



ISSN 2307–2539 (Print)  
ISSN 2712–8202 (Online)

# ТЕОРИЯ И ПРАКТИКА АРХЕОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ

---

THEORY AND PRACTICE  
OF ARCHAEOLOGICAL RESEARCH



2022 • Том 34, № 3

ISSN 2307-2539 (Print)  
ISSN 2712-8202 (Online)

Том 34 №3 • 2022

# ТЕОРИЯ И ПРАКТИКА АРХЕОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ



Барнаул

---

Издательство  
Алтайского государственного  
университета  
2022

**Главный редактор:**

А. А. Тишкин, д-р ист. наук, профессор (Россия)

**Редакционная коллегия:**

В.В. Горбунов (зам. главного редактора), д-р ист. наук, доцент (Россия);

А. Бейсенов, канд. ист. наук (Казахстан);

У. Бросседер, Ph.D. (Германия);

Т.Р. Гермес, Ph.D. (Германия);

Н.Н. Крадин, д-р ист. наук, профессор, чл.-корр. РАН (Россия);

А.И. Кривошапкин, д-р ист. наук, профессор, чл.-корр. РАН (Россия);

Н.Н. Серегин, д-р ист. наук (Россия);

М.Д. Фрачетти, Ph.D., профессор (США);

А.В. Харинский, д-р ист. наук, профессор (Россия);

Л. Чжан, Ph.D., профессор (Китай)

Д. Эрдэнэбаатар, канд. ист. наук, профессор (Монголия)

Д.В. Папин (отв. секретарь), канд. ист. наук (Россия);

Т.С. Паршикова (отв. секретарь), канд. ист. наук (Россия)

**Редакционный совет журнала:**

Ю.Ф. Кирюшин (председатель), д-р ист. наук, профессор (Россия);

Д.Д. Андерсон, Ph.D., профессор (Великобритания);

С.П. Грушин, д-р ист. наук, доцент (Россия);

А.П. Деревянко, д-р ист. наук, профессор, академик РАН (Россия);

И.В. Ковтун, д-р ист. наук (Россия);

Д.С. Коробов, д-р ист. наук, профессор (Россия);

А.Л. Кунгуров, канд. ист. наук, доцент (Россия);

Л.С. Марсадолов, д-р культурологии (Россия);

П. Линь, Ph.D., профессор (Китай);

А.В. Поляков, д-р ист. наук (Россия);

Д.Г. Савинов, д-р ист. наук, профессор (Россия);

А.Г. Ситдииков, д-р ист. наук, доцент (Россия);

С.С. Тур, канд. ист. наук (Россия);

Ц. Турбат, Ph.D., доцент (Монголия);

**Ю.С. Худяков** д-р ист. наук, профессор (Россия);

Т.А. Чикишева, д-р ист. наук (Россия);

М.В. Шуньков, д-р ист. наук, профессор, чл.-корр. РАН (Россия)

Журнал основан в 2005 г., с 2016 г. выходит 4 раза в год.

Учредителем издания является ФГБОУ ВО «Алтайский государственный университет».



Адрес издателя и редакции:  
656049, Алтайский край, Барнаул,  
пр-т Ленина, 61, каб. 211,  
телефон: 8 (3852) 291-256.  
E-mail: tishkin210@mail.ru

Утвержден к печати Объединенным научно-техническим советом АГУ.

Все права защищены. Ни одна из частей журнала либо издание в целом не могут быть перепечатаны без письменного разрешения авторов или издателя.

Печатное издание – журнал «Теория и практика археологических исследований»  
© Алтайский государственный университет, 2005–2022.

Зарегистрировано Федеральной службой по надзору в сфере связи, информационных технологий и массовых коммуникаций:  
серия ПИ № ФС77-80671  
от 07 апреля 2021 г.

ISSN 2307–2539 (Print)  
ISSN 2712–8202 (Online)

Vol. 34 (3) • 2022

# THEORY AND PRACTICE OF ARCHAEOLOGICAL RESEARCH



Barnaul

---

Publishing house  
of Altai State  
University  
2022

**Editor in Chief:**

A. A. Tishkin, Doctor of History, Professor (Russia)

**Editorial Staff:**

V.V. Gorbunov (Deputy Editor in Chief), Doctor of History, Associate Professor (Russia);

A. Beisenov, Candidate of History (Kazakhstan);

U. Brosseder, Ph.D. (Germany);

T.R. Hermes, Ph.D. (Germany);

N.N. Kradin, Doctor of History, Professor, Corresponding Member Russian Academy of Sciences (Russia);

A.I. Krivoshapkin, Doctor of History, Professor, Corresponding Member Russian Academy of Sciences (Russia);

N.N. Seregin, Doctor of History (Russia);

M.D. Frachetti, Ph.D., Professor (USA);

A.V. Kharinsky, Doctor of History, Professor (Russia);

L. Zhang, Ph.D., Professor (China);

D. Erdenebaatar, Candidate of History, Professor (Mongolia)

D.V. Papin (Assistant Editor), Candidate of History (Russia);

T.S. Parshikova (Assistant Editor) Candidate of History (Russia)

**Associate Editors:**

J.F. Kiryushin (Chairperson), Doctor of History, Professor (Russia);

D.D. Anderson, Ph.D., Professor (Great Britain);

S.P. Grushin, Doctor of History, Associate Professor (Russia);

A.P. Derevianko, Doctor of History, Professor, Academician of the Russian Academy of Sciences (Russia);

I.V. Kovtun, Doctor of History (Russia);

D.S. Korobov, Doctor of History, Professor (Russia);

A.L. Kungurov, Candidate of History, Associate Professor (Russia);

P. Ling, Ph.D., Professor (China);

L.S. Marsadolov, Doctor of Culturology (Russia);

A.V. Polyakov, Doctor of History (Russia);

D.G. Savinov, Doctor of History, Professor (Russia);

A.G. Sitdikov, Doctor of History, Associate Professor (Russia);

S.S. Tur, Candidate of History (Russia);

Ts. Turbat, Ph.D., Associate Professor (Mongolia);

T.A. Chikisheva, Doctor of History (Russia);

M.V. Shunkov, Doctor of History, Professor, Corresponding Member Russian Academy of Sciences (Russia);

J.S. Khudyakov, Doctor of History, Professor (Russia)

The journal was founded in 2005.

Since 2016 the journal has been published 4 times a year.

The founder of the journal is Altai State University.



The address of the publisher and the publishing house: office 211, Lenina av., 61, Barnaul, Altai region, 656049, Russia, tel.: (3852) 291-256.

E-mail: tishkin210@mail.ru

Approved for publication by the Joint Scientific and Technical Council of Altai State University

All rights reserved. No publication in whole or in part may be reproduced without the written permission of the authors or the publisher

Print Edition of the journal "The Theory and Practice of Archaeological Research"

© Altai State University, 2005–2022.

Registered by the Federal Service for Supervision in the Sphere of Communication, Information Technologies and Mass Communications:

PI series No.FS 77-80671

dated April 7, 2021

# CONTENT

---

## THEORETICAL AND METHODOLOGICAL ISSUES OF ARCHAEOLOGY

- Abolonkova I. V., Sayfulloev N. N., Zotkina L. V. Ancient Murals of the Shakhty Rock Shelter in the Light of Research Methods Development (Based on V. A. Ranov's Archive Materials and Modern Data).....*9
- Tabarev A. V., Popov A. N., Ereemeeva E. A. Technological Exploration and Ritual Use of Obsidian in Ancient Cultures of the Pacific ..*24

## RESULTS OF STUDYING OF MATERIALS OF ARCHAEOLOGICAL RESEARCH

- Miklashevich E. A. New Rock Art Site at the Riverside Cliffs in the Oglakhty Mountains (Khakasia) .....*39
- Tetenkin A. V. Late Upper Paleolithic of the Lower Vitim (Based on the Data of Kovrizhka-III–IV and Bol'shoi Yakor'-I Sites) .....*54
- Tikhonov S. S. Groups of Bone Arrowheads of the Elovka Settlement of the Late Bronze Period (Tomsk Region) .....*81

## USE OF NATURAL-SCIENTIFIC METHODS IN ARCHAEOLOGICAL RESEARCH

- Zimina O. Yu., Sizov O. S., Tsymbarovich P. R. Online Support for Comprehensive Archaeological and Geographical Surveys in the South of Western Siberia .....*88
- Rassadnikov A. Yu. Ethnozoology for Archaeology: Results of the Study of the Modern Livestock Breeding System in the Steppe Zone of the Southern Urals.....*112

## FOREIGN ARCHAEOLOGY

- Beisenov A. Z. Review of Preliminary Results of Archaeological Research in the Area of Mount Aiyrtas in 2022, Central Kazakhstan.....*131

---

*Dubova N. A., Filimonova T. G., Sataev R. M., Sataeva L. V., Kufterin V. V., Yamskov A. N.*  
Several Results of Bioarchaeological and Ethnoecological Investigations in Tajikistan ..... 148

*Ozheredova A. Yu., Ozheredov Yu. I.*  
Chinese Porcelain in Western Mongolia (the Qing Dynasty) .....164

*Samashev Z., Aitkali A.*  
Preliminary Results of the Research Into the Sites of the Xianbei Period in the  
Kazakh Altai.....176

*Erdenebaatar D., Ligang Zhou, Wanli Lan, Bin Liu, Mijiddorj E., Galbadrah B.*  
The Results of the Study of Gol Mod-2 Site by the Mongolian-Chinese Joint  
Archaeological Research Team .....194

### HISTORY OF ARCHAEOLOGICAL DISCOVERIES AND RESEARCH

*Ganenok V. Yu., Kitova L. Yu.*  
Tomsk Archaeological School in the Second Half of the 1970s — 1990s ..... 209

# СОДЕРЖАНИЕ

---

## ТЕОРЕТИЧЕСКИЕ И МЕТОДИЧЕСКИЕ ПРОБЛЕМЫ АРХЕОЛОГИИ

*Аболонкова И. В., Сайфулоев Н. Н., Зоткина Л. В.*

Древняя живопись грота Шахты в аспекте развития методики исследования  
(по архивным материалам В. А. Ранова и современным данным).....9

*Табарев А. В., Попов А. Н., Еремеева Е. А.*

Технология обработки и ритуальное использование обсидиана  
в древних культурах Пасифики.....24

## РЕЗУЛЬТАТЫ ИЗУЧЕНИЯ МАТЕРИАЛОВ АРХЕОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ

*Миклашевич Е. А.*

Новое местонахождение наскального искусства  
на береговых скалах Оглахты (Хакасия).....39

*Тетенькин А. В.*

Поздний верхний палеолит Нижнего Витима  
(по материалам стоянок Коврижка-III-IV и Большой Якорь-I).....54

*Тихонов С. С.*

Группы костяных наконечников стрел Еловского поселения периода поздней  
бронзы (Томская область).....81

## ИСПОЛЬЗОВАНИЕ ЕСТЕСТВЕННО-НАУЧНЫХ МЕТОДОВ В АРХЕОЛОГИЧЕСКИХ ИССЛЕДОВАНИЯХ

*Зимина О. Ю., Сизов О. С., Цымбарович П. Р.*

Веб-информационное обеспечение комплексных археолого-географических  
исследований на юге Западной Сибири .....88

*Рассадников А. Ю.*

Этнозоология для археологии: результаты исследования современной системы  
животноводства в степной зоне Южного Урала .....112



**ЗАРУБЕЖНАЯ АРХЕОЛОГИЯ**

*Бейсенов А. З.*

Обзор предварительных результатов археологических исследований  
в районе горы Айыртас в 2022 г., Центральный Казахстан..... 131

*Дубова Н. А., Филимонова Т. Г., Сатаев Р. М.,  
Сатаева Л. В., Куфтерин В. В., Ямсков А. Н.*

Некоторые результаты биоархеологических и этноэкологических исследований  
в Таджикистане..... 148

*Ожередова А. Ю., Ожередов Ю. И.*

Китайский фарфор в Монголии (династия Цин) .....164

*Самашев З., Айткали А.*

Предварительные итоги исследования памятников сяньбийского времени в  
Казахском Алтае .....176

*Эрдэнэбаатар Д., Лиганг Жоу, Ванли Лан, Бин Лиу, Мижиддорж Э., Галбадрах Б.*

Результаты исследования памятника Гол мод-2 монголо-китайской совместной  
археологической экспедицией .....194

**ИСТОРИЯ АРХЕОЛОГИЧЕСКИХ ОТКРЫТИЙ И ИССЛЕДОВАНИЙ**

*Ганенок В. Ю., Китова Л. Ю.*

Томская археологическая школа во второй половине 1970-х — 1990-х гг.....209

СПИСОК СОКРАЩЕНИЙ .....222

# THEORETICAL AND METHODOLOGICAL ISSUES OF ARCHAEOLOGY

---

Research Article / Научная статья

УДК 903.27(51)

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-01](https://doi.org/10.14258/tpai(2022)34(3).-01)

## ANCIENT MURALS OF THE SHAKHTY ROCK SHELTER IN THE LIGHT OF RESEARCH METHODS DEVELOPMENT (BASED ON V. A. RANOV'S ARCHIVE MATERIALS AND MODERN DATA)

*Irina V. Abolonkova*<sup>1\*</sup>, *Nuritdin N. Sayfulloev*<sup>2</sup>, *Lidia V. Zotkina*<sup>3</sup>

<sup>1</sup>"Tomskaya Pisanitsa" Museum-Reserve, Kemerovo, Russia;  
[abolonirina@mail.ru](mailto:abolonirina@mail.ru), <https://orcid.org/0000-0003-2033-7850>

<sup>2</sup>A. Donish Institute of History, Archaeology and Ethnography at the National Academy  
of Sciences of Tajikistan, Dushanbe, Tajikistan;  
[sayfulloev.nuritdin@gmail.ru](mailto:sayfulloev.nuritdin@gmail.ru), <https://orcid.org/0000-0001-8540-2145>

<sup>3</sup>Institute of Archaeology and Ethnography SB RAS, Novosibirsk, Russia;  
[lidiazotkina@gmail.com](mailto:lidiazotkina@gmail.com), <https://orcid.org/0000-0002-1912-3882>

\*Corresponding Author

**Abstract.** The article discusses the rock images of the Shakhty rock shelter. The authors' archival research in 2021 and 2022 revealed field diaries, photographs and colour photo slides of V. A. Ranov, who was the first to find the site, in the archive of A. Donish Institute of History, Archaeology and Ethnography of National Academy of Sciences of Tajikistan. The combination of evidence obtained from these sources, and a modern examination of panels with images, made it possible to shed light on the method of recording the murals of the rock shelter in 1958. The rerecording of these images in 2019 and DStretch colour filtering of the obtained photographs made it possible to refine the contours and details of some images that are important for the attribution and subsequent interpretation of individual images. The authors assume that murals of the Shakhty rock shelter were not all created at the same time, as suggested by V. A. Ranov, dating them from the Mesolithic — early Neolithic. The presence of paint of different shades, varying degree of preservation of the shelter murals, numerous palimpsests and refined details of the images on the rock give the grounds suggest different times of their creation. Based on the results of modern research, the images of the Shakhty rock shelter can be dated from the Mesolithic to the Bronze Age.

**Key words:** Eastern Pamirs, Shakhty rock shelter, rock art, painted images, rock art recording, DStretch, V. A. Ranov

**Acknowledgments:** the study is funded by RFBR project №20-09-00387 "Rock Art of the Eastern Pamirs: Chronology, Attribution, Context"

---

**For citation:** Abolonkova I. V., Sayfulloev N. N., Zotkina L. V. Ancient Murals of the Shakhty Rock Shelter in the Light of Research Methods Development (Based on V.A. Ranov's Archive Materials and Modern Data). *Teoriya i praktika arheologicheskikh issledovanij = Theory and Practice of Archaeological Research*. 2022;34(3):9–23. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-01](https://doi.org/10.14258/tpai(2022)34(3).-01)

---

## ДРЕВНЯЯ ЖИВОПИСЬ ГРОТА ШАХТЫ В АСПЕКТЕ РАЗВИТИЯ МЕТОДИКИ ИССЛЕДОВАНИЯ (ПО АРХИВНЫМ МАТЕРИАЛАМ В. А. РАНОВА И СОВРЕМЕННЫМ ДАННЫМ)

Ирина Васильевна Аболонкова<sup>1\*</sup>, Нуриддин Назурлоевич Сайфулоев<sup>2</sup>, Лидия Викторовна Зоткина<sup>3</sup>

<sup>1</sup>Музей-заповедник «Томская писаница», Кемерово, Россия;  
abolonirina@mail.ru, <https://orcid.org/0000-0003-2033-7850>

<sup>2</sup>Институт истории, археологии и этнографии им. А. Дониша Национальной академии наук Таджикистана, Душанбе, Таджикистан;  
sayfulloev.nuriddin@gmail.ru, <https://orcid.org/0000-0001-8540-2145>

<sup>3</sup>Институт археологии и этнографии СО РАН, Новосибирск, Россия;  
lidiazotkina@gmail.com, <https://orcid.org/0000-0002-1912-3882>

\*Автор, ответственный за переписку

**Резюме.** Статья посвящена наскальным изображениям грота Шахты. Благодаря архивным изысканиям, проведенным в 2021 и 2022 гг., в фондах Института истории, археологии и этнографии им. А. Дониша Национальной академии наук Республики Таджикистан были выявлены полевые дневники, фотографии и цветные фотослайды первооткрывателя этого памятника — В. А. Ранова. Совокупность информации, полученной из этих источников, и современное обследование панно с рисунками позволили пролить свет на методику фиксации наскальных изображений грота в 1958 г. Благодаря повторному документированию этих рисунков в 2019 г. и цветовой фильтрации полученных фотографий с помощью метода DStretch были уточнены контуры и детали некоторых изображений, важные для атрибуции и последующей интерпретации отдельных образов. Предполагается, что наскальные изображения грота Шахты не одновременны, как предполагал В. А. Ранов, относя их к периоду мезолита — раннего неолита. Наличие краски разных оттенков, разная сохранность рисунков грота, многочисленные палимпсесты и уточненные детали представленных на скале образов позволяют говорить о разном времени их создания. По результатам современных исследований наскальные изображения грота Шахты могут быть датированы в пределах от мезолита до эпохи бронзы.

**Ключевые слова:** Восточный Памир, грот Шахты, наскальное искусство, крашенные изображения, документирование наскальных изображений, DStretch, В. А. Ранов

**Благодарности:** работа выполнена при поддержке РФФИ, проект №20-09-00387 «Наскальная живопись Восточного Памира: хронология, атрибуция, контекст».

---

**Для цитирования:** Аболонкова И. В., Сайфулоев Н. Н., Зоткина Л. В. Древняя живопись грота Шахты в аспекте развития методики исследования (по архивным материалам В. А. Ранова и современным данным) // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 9–23. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-01](https://doi.org/10.14258/tpai(2022)34(3).-01)

---

### Introduction

Over the past decades, significant developments have been made in the methodology for recordings rock art sites. The expansion of the methods base is largely due to the advances in the technical tools used in dealing with rock art. The improvement in the technical equipment of researchers has affected the quality of field and laboratory work, and hence

the results of research itself, which sometimes leads to the opportunity to revise common ideas about a particular site. One of such cases is the modern research in the ancient murals of the Shakhty rock shelter, which has led to the identification of new details clarifying the set of images on the rock panel, the technological features of creating the images and their chronological boundaries. However, these data would not be complete without an analysis of the unpublished materials of V. A. Ranov kept in A. Donish Institute of History, Archaeology and Ethnography at the National Academy of Sciences of the Republic of Tajikistan. These include diaries, colour photo slides, photos and drawings of the researcher who was the first to uncover the rock images in the Shakhty rock shelter. The totality of these data reflects the high professionalism of the researcher, despite the specific and complex character of the site, the absence of materials that could be used copying painted images in the middle of the 20<sup>th</sup> century.

### **Study Object**

The ancient murals of the Shakhty rock shelter was found by the archaeological group of the Pamir expedition of the Academy of Sciences of the USSR under the leadership of V. A. Ranov in 1958 (Ranov, 1961). The rock shelter is located in the valley of the Kurteke-say River, 40 km southwest of the village of Murgab in Gorno-Badakhshan Autonomous Region. The absolute height of the site is about 4200 m above sea level. The rock shelter is composed of a huge limestone massif open to the east and aligned almost exactly to the cardinal points. It is dry, bright and well lit by the sun. The shelter is formed by two walls with a negative tilt which shape a small subtriangular cavity. The entrance is 7.5 meter wide, the rock shelter goes 6 meters deep, the ceiling height is 25–30 meters at least (Ranov, 2016, p. 45). The images are located on the southern wall of the rock shelter, which is inclined by about 45–50° and is composed of reddish field limestone. The images are located 1.6–2 m above the floor; they were made with red ocher paint, which has two tones — light ruddy and darker burgundy. According to V. A. Ranov, material for the paint could be taken from powdery deposits of ferruginous compounds in the cracks of the cave wall. Judging by the thickness of the lines, the murals could have been made with a finger (Ranov, 1958, p. 27–29, 35). Among the interpretable images, animal figures stand out: a wild boar; bear (or two boars); a large animal, possibly a Bovinae, and an anthropomorphic character, which Ranov supposes to be disguised as a bird (Fig. 1; Ranov, 1961, p. 71). The researcher combines these images into a single composition interpreting it as a hunting scene (Ranov, 2016, p. 45–47).

Directly below the plane with images. excavations were conducted in 1960, during which mainly stone artifacts were found. Their appearance allowed V.A. Ranov to attribute the cultural layer to the Mesolithic. Based on these materials, as well as on the images depicted on the wall, not typical for the high-mountainous regions of the Pamirs (wild boars, bears) together with their archaic style, the researcher attributes the images of the Shakhty rock shelter to the Mesolithic–Early Neolithic, although he notes that the Mesolithic finds in the rock shelter cannot be direct evidence of such an age of the images on its walls (Ranov, 1961, p. 81).

Research on the site was resumed only 60 years later using state-of-the-art capabilities (Zotkina, Abolonkova et al., 2022; Zotkina, Bobomulloev et al., 2022).

### **Methods**

During field work in the Shakhty rock shelter, the images were photographed using Nikon D750 camera equipped with Nikkor AF-S 60 mm f/2.8G ED Micro and Nikkor AF-S 105 mm f/2.8G IF-ED VR Micro lenses. Photographic recording was made at different scales (gener-

al view, macro-details) and at different lighting conditions (natural daylight and flash). Macro photography of images was used to record technological features, overlapping areas of different pigment colouring. To fix the maximum number of details, the authors shot panels with images in separate fragments with their subsequent merging to obtain a photo panorama several times larger than the original (Miklashevich, 2012, p. 167; Mukhareva and Tishkin, 2016, p. 94–96). In this case, merging was performed with Agisoft Metashape Pro software; an orthorectified image was later made based on the 3D model. This technique made it possible to identify in the laboratory conditions even almost obliterated areas with remains of the ancient pigment that are elusive to the eye. To enhance the contrast and refine the contours of some images the authors used DStretch — a method based on colour filtering of photographs of rock images, namely, on working with image channels of different colourspaces (Harman, 2015; Fig 1.-2).

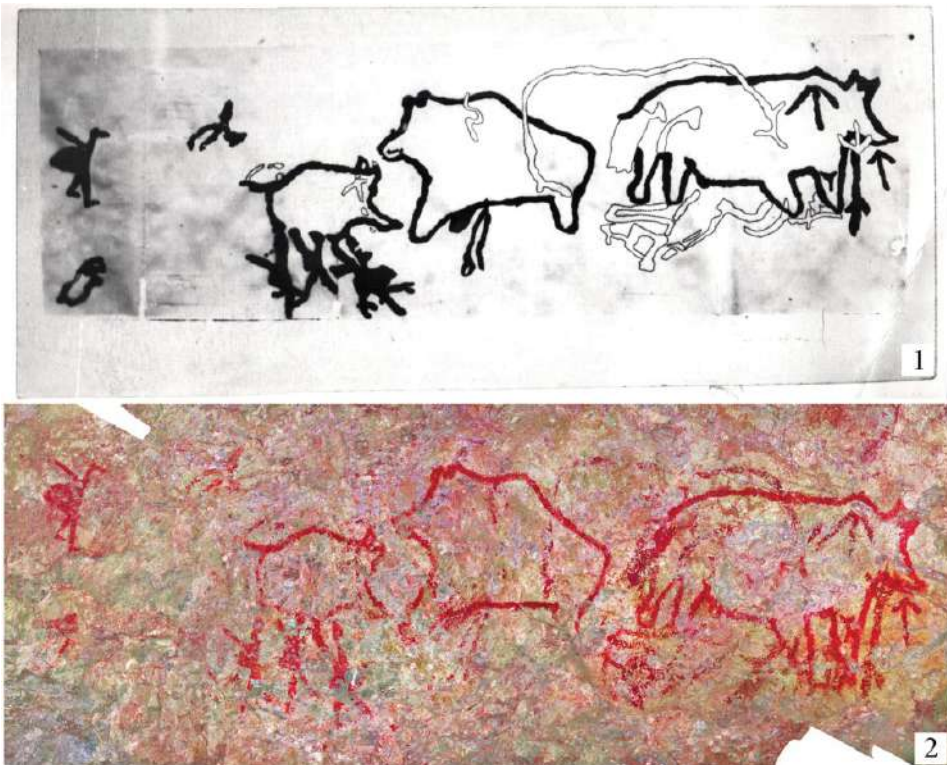


Fig. 1. Murals of the Shakhty rock shelter: 1 – Photo of recording the images of the Shakhty rock shelter (a photo from the archive of A. Donish Institute of History, Archaeology and Ethnography of the National Academy of Sciences of the Republic of Tajikistan); 2 – The result of DStretch processing a fragment of an orthophoto of a plane with images (based on a 3D model), 2020

Рис. 1. Наскальные изображения грота Шахты: 1 – фотография прорисовки изображений грота Шахты (фотография из фондов Института истории, археологии и этнографии им. А. Дониша Национальной Академии наук Республики Таджикистан); 2 – результат обработки фрагмента ортофотографии плоскости с рисунками (на основе трехмерной модели) при помощи DStretch, 2020 г.



Fig. 2. The process of video filming in the Shakhty rock shelter, 1958  
(a photo from the archive of A. Donish Institute of History, Archaeology and Ethnography  
of the National Academy of Sciences of the Republic of Tajikistan)

Рис. 2. Процесс видеосъемки в гроте Шахты, 1958 г.  
(фотография из фондов Института истории, археологии и этнографии им. А. Дониша  
Национальной академии наук Республики Таджикистан)

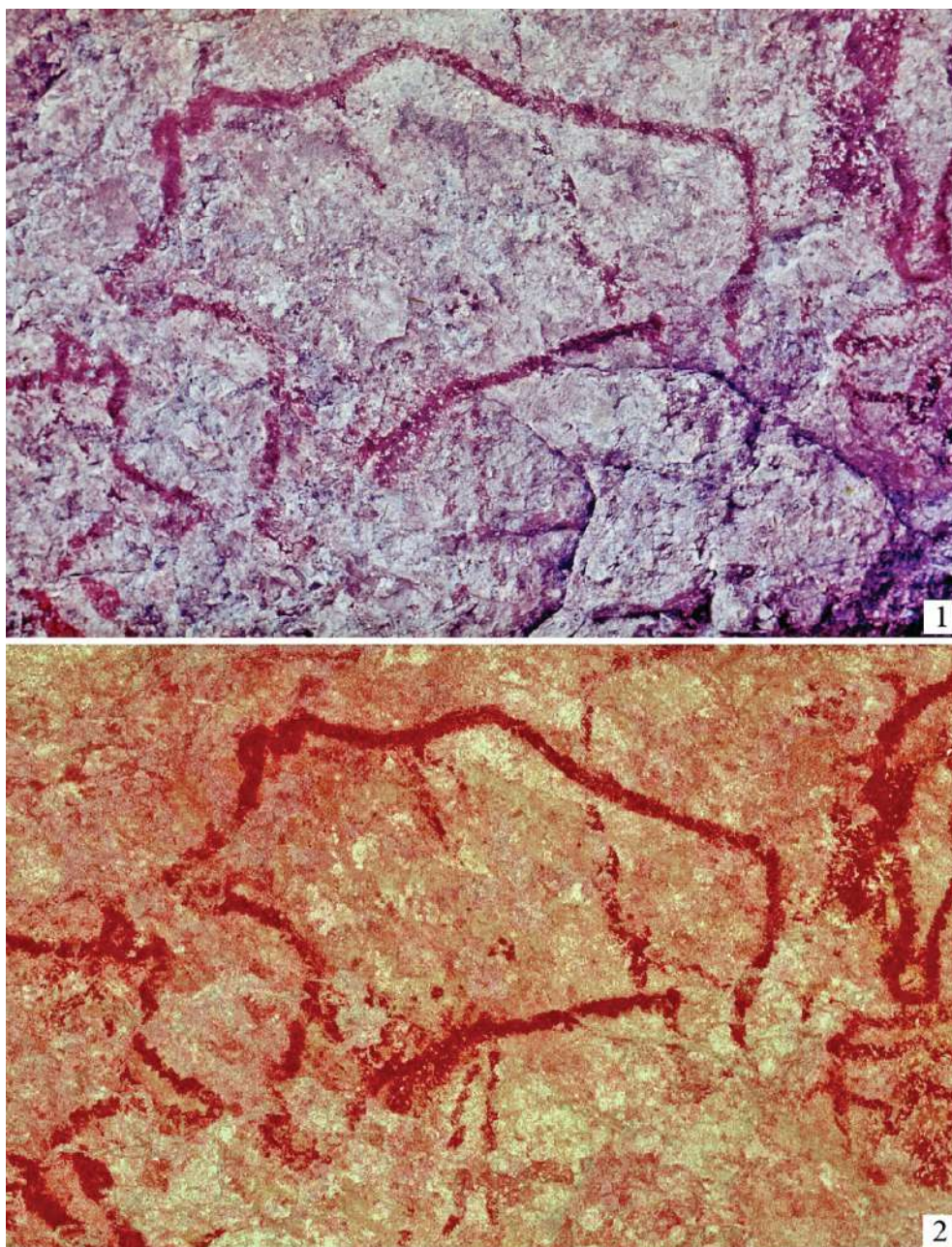


Fig. 3. Image of a boar: 1 – A photo of 1958 (a photoslide from the archive of A. Donish Institute of History, Archaeology and Ethnography of the National Academy of Sciences of the Republic of Tajikistan); 2 – The result of DStretch processing a 2019 photo

Рис. 3. Изображение кабана: 1 – фотоснимок 1958 г. (фотослайд из фондов Института истории, археологии и этнографии им. А. Дониша Национальной академии наук Республики Таджикистан); 2 – результат обработки фотографии 2019 г. при помощи DStretch

When interpreting zoomorphic images, given their ambiguity, the authors correlated them with evidence on the fauna and climatic conditions in the Eastern Pamirs in the Pleistocene and Holocene. Thus, based on the concepts of images in the Shakhty rock shelter, it is possible to make indirect judgment as to their age (Zotkina, Malikov et al., in press).

An analysis of the notes and sketches in the researcher's diary, as well as a thorough examination of the panels with images in the Shakhty rock shelter, made it possible to clarify methods of the murals recording used by V. A. Ranov.

### Results

When working in the archives of A. Donish Institute of History, Archaeology and Ethnography of the National Academy of Sciences of the Republic of Tajikistan in 2021–2022 the authors found numerous tracing-paper copies of rock images from various sites where V. A. Ranov had worked. However, copies of the images from the Shakhty rock shelter were not found. At the same time, previously unpublished photographs of the rock shelter were revealed including photos showing the process of video filming of the images (Fig. 2) and colour photo slides of the images (Fig. 3.-1), which made it possible to assess the degree of loss of the painted layer over the past 60 years (Abolonkova, Sayfulluev, Dedov, 2022). Another result of the archival search was the researcher's field diaries with descriptions and sketches of panels with images (1958), as well as a description of the excavation in the site (1960).

On the pages of the 1958 field diary, V. A. Ranov described in great detail not only the found images, but also the rock shelter itself, paying attention to the condition of the rock surface and the paint layer of images. V. A. Ranov pointed out that “the shelter wall, on which the images were made, is very uneven, rough and, as is common covered with limestone and layered, with individual “pimples” — spots rising 7, 5, 3 and 2 cm above the rock surface. There are hardly any smooth surfaces” (Ranov, 1958, pp. 29–30). According to the researcher, once the entire plane of the wall, starting almost from the entrance of the rock shelter and ending in the narrowest area along the southern wall, was covered with images. This is evidenced by numerous spots of paint and some individual lines or the remains of figures, which are not possible to interpret any longer (Ranov, 1958, pp. 29–30). For the convenience of describing images, V. A. Ranov conditionally divided the entire surface with images into three tiers. Only a few reddish spots remain from the images of the upper tier. The researcher admitted they could be nothing but streaks of the ferruginous substance found on the walls of the rock shelter. Spots of images from the collapsed lower tier are clearly visible 70 cm below the main “middle” tier, in which most of the images have survived (Ranov, 1958, p. 31). In total, Ranov identified seven main figures there: a human disguised as a bird, a wild boar; a bear (or two wild boars); a large Bovinae (?) and three badly preserved figures, one of which the researcher assumed to be a trap (?), and another was presumably interpreted as a bird hunted by the human. In addition, the researcher identified images of arrows, traps or other trapping devices used when hunting an animal (Ranov, 1958, pp. 32–33).

It is noteworthy that describing images V. A. Ranov immediately suggested his interpretation of what he saw, combining the figures into a single composition. For example, describing the anthropomorphic character, the researcher noted: “...this 4ure resembles Bushman drawings or drawings of primitive peoples in which characters disguised themselves as birds — this is a man hunting a bird and, perhaps, the image above him, very poorly preserved, depicts ex-



actly an object of hunting — a bird...” (Ibid.). Describing the lines under the image of the leftmost animal (Fig. 1) V. A. Ranov indicated “...crossing lines at the bottom of the image can be a palisade fence (a trap). On the other hand, the leftmost combination of lines may resemble a human figure” (Ranov, 1958, p. 36). It should be noted here that the latter guess was confirmed with modern graphic processing of photographs. Thus, without separating the description of images from their interpretation V. A. Ranov immediately combined what he saw into one composition, despite the varying degree of preservation of the figures, the presence of palimpsests and pigment of different shades, which he himself mentioned repeatedly. At the same time, V. A. Ranov paid quite a lot of attention to the description of paint of different shades indicating which figure was made in what colour, noting the thickness of the pigment layer, its features and the fact that the burgundy always overlaps the carmine (Ranov, 1958, p. 48). Pointing to a combination of arrows and traps, the presence of an anthropomorphic character disguised as a bird, V. A. Ranov suggested that the rock shelter wall depicted a hunting scene and dated it to the Mesolithic — early Neolithic.

Further, the authors will be comparing interpretations of the researcher with their own observations obtained in 2019 and later when working with photographic materials. On the copy of V. A. Ranov, under the image of the leftmost animal, there are spots of paint, which the researcher interpreted as trapping devices where the animal fell; other options suggested by V. A. Ranov include schematic representations of people or geometric signs characteristic of classical prehistoric art, such as “claviforms” (Ranov, 1961, pp. 73–74). Other interpretations cannot be excluded, however using the DStretch software the authors identified three anthropomorphic figures in this area (Fig. 1), which show a great resemblance to the leftmost character, whom V. A. Ranov interpreted as a hunter dressed as a bustard. These images partially overlap the legs of the animal, which may indicate a later addition to the existing composition of zoomorphic images.

Another example of overlapping patterns is recorded in the area of the croup of the rightmost zoomorphic image (presumably a wild boar (?)) — a bull, yak or bear as interpreted by V. A. Ranov (Fig. 1). During the DStretch processing of the photo, a darker spot that overlaps the tail of the animal was visualized as an anthropomorphic figure, which is invisible in a conventional visual inspection without colour filtering of the photograph and therefore had not been previously mentioned in the works of V. A. Ranov. The anthropomorphic character is depicted with hands raised up and fingers spread wide. Apparently, the image shows character’s headdress with a plume resembling a Saka hat. It suggests a much later age of this image compared with the lower possible chronological boundary of the creation of the first Shakhty images.

Observations regarding the state of preservation of the painted layer are also remarkable. In some areas where pigments of different shades intersect, there is a pronounced difference in the degree of their preservation. When it does not refer to rock plane sections located far enough from each other but to the same area of the wall, difference in the preservation of pigment can be explained either by different paint recipes or by a difference in the time of the paint application.

Thus, at the moment it can be said with certainty that the composition depicting the hunting scene from the Shakhty rock shelter was not created on a single occasion, and the sequence of making the images of each stage requires special study.

## Discussion

A rather detailed description of the Shakhty rock shelter, as well as a nuanced analysis of the images themselves accompanied with very accurate, albeit schematic sketches of individual images, made by V. A. Ranov in his diary are of great interest for modern research.

The first acquaintance with these materials once again proves the relevance of tracing/redrawing images when recording rock art. This activity gives a researcher a better opportunity to better observe the pictorial surface, literally follow the hand of the image creator, trying not to miss a single important detail and concentrating on the way each image was made, on the location of the indentations, the engraved line or even the paint layer. However, in 1958, when the Shakhty rock shelter was found, transparent materials for tracing images simply did not exist. The researcher's toolkit included only tracing paper widely used at that time for recording mostly relief rock images and a pencil for making sketches on the diary page.

It should be noted that the sketches have been used from the very beginning of studying rock art sites. As any other method, sketching has both its undeniable advantages, primarily associated with training the professional "look", and disadvantages stemming from the subjective perception of often peculiar images on the rocks, as well as with the possible inaccuracy of the researcher's hand in the process of sketching. There is evidence of the use of a camera obscura in making sketches for more accurate recording of the Yenisei petroglyphs by L. F. Titov as early as in the late 19<sup>th</sup> century (Spassky, 1857, p. 145). At the beginning of the 20<sup>th</sup> century A. V. Adrianov noted the insufficient accuracy of this recording method and looked for ways to improve it. For example, in order to preserve the "true dimensions" of petroglyphs, he sketched images "cell by cell" on paper lined with 1×1 and 2×2 squares (Miklashevich, Ozheredov, 2008, p. 158). The sketches are still relevant for keeping field diaries.

Tracing paper, widely used as a recording material in the middle of the 20<sup>th</sup> century, also had a number of weaknesses. In order for the image to be better seen in the process of recording it on tracing paper, it was often oiled, and the image on the rock was first outlined with chalk. After that, drawing on tracing paper was performed.

We have found no traces of chalk on the surface of the images neither during studying previous records (descriptions or photographs), nor during our visual examination of the rock surface of the Shakhty shelter. However, upon careful observation, a barely perceptible grid (!) approximately 10×10 cm made with graphite was found on the rock (Fig. 4, 5). Those lines led us to the idea of a possible redrawing of the rock shelter images guided by squares of this grid. Obviously, given the poor preservation and vagueness of the painted lines in the drawings, as well as the peculiarities of the tracing paper, the previous researcher might reject the idea of using it to make a contact recording.

During our private conversation with E. A. Miklashevich, she recalled that before the emergence of various technical means of scale copying, there was a method of redrawing "in cells"<sup>1</sup>. A grid was lined over the image to be recorded, and then it was redrawn cell by cell. Even if some inaccuracies occurred within individual cells, the general proportions of the image were still maintained and the resulting recorded image was more accurate than if sketched by sight. After

---

<sup>1</sup> We take the opportunity to express our deepest gratitude to Dr. Miklashevich for the detailed description of this tracing method.

that, the light table was used to transfer the contours of the drawing from the sheet lined with cells, then the resulting image was outlined with ink and photographed. It is probable that a photograph the authors found among V. A. Ranov's materials in the archives of the Institute (Fig. 1.-1) shows exactly such type of paper with the outlines of the Shakhty images outlined with ink.

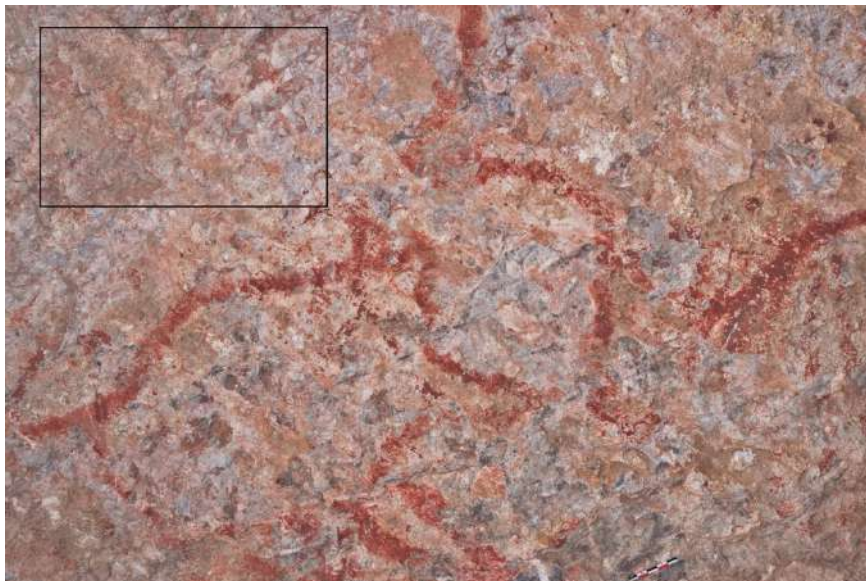


Fig. 4. Traces of a grid made with pencil on the surface with images in the Shakhty rock shelter.  
General view of the surface area with the lining

Рис. 4. Следы карандашной разлиновки сеткой скальной поверхности с изображениями грота Шахты. Общий вид участка поверхности с разлиновкой

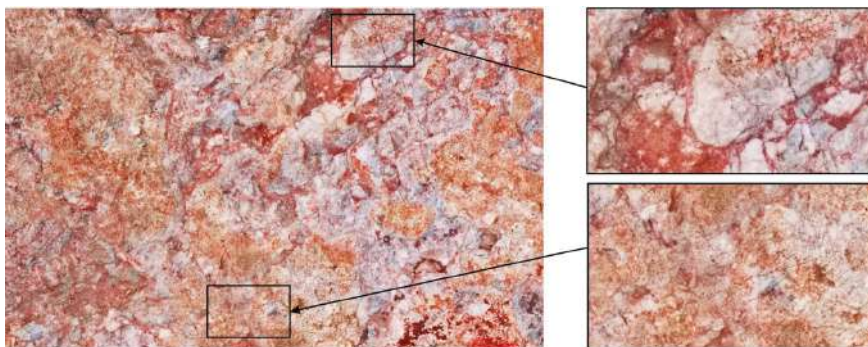


Fig. 5. Traces of a grid made with pencil on the surface with images in the Shakhty rock shelter.  
Photo of a fragment of the site with increased contrast. Arrows indicate traces of the pencil lining

Рис. 5. Следы карандашной разлиновки сеткой скальной поверхности с изображениями грота Шахты. Фотография фрагмента участка с увеличением контраста. Стрелками обозначены следы карандашной разлиновки

It is evident that a pencil lining right on the rock surface was needed to transfer the Shakhty rock paintings onto a sheet with smaller cells. Under the conditions of 1958, this technique seems to be quite suitable for the most complete recording of the rock shelter art. It is possible that the recoding, which was then widely replicated in many publications, had been obtained precisely in such a non-standard way for rock art studies. It is noteworthy that while working in the funds of the Institute, the authors found a tracing-paper copy of the famous plane with chariots from the Akjilga site, also lined with a pencil grid. It was this find that prompted the authors to think about the possible use of the described technique to make drawings of the Shakhty murals.

Obviously, it was the redrawing that allowed V. A. Ranov to accurately convey the poorly preserved painted images of the Shakhty rock shelter. It is not known whether the researcher did the redrawing himself or it was done by one of the members of his expedition (it used to be a common practice to invite professional artists in expeditions). However, detailed descriptions of the rock shelter murals reflected in the researcher's diary testify to a long and attentive examination into the surface with images. Such greatest degree of concentration on the images is achieved in creating a drawing or, in this case, redrawing from the original image.

Rerecording of the images in the Shakhty rock shelter in 2019–2020, including the use of colour filtering of photographic images with DStretch software, made it possible to identify poorly preserved images described above and allowed for their subsequent chronological attribution.

A few more remarkable details were recorded related to the content of the images and the peculiarities of their expression. For example, the ears of the central zoomorphic figure were depicted in two ways — both with a pointed triangle and with a rounded line (Fig. 3). This may indicate either an error, immediately corrected by the artist, as V. A. Ranov suggested (Ranov, 1958, p. 40), or a later alteration aimed at changing the concept of the image deliberately. Both of these options are possible. The same image includes such a detail as clearly traced fang, which is important for interpretation. V. A. Ranov also drew attention to it, additionally the researcher focused on the line of the mouth in this image (Ranov, 1958, p. 40; Fig. 6). It is significant that this image has morphological features and proportions typical of both a wild boar and a bear. The other two zoomorphic images located to the right and left of the above drawing demonstrate only features of the wild boar.

Information about the Pleistocene and Holocene fauna of the region in question is not very rich, nevertheless, it is known that bones of the bear were found at the Oshkhon site. In addition, the image of a saiga deserves special attention in the faunal collection of that site. The animal was a typical representative of the tundra-steppe Pleistocene fauna, perfectly adapted to arid plains with a sharply continental climate (Sokolov and Zhirnov, 1998). Its habitat in the Pleistocene was much wider than now. Judging by the materials from the Oshkhon site, the saiga inhabited the territory of the Eastern Pamirs in the late Pleistocene — early Holocene. Its presence in the region, as well as the geomorphological data of the area under consideration, indicate rather severe climatic conditions during this period, which are not suitable for the wild boar. Thus, it can be assumed that the main part of the images of the Shakhty rock shelter belong to the Holocene, perhaps with the exception of the central figure, which could originally be conceived by the artist as an image of a bear (Zotkina, Malikov et al., in press).

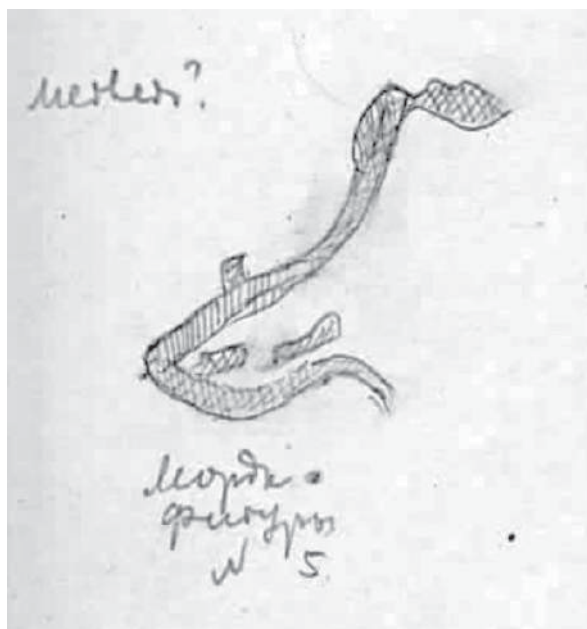


Fig. 6. Sketch of the head of a wild boar from the field diary of V.A. Ranov, 1958

Рис. 6. Зарисовка головы кабана из полевого дневника В.А. Ранова, 1958 г.

### Conclusion

The change in research approaches and the improvement of working methods enable researchers to obtain more information at a qualitatively different level, however, the case of recording the murals in the Shakhty rock shelter once again proves that even a seemingly archaic method can be very effective if used by an expert with an attentive and thoughtful approach. Given the complex nature of the site, the technique of creation and the degree of preservation of the Shakhty images, V. A. Ranov conducted his activities of 1958 at the highest methodological level. From today's perspective, the possible weaknesses of his work include the pencil lining directly over the image surface, however, the authors are well aware that it was necessary for the researcher to capture the images as accurately as possible. As for the semantic and chronological interpretation of the rock shelter images, taking into account the new details and analogies to these images revealed recently, his assumptions should be reconsidered. It seems that the interpretation of the images in the process of their description led the researcher to a premature conclusion about the synchronism of all images of the rock shelter, despite a number of circumstances that the researcher himself noted (varying degree of preservation of the images, different paints and others).

The studies of 2019–2022 discussed above allow the authors to conclude that the murals of the Shakhty rock shelter were not created simultaneously. The images can be dated within a fairly long period — from the Mesolithic, the time of the Eastern Pamirs settlement and the age of the cultural layer studied by V. A. Ranov immediately under the plane with images, to the Bronze Age.

## REFERENCES

Abolonkova I. V., Sayfulloev N. N., Dedov I. E. State of Preservation of the Shakhty Rock Art Site and the Possibility of its Conservation. *Arheologiya, etnografiya i antropologiya Evrazii = Archaeology, Ethnology and Anthropology of Eurasia*. 2022 (in print) (*In Russ.*)

Zotkina L. V., Abolonkova I. V., Alisher kyzy S., Sayfulloev N. N. Eastern Pamir Rock Art: Analogies and Concepts about the Age of these Images. *Stratum Plus*. 2022;2:203–218. (*In Russ.*)

Zotkina L. V., Bobomulloev B. S., Solodeynikov A. K., Abolonkova I. V., Shnayder S. V., Sayfulloev N. N. New Data on the Rock Paintings of Eastern Pamir. *Vestnik Novosibirskogo gosudarstvennogo universiteta = Bulletin of Novosibirsk State University*. 2022;21(3): 60–72. (*In Russ.*)

Miklashevich E. A. Engraving Technique in Rock Art of the Scythian Period. In: *Depictive and Technological Traditions in the Art of North and Central Asia*. Moscow; Kemerovo : Kuzbassvuzizdat, 2012. Pp. 157–202. (Proceedings of SAPAR. Issue IX) (*In Russ.*)

Miklashevich E. A., Ozheredov Y. I. Photographs of Siberian Rock Art Sites in the Legacy of A. V. Adrianov. In: *The Path of Millennia: Collected Papers to the Anniversary of Marianna Artashirovna Devlet*. Kemerovo : Kuzbassvuzizdat, 2008. Pp. 156–188 (Proceedings of SAPAR. Issue IV) (*In Russ.*)

Mukhareva A. N., Tishkin A. A. Petroglyphs of the Urkosh-XV Site in the Central Altai (recording petroglyphs made by abrasion). In: *Archaeology of Southern Siberia. To the 40<sup>th</sup> anniversary of the Department of Archaeology of KemGU*. Kemerovo : KGU, 2016. Issue 27. Pp. 90–100. (*In Russ.*)

Ranov V. A. Report on the Activities of the Pamir Detachment in the Shakhty Rock Shelter in 1958. In: *Archive of A. Donish Institute of History, Archaeology and Ethnography of the National Academy of Sciences of the Republic of Tajikistan*. (*In Russ.*)

Ranov V. A. Stone Age Paintings in the Shakhty Rock Shelter. *Sovetskaya etnografiya = Soviet Ethnography*. 1961;6:70–81. (*In Russ.*)

Ranov V. A. Running on the Rocks: Rock Paintings of the Pamirs. Dushanbe : Donish, 2016. 412 p. (*In Russ.*)

Sokolov V. E., Zhirnov L. V. Saiga. Phylogeny, Taxonomy, Ecology, Protection and Use. Moscow : Rossel'hozakademiya, 1998. 358 p. (*In Russ.*)

Spassky G. I. The Most Remarkable Sites of Siberian Antiquities and the Similarity of Some of Them with the Great Russian Ones. In: *Notes of the Imperial Russian Geographical Society*. Book XII. St. Petersburg, 1857. 181 p. (*In Russ.*)

Harman J. Using DStretch for Rock Art Recording. *International Newsletter on Rock Art*. 2015(72):24–30.

Zotkina L. V., Malikov D. G., Shnaider S. V., Sayfulloyev N. N., Kolobova K. A. Boar or Bear? Rock Art of the Shakhty Rock Shelter (Eastern Pamir). *ARA*. In print.

## СПИСОК ИСТОЧНИКОВ

Аболонкова И. В., Сайфулоев Н. Н., Дедов И. Е. Состояние сохранности памятника наскального искусства Шахты и возможности его консервации // Археология, этнография и антропология Евразии. 2022 (в печати).

Зоткина Л. В., Аболонкова И. В., Алишер кызы С., Сайфуллоев Н. Н. Наскальное искусство Восточного Памира: аналогии и концепции о возрасте рисунков // *Stratum Plus*. 2022а. №2. С. 203–218.

Зоткина Л. В., Бобомуллоев Б. С., Солодейников А. К., Аболонкова И. В., Шнайдер С. В., Сайфуллоев Н. Н. Новые данные о наскальном искусстве Восточного Памира // *Вестник Новосибирского государственного университета*. 2022. Т. 21(3). С. 60–72.

Миклашевич Е. А. Техника гравировки в наскальном искусстве скифского времени // *Изобразительные и технологические традиции в искусстве Северной и Центральной Азии*. М.; Кемерово : Кузбассвуиздат, 2012. С. 157–202 (Труды САИПИ. Вып. IX).

Миклашевич Е. А., Ожередов Ю. И. Фотографии сибирских писаниц в наследии А. В. Адрианова // *Тропюю тысячелетий: сб. науч. трудов, посвященный юбилею Марианны Арташировны Дэвлет*. Кемерово : Кузбассвуиздат, 2008. С. 156–188 (Труды САИПИ. Вып. IV).

Мухарева А. Н., Тишкин А. А. Петроглифы местонахождения Уркош-ХV в Центральном Алтае (о документировании наскальных изображений, выполненных в технике шлифовки) // *Археология Южной Сибири. К 40-летию кафедры археологии КемГУ*. Кемерово : КГУ, 2016. Вып. 27. С. 90–100.

Ранов В. А. Отчет о работах Памирского отряда в 1958 г. в гроте Шахты // *Фонды Института истории, археологии и этнографии им. А. Дониша Национальной Академии наук Республики Таджикистан*.

Ранов В. А. Рисунки каменного века в гроте Шахты // *Советская этнография*. 1961. Вып. 6. С. 70–81.

Ранов В. А. Бегущие по скалам: наскальные рисунки Памира. Душанбе : Дониш, 2016. 412 с.

Соколов В. Е., Жирнов Л. В. Сайгак. Филогения, систематика, экология, охрана и использование. М. : Россельхозакадемия, 1998. 358 с.

Спаский Г. И. О достопримечательнейших памятниках сибирских древностей и о сходстве некоторых из них с великорусскими // *Записки Императорского Русского Географического Общества*. Кн. XII. СПб., 1857. 181 с.

Harman J. Using DStretch for Rock Art Recording. *International Newsletter on Rock Art*. 2015(72):24–30.

Zotkina L. V., Malikov D. G., Shnaider S. V., Sayfulloyev N. N., Kolobova K. A. Boar or Bear? Rock Art of the Shakhty Rock Shelter (Eastern Pamir). *ARA*. In print.

---

#### CONTRIBUTION OF THE AUTHORS / ВКЛАД АВТОРОВ

---

I. V. Abolonkova: idea, archival research, material processing, writing sections of the article.  
Аболонкова И. В.: идея, проведение архивных изысканий, обработка материала, написание разделов статьи.

N. N. Sayfulloyev: collection of material, preparation of illustrations.

Сайфуллоев Н. Н.: сбор материала, подготовка иллюстраций.

L. V. Zotkina: field research, archival research, material processing, writing sections of the article, scientific editing.

Зоткина Л. В.: проведение полевых исследований, проведение архивных изысканий, обработка материала, написание разделов статьи, научное редактирование.

There is no conflict of interest / Конфликт интересов отсутствует.

---

#### INFORMATION ABOUT THE AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ

---

**Irina Vasilyevna Abolonkova**, Candidate of Historical Sciences, Head of the Research and Exposition Department of Kuzbass Museum-Reserve “Tomskaya Pisanitsa”, Kemerovo, Russia.

**Аболонкова Ирина Васильевна**, кандидат исторических наук, заведующий научно-экспозиционным отделом музея-заповедника «Томская Писаница», Кемерово, Россия.

**Nuritdin Nazurloyevich Sayfulloev**, Candidate of Historical Sciences, Head of the Archaeology Department of A. Donish Institute of History, Archaeology and Ethnography of the National Academy of Sciences the Republic of Tajikistan. Dushanbe, Tajikistan.

**Сайфулоев Нуритдин Назурлоевич**, кандидат исторических наук, заведующий отделом археологии Института истории, археологии и этнографии им. А. Дониша Национальной академии наук Республики Таджикистан, Душанбе, Таджикистан.

**Lidia Viktorovna Zotkina**, Candidate of Historical Sciences, Senior Researcher of Institute of Archaeology and Ethnography, Novosibirsk, Russia.

**Зоткина Лидия Викторовна**, кандидат исторических наук, старший научный сотрудник Института археологии и этнографии Сибирского отделения Российской академии наук, Новосибирск, Россия.

*The article was submitted 11.08.2022;*

*approved after reviewing 22.08.2022;*

*accepted for publication 31.08.2022.*

*Статья поступила в редакцию 11.08.2022;*

*одобрена после рецензирования 22.08.2022;*

*принята к публикации 31.08.2022.*



Research Article / Научная статья

УДК 903.01/.09

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-02](https://doi.org/10.14258/tpai(2022)34(3).-02)

## TECHNOLOGICAL EXPLORATION AND RITUAL USE OF OBSIDIAN IN ANCIENT CULTURES OF THE PACIFIC

**Andrey V. Tabarev<sup>1\*</sup>, Alexander N. Popov<sup>2</sup>, Ekaterina A. Ereemeeva<sup>3</sup>**

<sup>1</sup>*Institute of Archaeology and Ethnography,  
Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia;  
olmec@yandex.ru, <https://orcid.org/0000-0002-6249-8057>;*

<sup>2</sup>*Far Eastern Federal University, Vladivostok, Russia;  
poparchaeo@mail.ru, <https://orcid.org/0000-0002-1423-8410>;*

<sup>3</sup>*Novosibirsk State University, Novosibirsk, Russia;  
e.eremeeva@g.nsu.ru, <https://orcid.org/0000-0002-0460-1108>*

*\*Corresponding author*

**Abstract.** The article examines a range of directions and current stage of obsidian studies within the Pacific basin such as (1) geochemistry, identification of volcanic glass sources used in ancient cultures; (2) technology, obsidian exploration methods, their evolution, as well as experiments, and (3) cultural context, the use of obsidian in ritual practice, in the format of prestigious technologies, and in decorative art. While the geochemical studies have reached significant progress within the Pacific basin two other directions obviously require further development. Experimental works, conducted in 2020–2021 in Primorye, allow making useful observations both about the peculiarities of the local raw material base and about the behavioral side of the knapping process (such as the process of teaching and learning of knappers' competencies). In turn, the study of cultural meaning of obsidian includes not only the interpretation of the archaeological artifacts of high quality from the burials and caches (ritual, prestige, nonutilitarian), but also addressing to the ownership of the raw material sources, trade/exchange mechanism, and the status of the highly skillful knappers in ancient and traditional societies.

**Key words:** Pacific, Paleolithic, Neolithic, obsidian, exploration, prestige technologies, experiments, behavior

**Acknowledgments:** prepared in frames of the project (FWZG-2022-0004).

**For citation:** Tabarev A. V., Popov A. N., Ereemeeva E. A. Technological Exploration and Ritual Use of Obsidian in Ancient Cultures of the Pacific. *Teoriya i praktika arheologicheskikh issledovaniy = Theory and Practice of Archaeological Research*. 2022;34(3):24–38. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-02](https://doi.org/10.14258/tpai(2022)34(3).-02)

## ТЕХНОЛОГИЯ ОБРАБОТКИ И РИТУАЛЬНОЕ ИСПОЛЬЗОВАНИЕ ОБСИДИАНА В ДРЕВНИХ КУЛЬТУРАХ ПАСИФИКИ

Андрей Владимирович Табарев<sup>1\*</sup>, Александр Николаевич Попов<sup>2</sup>,  
Екатерина Андреевна Еремеева<sup>3</sup>

<sup>1</sup>Институт археологии и этнографии СО РАН, Новосибирск, Россия;  
olmes@yandex.ru, <https://orcid.org/0000-0002-6249-8057>;

<sup>2</sup>Дальневосточный федеральный университет, Владивосток, Россия;  
porarchaeo@mail.ru, <https://orcid.org/0000-0002-1423-8410>;

<sup>3</sup>Новосибирский государственный университет, Новосибирск, Россия;  
e.eremeeva@g.nsu.ru, <https://orcid.org/0000-0002-0460-1108>

\*Автор, ответственный за переписку

**Резюме.** В статье рассматриваются основные направления изучения обсидиана в тихоокеанском бассейне, включая (1) геохимическое, нацеленное на идентификацию источников вулканического стекла, использовавшегося в древних культурах; (2) технологическое, связанное с анализом методов обработки обсидиана, их эволюцией, а также экспериментами, и (3) культурный контекст, использование обсидиана в ритуальной практике, в формате престижных технологий и в декоративном искусстве. В то время как в геохимическом направлении достигнут серьезный прогресс, два других направления требуют дальнейшей разработки. Серия экспериментальных работ, проведенных в Приморье в 2020–2021 гг., позволила сделать весьма полезные наблюдения как по поводу особенностей местной сырьевой базы, так и по поводу поведенческой стороны процесса обработки обсидиана мастером и учениками (таких как обучение и наработка компетенций). В свою очередь, изучение особой роли обсидиана в культуре предполагает не только интерпретацию артефактов исключительного качества из кладов или погребений (ритуальная, престижная, неутилитарная), но и обращение к таким сюжетам, как контроль над источниками сырья, механизмы торговли/обмена, а также особый статус особо искусных мастеров по обработке камня в древних и традиционных обществах.

**Ключевые слова:** Пасифика, палеолит, неолит, обсидиан, обработка, престижные технологии, эксперимент, поведение

**Благодарности:** выполнено в рамках госзадания, проект FWZG-2022-0004.

**Для цитирования:** Табарев А. В., Попов А. Н., Еремеева Е. А. Технология обработки и ритуальное использование обсидиана в древних культурах Пасифики // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 24–38. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-02](https://doi.org/10.14258/tpai(2022)34(3).-02)

### Introduction

The Pacific basin is characterized by increased volcanic activity and widespread magmatic effusive materials. These include obsidian (volcanic glass), which is formed during rapid cooling of lava. The water content in obsidian is not more than 1%, which determines its uniformity and, accordingly, the possibility of artificial use — in the process of percussion and retouching, as well as polishing. In fact, all ancient and traditional cultures of the Pacific, since the time of the initial settlement, have used obsidian to one degree or another in tool and ritual activities, in the manufacture of jewelry, and in trade and exchange operations.

All these processes are known for the Russian Far East and adjacent territories of Korea, China, and Japan. As for the Russian part the use of obsidian is traced from the Final Pleistocene (15–14,000 BP) and during Early and mid-Holocene periods (10–5, 500 BP) (Popov, Tabarev, 2008, 2017; Popov, Tabarev, Mikishin, 2014; Tabarev, 2014).

Within the framework of Pacific archaeology, the study of obsidian can be divided into three interrelated directions:

- geochemistry, identification of volcanic glass sources used in ancient cultures, tracking the directions and distances of obsidian movement in different epochs — modern methods of analysis allow obtaining data based on minimal samples. A separate place in this direction is occupied by methods of dating artifacts according to the degree of hydration;
- technology, obsidian exploration methods, their evolution, as well as experimental studies that allow reconstructing the features of blade, microblade, flake and bifacial techniques, as well as various behavioral aspects of the operation of this type of raw material — in this case, the characteristics of raw materials (nodule size, quality) are extremely important;
- cultural context, the use of obsidian in ritual practice, in the format of prestigious technologies, symbolism and mythological meaning of volcanic glass of different color and texture.

On the territory of the Russian Far East, the systematic studies of obsidian started in the 1990<sup>th</sup> (Glascock et al., 1996; Kuzmin et al., 1999; Shackley et al., 1996). To date, there are real progress in geochemistry and technology of volcanic glasses used during the Stone and Paleometal periods in Primorye, the Amur Region, Sakhalin, Kamchatka, Chukotka, as well as in adjacent territories of the Japanese Archipelago and the Korean Peninsula, the bibliography includes several dozen works (articles, monographs, reports) in Russian and foreign languages (for example, Gillam, Tabarev 2004; Kuzmin, 2005, 2012; Kuzmin, Glascock, Sato, 2002; Kuzmin et al., 2021).

Recently, both Russian and foreign experts (Freund, 2013; Kuzmin, Oppenheimer, Renfrew, 2020) have been evaluating the achieved results of obsidian studies and determining the prospects for further research. It should be noted that this mainly concerns the first of the above-mentioned directions — it is about expanding the database and developing geochemical methods.

In turn, it seems to us extremely important to determine the perspective for studying the technology of processing volcanic glass, experimental research, and the role of obsidian in the cultural context (ritual, art, contacts and exchange). In Russian archaeological literature this aspect has only been outlined so far and, to a large extent, is based mostly on the materials from foreign territories.

#### **Experiments and Some Observation on the Knappers' Behavior**

The technological/experimental direction involves a detailed study of the entire technological sequence (*Chaîne opératoire*) of the relationship between man and raw materials — from the search and sampling of material at the outcrops to the production of tools and their disposal during economic activity:

- search and selection of material, its preliminary testing;
- transportation (transfer) from the sources to the camps or living areas;

- selection of tools (hammerstones, abraders, pressure flakers etc.);
- blanks production (blades, microblades, flakes) within the framework of various percussion systems and techniques (Tabarev, 2012);
- manufacture of tools (edge and fascial retouching, burination, grinding, etc.);
- their rejuvenation and final disposal in the course of economic activity.



Fig. 1. Experiments with obsidian: 1 – tested obsidian pebble, Ilystaya River, Primorye; 2 – instrumental set for experiments

Рис. 1. Эксперименты с обсидианом: 1 – тестированная обсидиановая галька, р. Илистая, Приморье; 2 – инструменты для экспериментов



Fig. 2. Experiments with obsidian: 1 – bi-polar percussion with the anvil and hammerstones; 2 – results of bi-polar percussion

Рис. 2. Эксперименты с обсидианом: 1 – биполярное расщепление с наковальней и отбойником; 2 – продукты биполярного расщепления

As an example, let us consider an interesting experience of experimental workshop for exploration of obsidian on the base of the Steklanukha archaeological project in Primorye in 2020–2021.

The natural outcrops of obsidian are found on the Shkotovsky Plateau in the south of Primorye. From volcanic glass there are deposits of pillow lavas and their individual fragments formed about 12–22 million years ago. When destroyed, lava beds give many fragments that

are carried by water and settle in river sediments, forming secondary sources (from rolled pebbles), which people have been guided by since the end of the Paleolithic (15–13, 000 BP). In the described experiment, the upstream of the Ilystaya River was chosen for searching of raw material (Fig. 1.-1).

The next stage was the preparation of working tools from antler and stone — hammerstones and anvils, which were assembled on nearby pebble river banks, taking into account the optimal size, configuration and weight. The percussion of obsidian pebbles was carried out in the format of two techniques: by bipolar splitting (hammerstone and anvil) and direct impact percussion using a hammerstone. Further processing of the obtained blanks was performed by pressure (edge and fascial) retouching, as well as burning with the use of pressure flakers armed with antler or copper tips (Fig. 1.-2).

The type of raw material — obsidian pebbles (3–10 cm) — predestined the leading technique — bipolar reduction (Fig. 2). This technique is well-known in archaeological contexts not only within the Pacific but in global scale and was studied in details including the experimental format (Ebert et al., 2015; LeBlanc, 1992; Shott, 1999).

The participants of the experiment were divided into three groups — (1) an experienced knapper who conducted introductory instruction and training in the format of a masterclass; (2) students and schoolchildren without experience, and (3), during the second year of the experiments, senior students of the Novosibirsk State University and the Far Eastern Federal University, who were familiar with the basics of making obsidian tools and have the opportunity to work independently (Fig. 3.-1). In addition to experience, other factors influenced the quality and speed of mastering skills — body size, strength hands and fingers, right or left preference of the leading hand (considering the fact that the instructor was right-handed), predisposition, attention to detail, concentration, motivation, etc., everything that could affect the qualitative and quantitative characteristics of the results in the past.

It is noteworthy that high physical endurance is not required to work with a stone, the accuracy of fine motor skills, the perseverance of the student and the spatial understanding of the performed movements are much more valuable. Such a predisposition of a person was revealed during training. Correct working posture, clear statement of movements and stable position of the workpiece in the hands of the knapper — these requirements and their quality depended both on the correct explanation by the instructor and on the desire of the student to get clear positive result of the experience of working with a stone. With proper training, consisting of several stages (introductory part, safety techniques, body positions and techniques of obsidian percussion), each participant had the ability to independently manufacture a tool (scraper, cutting tool, burin, small point etc.) (Fig. 3.-2). On average, it took about 25–40 minutes to create one experimental sample. With the development of skills, this time is significantly reduced.

We also note the importance of the objective factor — if in 2020 there were no problems with the collecting of raw material, while in 2021 we met with the limitation of obsidian pebbles, and the pebbles themselves were smaller (in other words — the model of the so-called “stressful situation”). The consequence of this was the need to be neat with raw material, which, in turn, affected the size of the final tools. So, during the first season, a collection of tools with an average size from 2 to 10 cm along the maximum axis was obtained, and during the second — in the range from 2 to 6 cm only.



Fig. 3. Experiments with obsidian: 1 – pressure flaking produces by students with basic competencies; 2 – instruments, produced in frames of the experiments

Рис. 3. Эксперименты с обсидианом: 1 – отжимное ретуширование в исполнении студентов с базовыми навыками; 2 – орудия, изготовленные в ходе экспериментов



Fig. 4. Work with experimental tool: 1 – fishing knife;  
2 – red fish processing with obsidian and bone knives

Рис. 4. Использование экспериментальных орудий: 1 – рыбный нож;  
2 – разделка рыбы с помощью обсидиановых и костяных инструментов



We also had the opportunity to test experimental tools in food processing — fish cleaning and chopping. Working edge of the tools (combined knives) turned out to be very sharp due to the quality of raw material and careful processing techniques (Fig. 4.-1). When cutting fish, the tools matched their task, but the obvious disadvantage of using obsidian tools is its fragility, the danger of small particles of volcanic glass getting into the fibers of food should not be excluded. In such case bone knives well-known from the ethnographical records are of better choice (Fig. 4.-2).

Thus, the experimental study of obsidian, in addition to technological data on the characteristics of a particular type of raw material, allows us to obtain interesting information related to the cultural context and to the behavior — the process of learning and acquiring skills, individual character and abilities, the effectiveness of tools in work (products of hunting and fishing) etc.

### **Cultural Context: Some Archaeological and Ethnographical Examples**

Cultural interpretation of obsidian proposes special technological analysis of the archaeological materials with the recognizing of utilitarian and nonutilitarian (prestige) technologies (Hayden, 1998). Prestige technologies may be traced in the collections as: (1) the utilization of obsidian only for specific types of tools; (2) the production of obsidian tools (points, knives, blades) of unusual size, form and configuration; (3) the presence of obsidian artifacts of high quality in burials; (4) the production of decoration objects from obsidian (mirrors, bracelets, pendants, beads, figurines etc.).

Such facts have been preliminary registered in the archaeological materials for the Paleolithic (Ustinovka culture, Ogon'ki culture) and for the Neolithic (Boisman culture, Zaisanovka culture) which with the information on the distribution of obsidian from the sources allows suggesting intensive cultural exchange and use of obsidian in decorative art and rituals. For example, at Boisman-2 Site (7–5,000 BP) large obsidian biface (20, 5 cm) with extremely high level of pressure technique was found between forearms of woman (22–25 years old) in Burial #4 (Popov, Tabarev, 2008, 2016; Tabarev, 2009) (Fig. 5). The source of this obsidian is Paektu volcano, which is about 300 km from the coast.

Another illustration of the prestige meaning of obsidian artifacts comes from Sakhalin Island — two big polyhedral obsidian cores (black and red colors) were found as a kind of separated complex (cache?) during the excavations of the Early Neolithic (9–8, 100 BP) Slavnya-5 Site. They demonstrate the hallmark of pressure blade technology on the obsidian which was brought to Sakhalin from Hokkaido sources (about 300–350 km) along with the “red-black” symbolism well known in the mythological systems over the North Pacific coasts and match the category of “lithic caches” described in details for the territory of the Japanese Archipelago both for the Paleolithic and Jomon periods (Tabarev, Ivanova, Kanomata, 2021).

For example, elaborated technologies of huge obsidian biface production were traced by some Japanese archaeologists in the Final Paleolithic (18–12,000 BP) on Hokkaido. Unique sizes and such distinctive details of face preparation as overshot flaking makes it possible to compare them with the finest examples of Solutrean leaf bifaces in Western Europe (22–17,000 BP). Focusing on the technological similarities American archaeologists Dennis Stanford and Bruce Bradley built the hypothesis about the possible migrations of Solutreans to North America. From their point of view such similarities as big leaf shaped bifaces and caches of big points

are common only for the Solutre and Clovis cultures (Bradley, Stanford, 2004). Close analysis of fareastern assemblages (Russian Far East, Japanese Islands) gave enough facts about the existence of such technologies and about the chances to discuss with Stanford and Bradley about the uniqueness of “Solutrean-Clovis” similarities (Kornfeld, Tabarev, 2009).

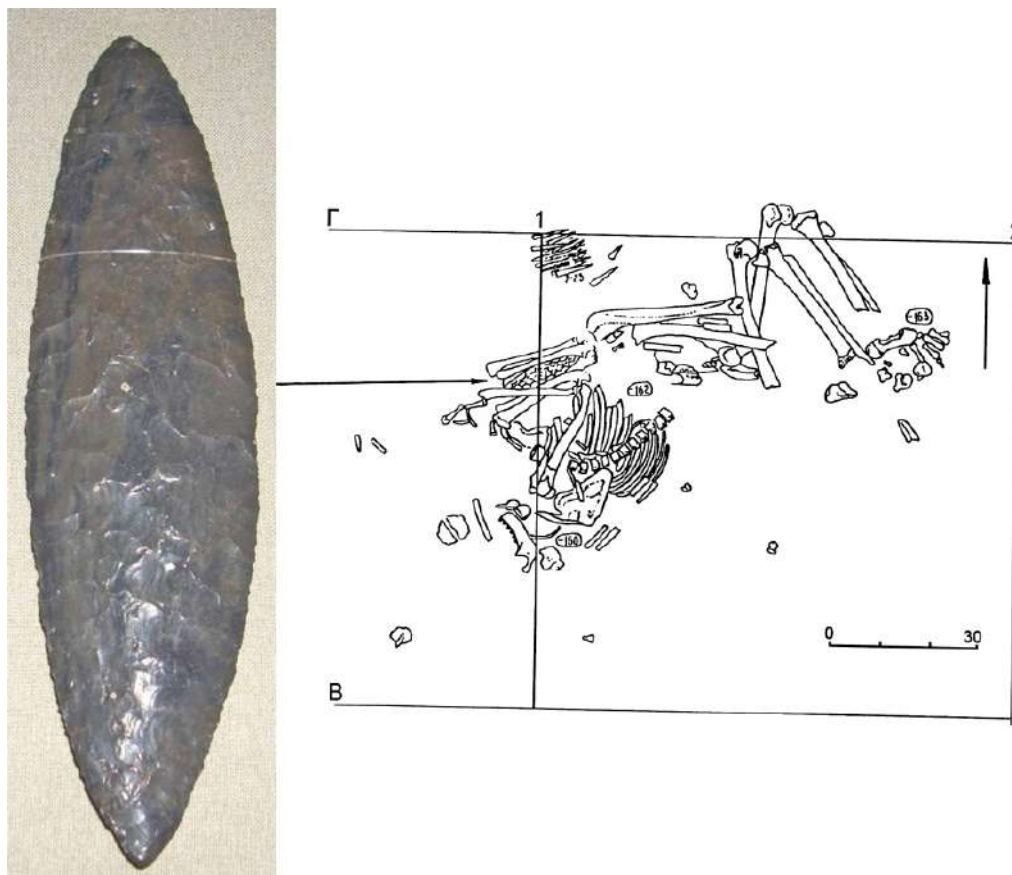


Fig. 5. Obsidian biface from the Neolithic burial at Boisman-2 Site, Maritime Region, Russian Far East

Рис. 5. Obsidianовый бифас из неолитического погребения на памятнике Бойсмана-2, Приморье, Российский Дальний Восток

It is important to underline that in many cases archaeologists should be very careful using terms “trade” or “exchange” (Kuzmin, 2005). For example, for Sakhalin Island we have tons of obsidian transported from Shirataki region (Kuzmin, Glascock, Sato, 2002) and almost no information about any goods transported from Sakhalin to Hokkaido which allows interpreting just “distribution” and not “exchange”. From our point of view, it may be just an argument that people from Hokkaido were doing hunting and fishing on the northern territories during warm seasons of the year and used to take obsidian with them to make and to fix hunting gear.

On Hokkaido the distribution of obsidian from the sources and the types of artifacts (preforms, blanks, finished tools, debitage) were traced over dozens of sites and localities. In many

works of Japanese archaeologists, it was explained as “network” and “symbol of exchange” (e.g., Kimura, 1998) while there are no archaeological evidences of any equivalents of the obsidian. Of course, we may speculate that such equivalents were of organic and perishable nature, and they were totally destroyed by highly acidic Fareastern soils but in any case, this requires additional researches and arguments.



Fig. 6. “Flint-carrier” — participant of the White Deer Skin Dance with obsidian biface.  
Reconstruction on the base of photos of E. Curtis by Y.V. Tabareva

Рис. 6. «Носитель» — участник танца Шкуры Белого Оленя с обсидиановыми бифасами  
(графическая реконструкция Ю.В. Табаревой по фотографии Э. Кёртиса)

Archaeological and ethnographical correlations with the other territories and periods over the Pacific may be of special value for reconstructions of obsidian use in the Far East. For example, obsidian industry and raw material distribution known for sites around Mt. Edziza in British Columbia (Canada) with developed bifacial and burin techniques which are dated much younger than Fareastern materials but morphologically identical (Fladmark, 1985).

Very interesting example — ritual use of large (up to 70–90 cm) red and black obsidian bifacies in ceremonial practice (dances, magic, display of social status, burials) among North

Californian Indians (Yurok, Karok, Hupa, and Tolowa groups) (Fig. 6). Recorded by ethnographical and archaeological materials this phenomenon has its origin in the Paleoindian times and relates to the initial peopling of America (e.g., Gould, 1985; Kroeber, 1925; Powers, 1877; Rust, 1905). The similarity of “red-black” obsidian artefacts used in ritual context on the opposite coasts of Pacific matches with this model.

It is also important to pay special attention to the information about the traditions of the obsidian mines and quarries usage. Ethnographical and historical records gave very interesting pictures about the ownership relations of tribes living near and far from the sources (Hodgson, 2005). In most cases the sources were opened for public but also examples of conflicts, and even warfare among the Indians were described (Heizer, Treganza, 1944). Some ethnographical records include the information about professional obsidian knappers and point-makers along with the traditions of transportation and exchange (Hughes, Bettinger 1984). These facts may be of high value for the interpretation of the exploration of obsidian in the Far Eastern region during the Final Paleolithic — Early Neolithic times.

### Conclusion

The role obsidian (volcanic glass) played in ancient societies has long been a topic of interest to archaeologists, anthropologists and geologists. As it was postulated above three principal directions of obsidian studies could be recognized — geochemical, technological (including experimental part), and cultural. While the geochemical studies have reached significant progress within the Pacific basin two others directions obviously require further development.

In case of experiments, the ideal conditions exist where there is an abundance of high-quality raw materials (Japanese Archipelago, Bismarck Archipelago, American Northwest Coast, California). In the Russian Far East, and in Primorye in particular, the experimental works always will be limited by the quality and quantity of obsidian pebbles. From the other hand, this gives the rare chance to explore all the advantages of bipolar technique — simple way of percussion and high variability in the transformation of products of percussion into effective tools (end and side scrapers, backed knives, perforators, burins etc.). It also allows making useful observations about the behavioral side of the knapping process.

The study of the cultural meaning of obsidian includes not only the interpretation of the archaeological artifacts from the burials, caches and decoration items but also addressing to the ownership of the raw material sources, trade/exchange mechanism, and the status of the highly skillful knappers in ancient and traditional societies. To get a full picture of these phenomena, it is necessary to refer to archaeological and ethnographical data on other regions of the world (Near East, Africa, and Europe).

### REFERENCES

- Bradley B., Stanford D. The North Atlantic Ice-Edge Corridor: A Possible Paleolithic Route to the New World. *World Archaeology*. 2004;36(4):459–478.
- Ebert C. E., Dennison M., Hirth K. G., McClure S. B., Kennett D. J. Formative Period Obsidian Exchange along the Pacific Coast of Mesoamerica. *Archaeometry*. 2015;57:54–73. doi.org/10.1111/arcm.12095
- Fladmark K. R. Glass and Ice. The Archaeology of Mt. Fdziza. Department of Archaeology, Simon Fraser University, Burnaby, B.C., 1985. Publication No.14. 217 p.

Freund K. P. An Assessment of the Current Applications and Future Directions of Obsidian Sourcing Studies in Archaeological Research. *Archaeometry*. 2013;55:779–793. doi.org/10.1111/j.1475-4754.2012.00708.x

Gillam J. C., Tabarev A. V. On the Path of Upper-Paleolithic Obsidians in the Russian Far East. *Current Research in the Pleistocene*. 2004;21(1):3–6.

Glascock M. D., Krypianko A. A., Kuzmin Y. V., Shackley S. M., Tabarev A. V. Geochemical Characterization of Obsidian Artifacts from Prehistoric Sites in the Russian Far East: Initial Study. In: *Archaeology of the Northern Pacifica*. Vladivostok : Dal'press, 1996. P. 406–410.

Gould R. A. The Indians of Northwest California. *Masterkey*. 1985;59(2–3):2–21.

Hayden B. Practical and Prestige Technologies: The Evolution of Material Systems. *Journal of Archaeological Method and Theory*. 1998;5(1):1–55.

Heizer R. F., Treganza A. E. Mines and Quarries of the Indians in California. *Quaternary Chapter of the State Mineralogist's Report*. 1944;XL:291–359.

Hodgson S. F. “Obsidian Spirits Just Speak Once” — California Indians in a Geothermal Land. Paper Presented at World Geothermal Congress. Antalya, Turkey, 24–29 April, 2005.

Hughes R. E., Bettinger R. L. Obsidian and Prehistoric Sociocultural Systems in California. *Exploring the Limits: Frontiers and Boundaries in Prehistory*. BAR International Series. 1984;223:153–172.

Kimura H. Obsidian Human Technology. In: *Paleoecology of Pleistocene and Stone Age Cultures of Northern Asia and Adjacent Territories*. Novosibirsk : Institute of Archaeology and Ethnography Press, 1998. P. 302–314.

Kornfeld M., Tabarev A. The French Connection? Or Is It? *Current Research in the Pleistocene*. 2009;26:90–92.

Kroeber A. L. Handbook of the Indians of California. *Bureau of American Ethnology Bulletin*. 1925;78:995 p.

Kuzmin Y. V. Geochronology and Paleoenvironment in Late Paleolithic and Neolithic of Temperate East Asia. Vladivostok : Pacific Institute of Geography, 2005. 282 p. (In Russian with English summary).

Kuzmin Y. V. Long-distance Obsidian Transport in Prehistoric Northeast Asia. *Bulletin of the Indo-Pacific Prehistory Association*. 2012;32:1–5.

Kuzmin Y. V., Glascock M. D., Sato H. Sources of Archaeological Obsidian on Sakhalin Island (Russian Far East). *Journal of Archaeological Science*. 2002;27(7):741–749.

Kuzmin Y. V., Oppenheimer C., Renfrew C. Global perspectives on Obsidian Studies in Archaeology. *Quaternary International*. 2020;542:41–53. doi.org/10.1016/j.quaint.2020.02.036

Kuzmin Y. V., Glascock M. D., Vorobei I. E., Grebennikov A. V. Sourcing of Obsidian Artifacts from the Omolon River Basin and the Neighboring Region (north-eastern Siberia): Prehistoric Procurement from Kamchatkan and Chukotkan Sources. *Archaeometry*. 2021;63:1141–1156. doi.org/10.1111/arcm.12675

Kuzmin Y. V., Tabarev A. V., Popov V. K., Glascock M. D., Shackley M. S. Geochemical Source Analysis of Archaeological Obsidian in Primorye (Russian Far East). *Current Research in the Pleistocene*. 1999;16:97–99.

LeBlanc R. Wedges, Pieces Equillees, Bipolar Cores, and Other Things: An ‘Alternative to Shott’s View of Bipolar Industries. *North American Archaeologist*. 1992;13:1–14.

Popov A. N., Tabarev A. V. Neolithic Cultures of the Russian Far East: Technological Evolution and Cultural Sequence. *Turkish Academy of Sciences Journal of Archaeology*. 2008;11:41–62.

Popov A. N., Tabarev A. V. Lords of the Shell Rings: Boisman Neolithic Culture, Russian Far East / Seigneurs des anneaux sur coquilles: la culture néolithique de Boismanskaya, Extrême-Orient russe. *Séances de la Société préhistorique française*. 2016;6:393–408.

Popov A. N., Tabarev A. V. The Preagricultural Human Occupation of Primorye (Russian Far East). In: *Handbook of East and Southeast Asian Archaeology*. New York : Springer, 2017. P. 379–396. doi.org/10.1007/978-1-4939-6521-2\_24

Popov A. N., Tabarev A. V., Mikishin Y. A. Neolithization and Ancient Landscapes in the Southern Primorye, Russian Far East. *Journal of World Prehistory*. 2014;27(3):247–261. doi.org/10.1007/s10963-014-9073-1

Powers S. Tribes of California. *Contribution of North American Ethnology*. 1877;3:645.

Rust H. N. The Obsidian Blades of California. *American Anthropologist*. 1905;7:688–689.

Shackley M. S., Glascock M. D., Kuzmin Y. V., Tabarev A. V. Geochemical Characterization of Archaeological Obsidian from the Russian Far East: A Pilot Study. Paper Presented at International Symposium on Archaeometry. University of Illinois of Urbana. Champaign, Urbana, 1996.

Shott M. On Bipolar Reduction and Splintered Pieces. *North American Archaeologist*. 1999;20(3):217–238.

Tabarev A. V. On the Dark Side of the Neolithisation: Evidences of Violence in the Neolithic Burials at Boisman-2 Site, Russian Far East. In: *Neolithization and Modernization: Landscape History on East Asian Inland Seas*. Kyoto : Nakanishi printing Co Ltd, 2009. P. 131–138.

Tabarev A. V. Blades and Microblades, Percussion and Pressure: Towards the Evolution of Lithic Technologies of the Stone Age Period, Russian Far East. In: *The Emergence of Pressure Blade Making: From Origin to Modern Experimentation*. New York : Springer, 2012. P. 329–346. doi.org/10.1007/978-1-4614-2003-3\_13

Tabarev A. V. The Later Prehistory of the Russian Far East. In: *The Cambridge World Prehistory*. V. 2. East Asia and the Americas. New York : Cambridge University Press, 2014. P. 852–869. doi:10.1017/CHO9781139017831.058

Tabarev A. V., Ivanova D. A., Kanomata Y. Knap and Keep: Late Paleolithic-Neolithic Caches, Far East. *Documenta Praehistorica*. 2021;48:2–11. doi.org/10.4312/DP.48.7

---

#### CONTRIBUTION OF THE AUTHORS / ВКЛАД АВТОРОВ

---

A. V. Tabarev: experiments, collecting information from foreign literature, text preparation.  
Табарев А. В.: проведение экспериментов, сбор информации по зарубежной литературе, подготовка текста к публикации.

A. N. Popov: collecting information from Russian literature, texts writing.

Попов А. Н.: сбор информации по российской литературе, подготовка частей текста.

E. A. Eremeeva: participation in the experiments, preparation of the illustrations for the article.

Еремеева Е. А.: участие в экспериментах, подготовка иллюстраций к статье.

There is no conflict of interest / Конфликт интересов отсутствует.

---

**INFORMATION ABOUT THE AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ**

---

**Andrey Vladimirovich Tabarev**, Doctor of Historical Sciences, Leading Research Fellow, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, Novosibirsk, Russia.

**Табарев Андрей Владимирович**, доктор исторических наук, ведущий научный сотрудник Института археологии и этнографии Сибирского отделения Российской академии наук, Новосибирск, Россия.

**Alexander Nikolaevich Popov**, Candidate of Historical Sciences, Director of Education-Scientific Museum, Far Eastern Federal University, Vladivostok, Russia.

**Попов Александр Николаевич**, кандидат исторических наук, директор Учебно-научного музея Дальневосточного федерального университета, Владивосток, Россия.

**Ekaterina Andreevna Eremeeva**, Bachelor, Institute of Humanities, Novosibirsk State University, Vladivostok, Russia.

**Еремеева Екатерина Андреевна**, студент программы бакалавриата, Гуманитарный институт Новосибирского государственного университета, Новосибирск, Россия.

*The article was submitted 09.06.2022;*

*approved after reviewing 03.08.2022;*

*accepted for publication 16.08.2022.*

*Статья поступила в редакцию 09.06.2022;*

*одобрена после рецензирования 03.08.2022;*

*принята к публикации 16.08.2022.*

# RESULTS OF STUDYING OF MATERIALS OF ARCHAEOLOGICAL RESEARCH

---

Research Article / Научная статья

УДК 903.27(571.1/5)

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-03](https://doi.org/10.14258/tpai(2022)34(3).-03)

## NEW ROCK ART SITE AT THE RIVERSIDE CLIFFS IN THE OGLAKHTY MOUNTAINS (KHAKASIA)

**Elena A. Miklashevich**

*Institute of Archaeology RAS, Moscow, Russia;*

*"Tomskaya Pisaniitsa" Kuzbass museum-reserve, Kemerovo, Russia;*

*elena-miklashevich@yandex.ru, <https://orcid.org/0000-0003-3190-0311>*

**Abstract.** The article presents the results of investigation of the rock art site discovered in 2014 on riverside rocks in the Oglakhty mountain range (Republic of Khakasia, left bank of the Yenisei River). One of the largest rock art complexes of the Minusinsk Basin is located in these mountains; the best known in archaeology are the tremendous concentrations of petroglyphs which were located on coastal cliffs before they were flooded by the reservoir of the Krasnoyarsk hydroelectric power station. Most of them are irretrievably lost, but some are still preserved and becoming relatively accessible in periods of lower water level. In the process of searching for and redocumenting the petroglyphs at the locations already known (Oglakhty I and II according to Ya. A. Sher's inventory) new decorated panels have been revealed, and not only in the flooded levels, but also on inaccessible rocks above the highest water level. This new location is situated upstream from the known ones, within the southernmost section of the riverside cliffs. Several years of regular inspections of this section from a boat at various water levels and with binoculars made it possible to find and document 24 panels, containing about 50 complete and partially preserved figures of wild animals (elk, red deer, roe deer, aurochs, arkhar, horse and others). Several stylistic groups of images are distinguished; almost all of them have analogies at known sites, which allows us to confidently attribute them as a whole to the earliest phase of Minusinsk Basin rock art which undoubtedly predates the Bronze Age, although the specific period of its existence has not yet been determined.

**Key words:** rock art, earliest stratum, documenting, flooded petroglyphs, Minusinsk Basin, Oglakhty

**Acknowledgments:** the work was carried out with financial support from the Russian Science Foundation (project No. 21-78-10121 "Development of an Interactive Methodological Infrastructure for the Study and Preservation of Data on the Sites of Rock Art in Russia"); the author expresses her sincere gratitude to L. L. Bove for his invaluable help in the field investigations of rock art sites in the Oglakhty Mountains.

---

**For citation:** Miklashevich E. A. New Rock Art Site at the Riverside Cliffs in the Oglakhty Mountains (Khakasia). *Teoriya i praktika arheologicheskikh issledovanij = Theory and Practice of Archaeological Research*. 2022;34(3):39–53. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-03](https://doi.org/10.14258/tpai(2022)34(3).-03)

---



## НОВОЕ МЕСТОНАХОЖДЕНИЕ НАСКАЛЬНОГО ИСКУССТВА НА БЕРЕГОВЫХ СКАЛАХ ОГЛАХТЫ (ХАКАСИЯ)

**Елена Александровна Миклашевич**

Институт археологии РАН, Москва, Россия;

Кузбасский музей-заповедник «Томская Писаница», Кемерово, Россия;

[elena-miklashevich@yandex.ru](mailto:elena-miklashevich@yandex.ru), <https://orcid.org/0000-0003-3190-0311>

**Резюме.** В статье представлены результаты исследований открытого в 2014 г. местонахождения наскального искусства на береговых скалах горного массива Оглахты (Республика Хакасия, левый берег р. Енисей). В этих горах находится один из самых крупных комплексов памятников наскального искусства Минусинской котловины; наибольшую известность в науке получили петроглифы, до затопления Красноярским водохранилищем концентрировавшиеся в большом количестве на нескольких участках береговых скал. Большинство из них безвозвратно погибло, однако некоторые еще сохраняются и относительно доступны для изучения в периоды снижения уровня воды. В процессе поиска и редокументирования сохранившихся изображений известных местонахождений (Оглахты-I и II по индексации Я. А. Шера) выше по течению от них на самом южном участке береговых скал были обнаружены ранее неизвестные петроглифы, причем не только затопляемые, но и расположенные на труднодоступных скалах намного выше самого высокого уровня затопления. Несколько лет регулярных осмотров береговых скал с лодки при разных уровнях воды и с помощью бинокля позволили выявить и документировать на этом участке 24 плоскости, содержащие около 50 полных и частично сохранившихся фигур диких животных (лоси, благородные олени, косули, быки-туры, архары, лошадь и др.). Выделяется несколько стилистических групп изображений, почти все они имеют аналогии на известных памятниках, что позволяет уверенно отнести их в целом к древнейшему пласту наскального искусства Минусинской котловины (который, без сомнений, предшествует эпохе бронзы, хотя конкретный период его бытования пока точно не установлен).

**Ключевые слова:** наскальное искусство, документирование, древнейший пласт, затопленные петроглифы, Минусинская котловина, Оглахты

**Благодарности:** работа выполнена при финансовой поддержке РФФИ (проект №21-78-10121 «Разработка интерактивной методической инфраструктуры для изучения и сохранения данных о памятниках наскального искусства России»); автор выражает искреннюю благодарность Л. Л. Бове за помощь в полевых исследованиях памятников наскального искусства в горах Оглахты.

**Для цитирования:** Миклашевич Е. А. Новое местонахождение наскального искусства на береговых скалах Оглахты (Хакасия) // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 39–53. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-03](https://doi.org/10.14258/tpai(2022)34(3).-03)

### **I**ntroduction

Along the banks of the middle course of the Yenisei River and its tributaries there were dozens of rock art sites, which over half a century ago went completely or partially under water after the construction of the Krasnoyarsk hydroelectric power station and the filling of its reservoir. Thousands of images have been destroyed and continue to perish due to destruction of the rock massif, seasonal fluctuations of the water level, ice drifts, crumbling, and so on. Even the images on the mountain slopes above the flood level are being destroyed due to ongoing bank reworking. Some rock art sites had been investigated and recorded before the flooding; thus, copies and photographs by A. V. Adrianov, Ya. A. Sher and other researchers have preserved a significant part of the now lost heritage for study. However, even

at sufficiently well recorded sites not everything has been revealed; not all the known panels have been recorded, and certainly not all of the locations have yet been found. It is also obvious that the level of documentation of that time is far from our contemporary capabilities and demands in rock art research. Therefore, at the present stage, attempts have been resumed to search for and redocument with new methods some of the surviving decorated panels within the sites that were thought to have been completely lost as a result of the flooding.

In the central and northern parts of the Krasnoyarsk reservoir the water level remains high even during the periods of discharge; some sites are now 20–40 metres and more under the water, so they are inaccessible for research. But in the southern part (from the mouth of the Abakan river and downstream) the water level sometimes drops so low that the riverside cliffs become exposed and one can see those petroglyphs which are still preserved. However, the destructive processes are proceeding and each year fewer and fewer petroglyphs emerge from the water.

The greatest concentrations of rock art were (and still are) on the rocks of the Oglakhty mountain massif (left bank of the Yenisei) and the Tepsei mountain (at the confluence of the Tuba river and the Yenisei), located opposite each other. These complexes have a rich history of study and have been published in monographs (Sher et al., 1994; Blednova et al., 1995). There are also many other publications, as well as photographs and collections of copies in various museums and archives, thanks to which modern researchers can get a fairly good idea of the sites, including their localization and their importance for cultural and chronological attribution and interpretation of South Siberian rock art. However, it is difficult to obtain from the old materials those deeper layers of information (details, technique, superimpositions, context, etc.) that we are now able to obtain thanks to usage of modern technologies in documenting rock art. Thus, steady monitoring and new investigations in the areas of the flooded sites in search of extant original sources of information are extremely important. This work is being carried out quite successfully and brings important results: at both Oglakhty and Tepsei many known panels were found (at which important details for interpretation were clarified or new images revealed), and some entirely new panels were discovered among the known ones. Moreover, in the Oglakhty a new site has been discovered. The purpose of this article is to show how that was done and to introduce some materials of its research into scholarly circulation.

#### **Oglakhty: Rock Art Sites on Riverside Cliffs**

One of the largest rock art complexes in the Minusinsk Basin is located in the Oglakhty mountainous massif on the left bank of the Yenisei River (now Krasnoyarsk reservoir) 40 km north of Abakan in the Republic of Khakassia (Fig. 1.-1, 2). The area has not yet been surveyed completely, but at the moment we know up to 20 concentrations of rock art, both on the riverside cliffs and at a considerable distance from the river (Fig. 1.-3).

The best known sites, fairly well represented in the scholarly literature, are the locations of petroglyphs on the rocks along the banks in the southern part of the Oglakhty mountain range (Fig. 1.-4). As these are the most accessible, being scattered in dense concentrations on the lower outcrops of the riverside cliffs, they have attracted the attention of travellers and researchers since the 18<sup>th</sup> century. The most ambitious and fruitful work on their documentation was undertaken by A. V. Adrianov in 1907 and Ya. A. Sher in the 1960s, the latter in connection with the forthcoming flooding. Adrianov regarded all the visible petroglyphs (about 450 images) as one site and indexed it according to his system as XLI (Adrianov, 1908, p. 37–39). Sher divided

the same area into two sites — Oglakhty I (121 panels, about 700 images) and Oglakhty II (14 panels, 37 images) (Sher et al., 1994). The former is now flooded almost completely and most of the petroglyphs are lost, while the latter, being situated high above the flood level, is preserved completely but difficult to access.

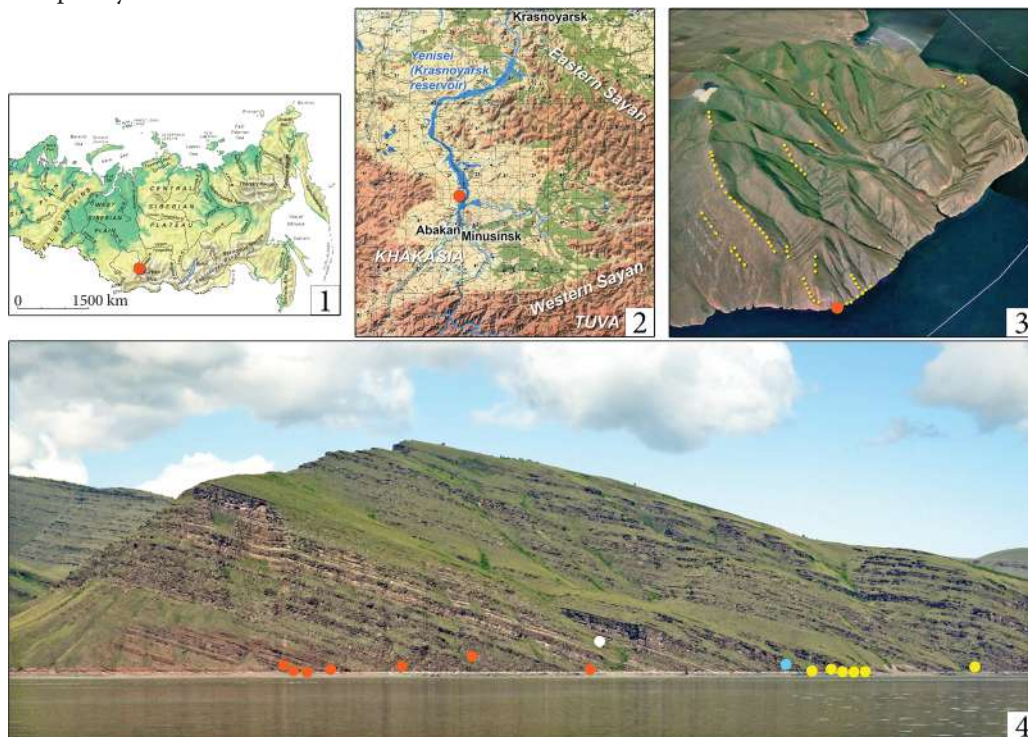


Fig. 1. Oglakhty mountain massif: 1, 2 — location on the map of Russia and that of the Minusinsk Basin; 3 — rock art sites (marked by yellow dots) on GoogleEarth satellite image, the red dot indicates the position of the new site; 4 — panoramic photo of the riverside cliffs in the southern part of the massif, view from the southeast; red dots indicate the localisation of the groups of surfaces within the new site, white dot — Bugaev Log; blue dot — Oglakhty-II (according to Ya. Sher), yellow dots — Oglakhty-I (according to Ya. Sher)

Рис. 1. Горный массив Оглахты: 1, 2 — расположение на карте России и Минусинской котловины; 3 — памятники наскального искусства (обозначены желтыми точками) на спутниковом снимке GoogleEarth, красной точкой обозначено новое местонахождение; 4 — фотопанорама береговых скал в южной части массива, вид с юго-востока; красными точками обозначено расположение групп плоскостей нового местонахождения, белой — Бугаев Лог; голубой — Оглахты-II (по Я.А. Шеру), желтыми — Оглахты-I (по Я.А. Шеру)

When the reservoir was filled up, in the late 1970s N. V. Leontiev and B. N. Pyatkin independently discovered another rock art site (Bugaev Log), also located on the bank, in a shallow ravine above the flood level. It contains 12 panels with about 40 images and is situated to the south (upstream) of the locations documented by Adrianov and Sher. Later we indexed it as Oglakhty VII (Sovetova, Miklashevich, 1999, p. 50; Miklashevich, 2015a, p. 66, 70) to continue the system of Ya. A. Sher.

In addition, it has recently come to light that the Apkashev rock art site discovered by N. L. Chlenova in 1958, from which she published only several images (Chlenova, 1981, p. 86, 87) and no information about its location, also belongs to the complex of sites on the riverside rocks of the Oglakhty, and is located downstream (to the north) of Oglakhty I and II. This site is completely flooded but is sometimes exposed when the water level drops to a minimum. This is quite a significant concentration: more than 30 panels and at least a hundred images.

All in all, according to the results of previous investigations, one can count a total of about 170–180 decorated panels with more than 700 images at the riverside sites. The petroglyphs belong to various periods, but the overwhelming majority date to the earliest stages in the rock art of the Minusinsk Basin — to the so-called Minusinsk and Angara traditions or styles (Podolsky, 1973, p. 270–272; Sher, 1980, p. 190–193) and their variations. These are amazing for their artistically skilful figures of aurochs, wild horses, deer, elks, arkhars, bears and wild boars, and also images of fish, anthropomorphs and boats. The dating of this stratum is unclear and debatable, although there is no doubt that the figures belong to a period earlier than the Bronze Age. Ya. A. Sher did not even rule out “their Upper Palaeolithic age” (Sher, 1980, p. 193). In order to solve this acute problem it is necessary both to document the published imagery more thoroughly (when possible) and to search for new sources. In the course of our search for and redocumentation of the surviving panels at the known sites (Oglakhty I and II, according to Ya. A. Sher’s inventory) in recent years, they have not only been localized and photographed, but new images and panels have also been discovered, and, beyond all expectations, a previously unknown site was discovered in 2014, located upstream of the known sites, in the southernmost section of the riverside cliffs (Fig. 1.-4). Initially, it was given another ordinal index of Oglakhty IX (Miklashevich, 2015a, p. 68–71; Miklashevich et al., 2015), but as further surveys of the entire mountain range have revealed new sites and clarification of the boundaries of the known ones, we have changed the indexing system as a whole. This new site is now designated as “Oglakhty Bereg I” (Bereg in Russian means bank, shore, coast).

### **Methods of Searching and Documenting**

The search for and documenting of the flooded petroglyphs on the riverside cliffs in the southern part of the Krasnoyarsk reservoir are possible in the course of surveying the exposed rocks from an inflatable boat during the water’s recession, usually in early May. At the lowest level it is even possible to survey from the exposed shoreline. The revealed decorated panels are then cleared of the muddy sediment or scree, following which they are photographed according to an established algorithm (Miklashevich, Bove, 2017). In 2014, one of the purposes of our work was to survey the condition of the riverside cliffs of Oglakhty. The field survey was timed to take place in early May when the water level in the reservoir is usually quite low. However, that year the expected drop in water level did not occur in May. The water was a few metres below its highest point, but those images that would normally be above the water level in spring were still flooded. Nevertheless, we decided to inspect the cliffs from a boat, hoping to see those petroglyphs which, before the flooding, were located on inaccessible upper panels and had been copied using ladders and ropes. As this method worked well at the site investigated by Ya. A. Sher (Oglakhty-I), we decided to expand the search area and as a result, after multiple inspections, we found unknown petroglyphs within a more southern section.

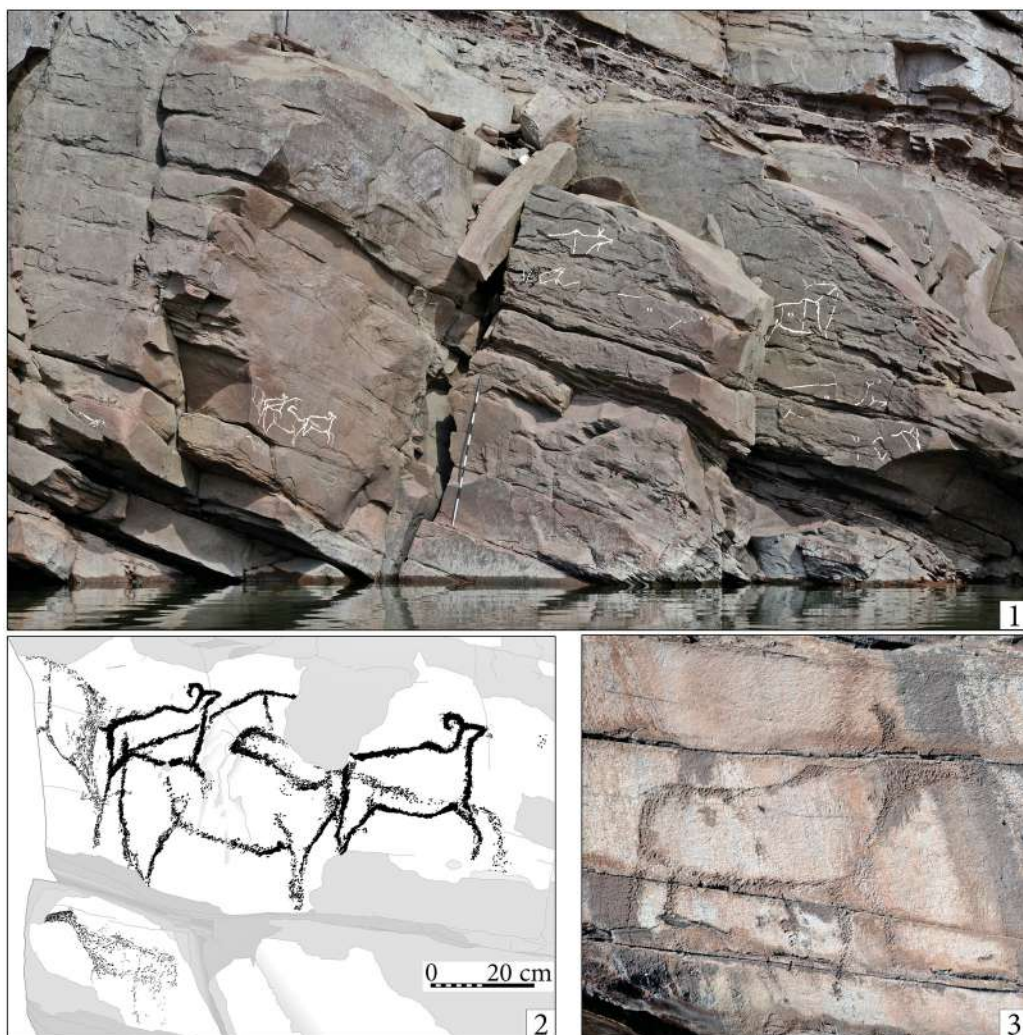


Fig. 2. 1 – One of the sections of the new site during the spring water recession in the reservoir, the localisation of surfaces 4–8 is shown by inverted tracings overlapping; 2 – surface 5, tracing; 3 – surface 1, photo

Рис. 2. 1 – один из участков нового местонахождения в период весеннего спада воды в водохранилище, расположение плоскостей 4–8 показано наложением прорисовок; 2 – прорисовка плоскости 5; 3 – фотография плоскости 1

On the rocks which had been under water for a long time, covered with a whitish muddy coating, with cracks and numerous detachments of rocky crust, it was extremely difficult to see the remains of large contoured figures. It was possible to spot them in oblique sunlight and to make them visible by removing the muddy coating with water and brushes. At first a compact group of four panels was revealed in this way (Fig. 2.-1, 2; 3). In May they were 1-2 m above the water. Having compared the position of the known panels according to ar-

chive photographs by A. V. Adrianov and Ya. A. Sher with those visible above water at that time, we found that the new panels must have been high on steep cliffs before the flooding, about 8-10 m above the shoreline. This explains why they had not previously been noticed by the researchers. It is possible that at that time these rocks were also obscured by trees growing on the bank. In the period when these images were created, they could have been accessed from the underlying cornices of the rock massif, but over the millennia, major geological changes had taken place and the lower rock blocks had been destroyed.

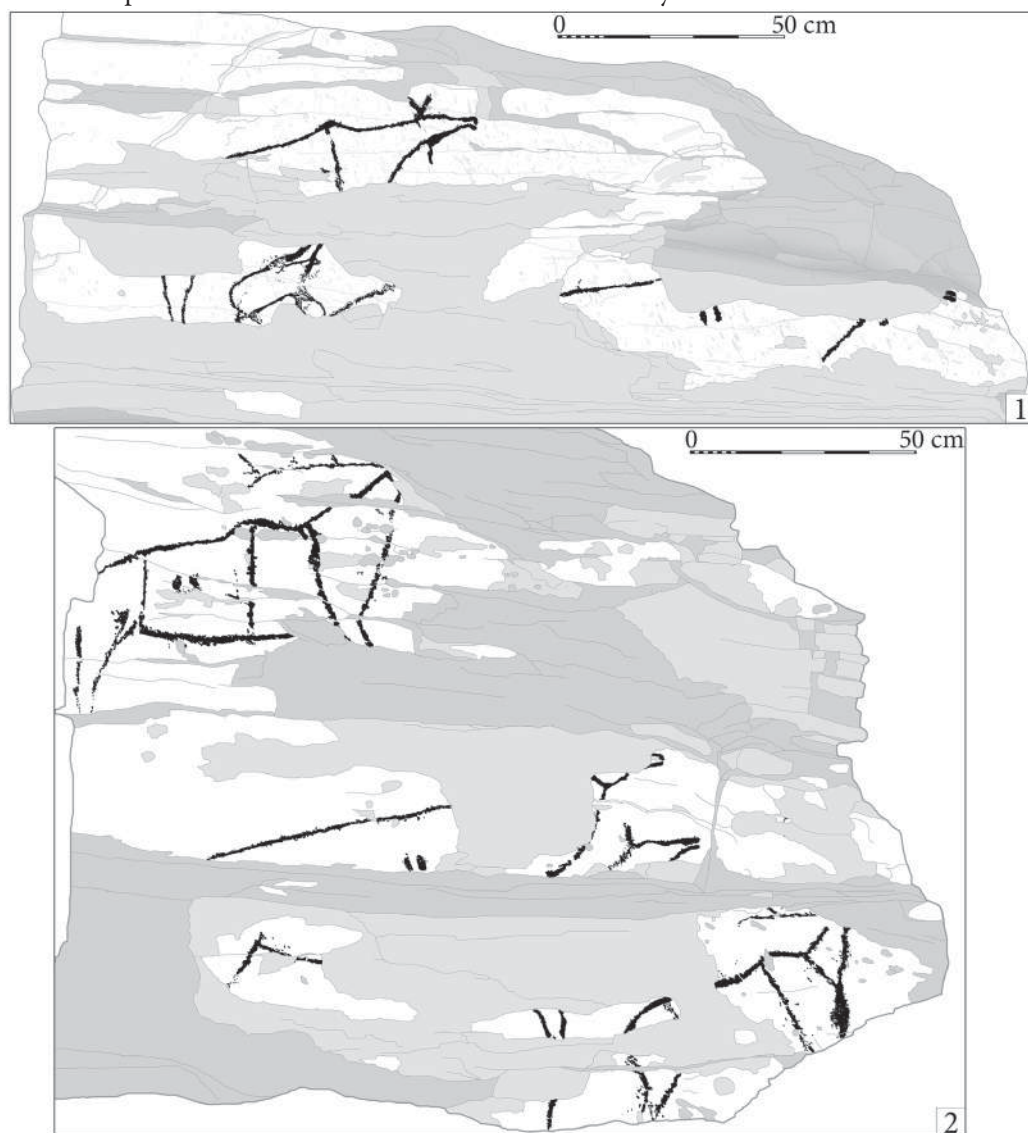


Fig. 3. Surfaces 7 (1) and 8 (2), tracings

Рис. 3. Плоскости 7 (1) и 8 (2), прорисовки

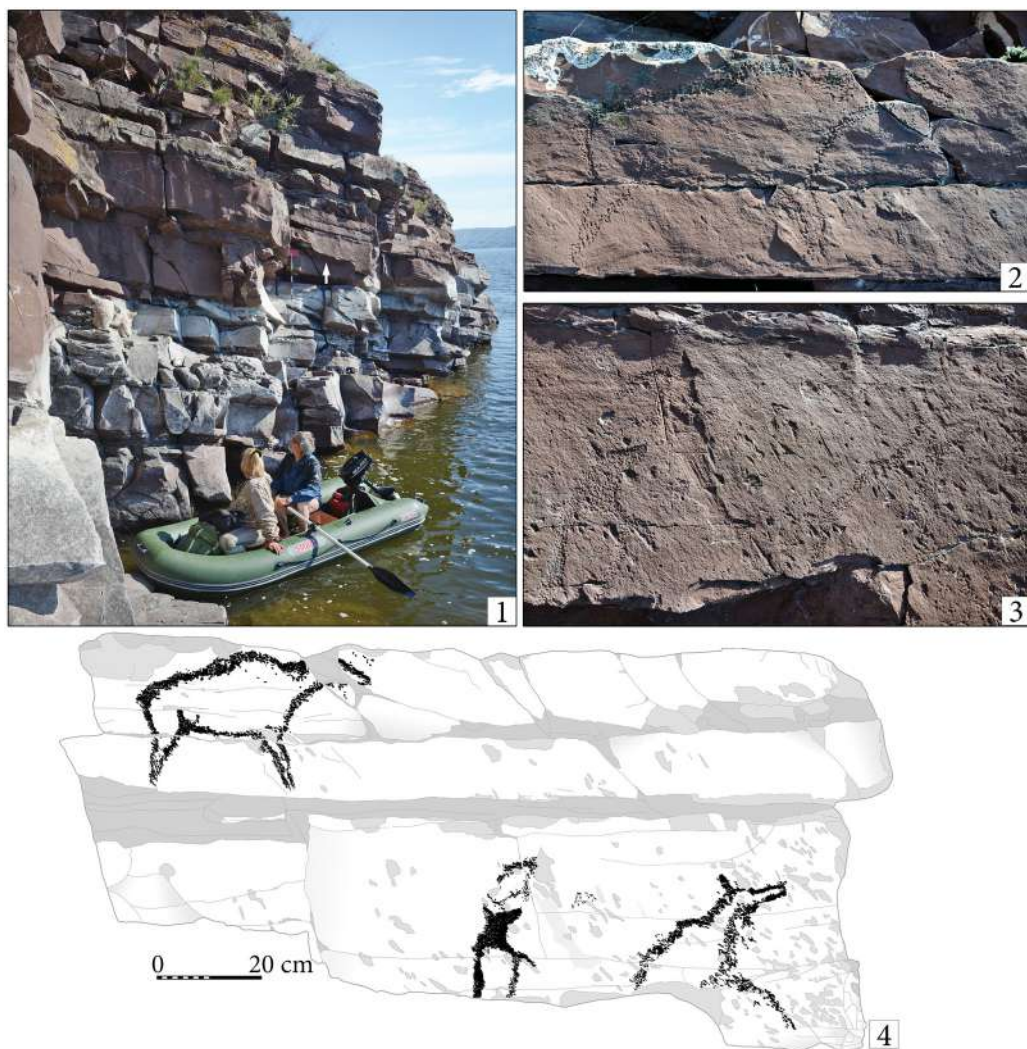


Fig. 4. 1 – survey of riverside cliffs from a boat, an arrow points to surfaces 15 and 16 located just above the highest flood level; 2–4 – surfaces 15 and 16, photos and a tracing

Рис. 4. 1 – обследование береговых скал с лодки, стрелка указывает на плоскости 15 и 16, расположенные непосредственно над самым высоким уровнем затопления; 2–4 – плоскости 15 и 16, фото и прорисовка



Fig. 5. Surface 20: 1 – tracing; 2 – photo, fragment with images of confronting arkhars

Рис. 5. Плоскость 20: 1 – прорисовка; 2 – фото, фрагмент с изображением противостоящих архаров

In July of the same year, the water level had risen by 3 m and the panels found in May had gone underwater. However, this enabled us to inspect the next higher tier of rocks from the boat and to find two panels at the very edge of the water (Fig. 4). Moreover, later, on carefully inspecting the slopes with binoculars from the highest water level, we found that rock art was also present on the tiers of rock outcrops well above the flood level. As a result the new site was supplemented with a series of other interesting panels. Some of them are on steep inaccessible rocks high above the water (Fig. 2.-3; Fig. 6.-3, 4, 6), while others are on the moun-



tainside on the higher levels of rocky outcrops, access to which is still possible but very difficult because of the destruction of the lower levels (Fig. 5; 6.-1, 2, 5). Applying the described search technique in subsequent seasons, in this southern section by 2019 we revealed 24 panels at different levels containing about 50 individual images.

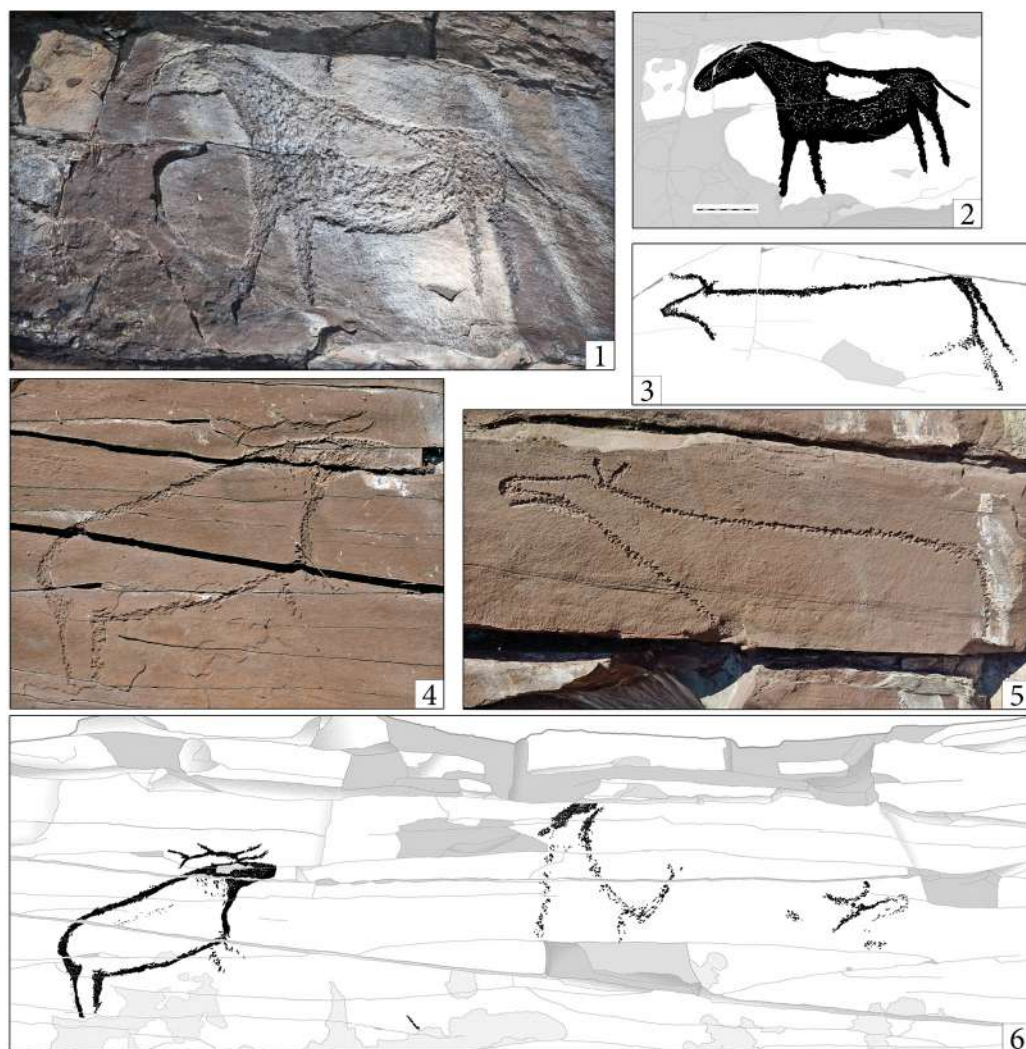


Fig. 6. 1, 2 – surface 19, photo and tracing; 3 – surface 23, tracing; 4, 6 – surface 24, photo of the image of a deer and tracing; 5 – surface 18, photo

Рис. 6. 1, 2 – плоскость 19, фото и прорисовка; 3 – плоскость 23, прорисовка; 4, 6 – плоскость 24, фото с изображением оленя и прорисовка; 5 – плоскость 18, фото

We used photography as our method of documenting the revealed decorated surfaces, but this was not an easy task. Photographing in strictly orthogonal projection was difficult or im-

possible in almost all cases. It had to be done either from a boat (drifting with the current and rocking on waves), or too close to the panel from narrow ledges, or at an angle from below, and so on. It was impossible to get close enough to the panels high on the slopes, so we photographed them from the water, from a boat, using a full matrix camera and long-focus lenses, trying to minimise perspective distortions (Miklashevich, Bove, 2017). Under such conditions it is impossible to use a scale and perspective distortions are still inevitable, but we have succeeded in capturing details of the images. There were also other problems: due to the impossibility of using artificial light, one has to wait for optimal sunlight, which for some panels lasts only a couple of hours, and this does not always coincide with other conditions of boat use; it is not always possible to clear the panels of plaque, lichen, traces of insect life, etc. (this makes the identification of image details from the photograph less accurate). Nevertheless, all the revealed panels have been photographed to the best possible quality.

The next stage in the documentation process is the creation of digital graphic multi-layered renderings (tracings). We apply the photomontage method, when a series of shots of fragments of each panel are compiled into a very high resolution photo image; then, on top of it, using the Photoshop program, the images and the rock surface in all their details and features are traced at high magnification (Fig. 2.-2; 3; 4.-4; 5.-1; 6.-2, 3, 6). The resulting tracing makes it possible to assess the state of preservation of each decorated surface, and facilitates analysis and interpretation of the imagery.

#### **Characteristics of the Site**

The new site “Oglakhty Bereg-I” is located in the southernmost section of the riverside line of the Oglakhty mountain range and contains 24 decorated surfaces revealed so far. They are located in groups over a length of 230 m, at various elevations. Thirteen of them are being periodically flooded, the others are above the flood level. The rock massif is composed of red Devonian sandstone; the images were made with a pecking technique on the vertical and sub-vertical surfaces of the rock outcrops facing south and south-east.

The state of preservation of all panels is unsatisfactory. The flooded ones, of course, have suffered the most. The petroglyphs on them have survived in fragments on the preserved pieces of rock crust, and not only has the crust become detached, but whole stone blocks have fallen off. The natural cornices above and below the panels are lost. The preserved surfaces have been damaged by rocks falling from above and probably also by ice drifts. It is noticeable that even the rock massif itself underwent significant changes: the block with panel 7, for example, moved along a vertical fracture to the river, overshadowing part of an image on panel 8, and another stone fell into the cleft from above (Fig. 2.-1). The state of those panels which are periodically flooded and exposed is very unstable, and they are under constant threat of collapse. The panels located above the water level are more stable, although they too have damage such as exfoliation of rock crust, loss of stone fragments, cracks, traces of falling stones and so on. But their main danger lies in the gradual destruction of the underlying layers of the rock massif. It is obvious that the 24 panels we discovered are only a minor part of the art that once decorated the riverside cliffs at the southern tip of the Oglakhty mountains. It seems a miracle that they have survived for several millennia in the open air, and even more so after several decades under water.

There is a total of about 50 images on the panels, of which about half are more or less complete recognizable figures; the other half are fragments and remnants, but some of them can still be identified by their content. The repertoire and quantitative distribution of the images are: elks (11), red deer and (?) roe (9), wild sheep (arkhar?) (6), aurochs (5), goat (4), wild horse (1), bear (?) (1), fish (1), uncertain animals (7), uncertain images (3–5). As one can see, all of these are images of animals. They are rendered both in outline and silhouette; many of the figures are quite large in size (up to 50–70 cm long), most of them are very realistic, and some are even highly artistic. One of the discovered compositions is a true masterpiece of rock art (Fig. 5): two arkhars (?) facing each other are depicted with amazing skill and a profound knowledge of nature, with very accurately depicted curved horns, bent muzzle, split hooves, fur of a different colour on the belly rendered by an absence of pecking, and other details. Such realistic depictions of this animal species and this kind of composition were not previously known in the early rock art of the Minusinsk Basin, although stylistically similar images do occur. On the same panel there is also a beautiful figure of an elk with a crown of antlers, and on a nearby panel a silhouetted image of a wild horse (Fig. 6.-1) is depicted and it too has an unpecked spot on its back, probably indicating fur of another colour.

All the images at this site can be attributed to the oldest phase in the rock art of the Oglakhty and of the Minusinsk Basin in general. As was mentioned above, the cultural and chronological attribution of this phase is not yet established, except that the figures are undoubtedly earlier than the Bronze Age (images of the Bronze Age and later periods have convincing connections in the archaeological materials of the region). However, this phase is not stylistically and iconographically homogeneous, either in Oglakhty or in other rock art complexes of the Minusinsk Basin. Among them two most vivid stylistic groups have long ago been distinguished, conventionally called the “Minusinsk” and “Angara” traditions or styles (Podolskiy, 1973; Sher, 1980, p. 186–193); but actually, apart from these two groups there are many other images which bear features of either group or both, or their variations and reminiscences. What also unites all these various stylistic groups is the repertoire of images and their presence at the same sites and even on the same panels. In general, the classic “Minusinsk style” is clearly earlier than the classic “Angara style”, but it is not yet clear how they correspond to the other groups: are the other groups chronologically between “Minusinsk” and “Angara” styles? Do the stylistic differences reflect different chronological positions of various groups? Or maybe they are just various individual artistic styles from the same period? We have already proposed that, in order to solve these questions, all the groups should be studied as a whole so far, combined under the term “the earliest rock art of the Minusinsk Basin” (Miklashevich, 2015b, p. 67). So the petroglyphs of the new site in Oglakhty perfectly reflect this eclecticism of the early phase. There are images of classical “Minusinsk” style (Fig. 2.-2; 3.-1, 2; 4.-4), there are images with some features of “Angara” style (Fig. 2.-3; 5.-1 (elk, arkhars); 6.-2), and there are images with no clearly definable features of either, but with features that in images from other sites are combined with characteristic features of “Minusinsk” or “Angara” style. While not denying the chronological differences within the earliest phase, we tend to think that some stylistic features can be better explained not so much by chronology as by the individual style of the ancient artists. Thus, using the site under consideration as an example, we may assume that the wild horse on panel 18 and the confronted arkhars and antlered elk on panel 19 were

executed by the same master (compare fig. 5 and fig. 6.-1, 2). Also, it seems to us that the same (another) master executed the image of an elk on panel 17 and an aurochs on panel 22 (compare fig. 6.-3 and fig. 6.-5). Their style differs markedly from that of the previous group, but does this necessarily mean that they belong to different cultures? This is how the accumulation of such observations and their analysis can, in our opinion, help us to advance questions of the attribution of the oldest phase in the rock art of the Minusinsk Basin.

### Conclusion

Thus, as a result of field investigations carried out in accordance with the seasonal water-level fluctuations in the upper reaches of the Krasnoyarsk reservoir on the Yenisei River, a new rock art site has been discovered on the riverside cliffs in the Oglakhty mountains, which was considered to have been well studied for its rock art; moreover, the rock art there was thought to be lost due to flooding. In the process of investigating the new site, a methodology was developed for revealing and documenting petroglyphs on the slopes of riverside cliffs in the zone of periodic flooding, which has also been successfully applied at other sites. The revealed imagery considerably replenished the source base for the study and analysis of the earliest phase of rock art in the Minusinsk Basin, which is important as the data for its cultural and chronological attribution are not yet sufficient.

### Declaration of Competing Interest

The author declares that there are no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### REFERENCES

- Adrianov A. V. A Survey of the Minusinsk Rock Art Sites in the Summer of 1907. *Izvestiya Russkogo Komiteta dlya izucheniya Srednej i Vostochnoj Azii = Proceedings of the Russian Committee for the Study of Central and East Asia*. 1908;8:37–46. (In Russ.)
- Miklashevich E. A. The Oglakhty Rock Art Complex: Informational Potential and Research Perspectives. *Sayano-Altajskoe nauchnoe obozrenie. Arheologiya = Sayan-Altay Scientific Review. Archaeology*. 2015a;1(9):54–77. (In Russ.)
- Miklashevich E. A. The Earliest Rock Art Imagery of the Minusinsk Basin: Research Problems and Perspectives. *Uchenye zapiski muzeya-zapovednika "Tomskaya Pisanica" = Scientific Notes of the "Tomskaya Pisanitsa" Museum-Reserve*. 2015b;2:66–78. (In Russ.).
- Miklashevich E. A., Bove L. L. New Petroglyphs on the Coastal Rocks of the Krasnoyarsk Reservoir (Methods of Search and Documentation Problems). In: *Proceedings of the V (XXI) All-Russian Archaeological Congress in Barnaul — Belokurikha*. Barnaul : Izd-vo Alt. un-ta, 2017. Vol. III. Pp. 121–126. (In Russ.).
- Miklashevich E. A., Bove L. L., Zotkina L. B., Solodeynikov A. K., Tekhterekov A. S. Investigation of the Most Ancient Petroglyphs on the Coastal Rocks of Oglakhty (Khakasia) in 2014. *Vestnik KemGU = Bulletin of Kemerovo State University*. 2015;3/1(61):55–65. (In Russ.).
- Podol'skij N. L. About Principles of Rock Art Dating. *Sovetskaya Archeologiya = Soviet Archaeology*. 1973;3:265–275. (In Russ.)
- Sovetova O. S., Miklashevich E. A. Chronological and Stylistical Peculiarities of the Middle Yenisei Petroglyphs. In: *Archaeology, Ethnography and Museography*. Kemerovo : KemGU, 1999. Pp. 47–74 (In Russ.).

Chlenova N. L. Tagar Horses (on the Links Between the Tribes of SOUTH Siberia and Central Asia in the Scythian Period). In: *Caucasus and Central Asia in Antiquity and the Middle Ages (History and Culture)*. Moscow : Nauka, 1981. Pp. 80–94. (*In Russ.*)

Sher Ya. A. Petroglyphs of Middle and Central Asia. Moscow : Nauka, 1980. 328 p. (*In Russ.*)

Blednova N., Francfort H.-P., Legtchilo N., Martin L., Sacchi D., Sher J., Smirnov D., Soleilhavoup F., Vidal P. Tepsej I–III, Ust'-Tuba I–VI (Russie, Khakassie). *Répertoire des pétroglyphes d'Asie Centrale. Fasc. No. 2. Sibérie du Sud 2*. Paris : Diffusion de Boccard, 1995. 246 p.

Sher J. A., Blednova N., Legchilo N., Smirnov D. Oglakhty I–III (Russie, Khakassie). *Répertoire des pétroglyphes d'Asie Centrale. Fasc. No. 1: Sibérie du Sud 1*. Paris : Diffusion de Boccard, 1994. 156 p.

### СПИСОК ИСТОЧНИКОВ

Адрианов А. В. Обследование писаниц в Минусинском крае летом 1907 года // *Известия Русского Комитета для изучения Средней и Восточной Азии*. 1908. Вып. 8. С. 37–46.

Миклашевич Е. А. Комплекс памятников наскального искусства Оглахты: информационный потенциал и перспективы исследования // *Научное обозрение Саяно-Алтая. Археология*. 2015а. №1(9). С. 54–77.

Миклашевич Е. А. Древнейшие наскальные изображения Минусинской котловины: проблемы и перспективы исследования // *Ученые записки музея-заповедника «Томская Писаница»*. 2015b. Вып. 2. С. 66–78.

Миклашевич Е. А., Бове Л. Л. Новые петроглифы на береговых скалах Красноярского водохранилища (методика поиска и проблемы документирования) // *Труды V (XXI) Всероссийского археологического съезда в Барнауле — Белокурихе*. Барнаул : Изд-во Алт. ун-та, 2017. Т. III. С. 121–126.

Миклашевич Е. А., Бове Л. Л., Зоткина Л. В., Солодейников А. К., Тыхтереков А. С. Исследование петроглифов древнейшего пласта на береговых скалах Оглахты в 2014 г. // *Вестник КемГУ*. 2015. Т. 3, №1(61). С. 55–65.

Подольский Н. Л. О принципах датировки наскальных изображений // *Советская археология*. 1973. №3. С. 265–275.

Советова О. С., Миклашевич Е. А. Хронологические и стилистические особенности среднеенейских петроглифов // *Археология, этнография и музейное дело*. Кемерово : КемГУ, 1999. С. 47–74.

Членова Н. Л. Тагарские лошади (о связях племен Южной Сибири и Средней Азии в скифскую эпоху) // *Кавказ и Средняя Азия в древности и средневековье (история и культура)*. М. : Наука, 1981. С. 80–94.

Шер Я. А. Петроглифы Средней и Центральной Азии. М. : Наука, 1980. 328 с.

Blednova N., Francfort H.-P., Legtchilo N., Martin L., Sacchi D., Sher J., Smirnov D., Soleilhavoup F., Vidal P. Tepsej I–III, Ust'-Tuba I–VI (Russie, Khakassie). *Répertoire des pétroglyphes d'Asie Centrale. Fasc. No. 2: Sibérie du Sud 2*. Paris : Diffusion de Boccard, 1995. 246 p.

Sher J. A., Blednova N., Legchilo N., Smirnov D. Oglakhty I–III (Russie, Khakassie). *Répertoire des pétroglyphes d'Asie Centrale. Fasc. No. 1: Sibérie du Sud 1*. Paris : Diffusion de Boccard, 1994. 156 p.

---

**INFORMATION ABOUT THE AUTHOR / ИНФОРМАЦИЯ ОБ АВТОРЕ**

---

**Elena Alexandrovna Miklashevich**, Researcher, Institute of Archaeology RAS, Moscow, Russia; Senior Researcher, “Tomskaya Pisanitsa” Kuzbass Museum-Reserve, Kemerovo, Russia.

**Миклашевич Елена Александровна**, научный сотрудник Института археологии РАН, Москва, Россия; старший научный сотрудник Кузбасского музея-заповедника «Томская Писаница», Кемерово, Россия.

*The article was submitted 26.07.2022;*

*approved after reviewing 22.08.2022;*

*accepted for publication 31.08.2022.*

*Статья поступила в редакцию 26.07.2022;*

*одобрена после рецензирования 22.08.2022;*

*принята к публикации 31.08.2022.*

Research Article / Научная статья

УДК 902(571.5)

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-04](https://doi.org/10.14258/tpai(2022)34(3).-04)

## LATE UPPER PALEOLITHIC OF THE LOWER VITIM (BASED ON THE DATA OF KOVRIZHKA-III-IV AND BOL'SHOI YAKOR'-I SITES)

**Aleksei V. Tetenkin**

*Irkutsk National Research Technical University, Irkutsk, Russia;  
altet@list.ru, <https://orcid.org/0000-0003-2448-3580>*

**Abstract.** The multilayer sites Kovrizhka-IV and Bol'shoi Yakor'-I, Kovrizhka-III (Baikal-Patom Highlands, Lower Vitim) make it possible to characterize the Late Upper Paleolithic (LUP) at the early, 19–17 Kyr BP, and late, 15–13 Kyr BC, stages, respectively. The high information potential makes it possible to highlight the culture and activities of the inhabitants in terms of lithic production and microblade splitting, living features, settling, hunting, the transportation of mineral resources from remote sources, sign-symbolic activity and art. The lithic assemblages of LUP appearance, in general, show continuity from the early stage to the late one. In microblade splitting, this is expressed in the translation of the Kovrizhka and Yubetsu-Bol'shoi Yakor' techniques for preparing the wedge-shaped microcore and reducing the biface. For the early stage, chisel-shaped tools are more typical than for the late stage, for the late stage - transversal burins. On Kovrizhka-IV (early stage), the remains of dwelling features were found, art objects were discovered as well as numerous evidence of the use of ocher. Bol'shoi Yakor'-I and Kovrizhka-III (late stage) show various hearth complexes and specific structures made of gneiss slabs. Culturally and typologically, the LUP of the Lower Vitim correlates with the Studenovskaya culture of Southern Transbaikalia at an early stage, the Dyuktai culture of Yakutia, and the Verkholsenskaya culture of Southwestern Cisbaikalia at a later stage. In the early Holocene, LUP traditions were continued in a number of sites. However, already along with the appeared complexes of the Mesolithic appearance.

**Key words:** Eastern Siberia, Baikal-Patom Highlands, Late Upper Paleolithic, Sartan glaciation, Final Pleistocene, lithic industry, microblade splitting, dwelling, ocher, art

**Acknowledgements:** the study was carried out with the support of grant from the Russian Foundation for Basic Research, project No. 21-59-93002.

**For citation:** Tetenkin A. V. Late Upper Paleolithic of the Lower Vitim (Based on the Data of Kovrizhka-III-IV and Bol'shoi Yakor'-I Sites). *Teoriya i praktika arheologicheskikh issledovaniy = Theory and Practice of Archaeological Research*. 2022;34(3):54–80. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-04](https://doi.org/10.14258/tpai(2022)34(3).-04)

## ПОЗДНИЙ ВЕРХНИЙ ПАЛЕОЛИТ НИЖНЕГО ВИТИМА (ПО МАТЕРИАЛАМ СТОЯНОК КОВРИЖКА-III-IV И БОЛЬШОЙ ЯКОРЬ-I)

**Алексей Владимирович Тетенькин**

*Иркутский национальный исследовательский технический университет, Иркутск, Россия;  
altet@list.ru, <https://orcid.org/0000-0003-2448-3580>*

**Резюме.** Многослойные памятники Коврижка-IV и Большой Якорь-I, Коврижка-III (Байкало-Патомское нагорье, Нижний Витим) дают возможность характеризовать поздний верхний

палеолит (ПВП) на раннем, 19–17 тыс. л.н., и позднем, 15–13 тыс. л.н., этапах соответственно. Высокий информационный потенциал позволяет описывать культуру и деятельность обитателей в аспектах каменного производства и микропластинчатого расщепления, жилищных структур, выбора места поселения, охотничьего промысла, доставки минеральных ресурсов с удаленных источников, знаково-символической деятельности и искусства. Каменные индустрии общего ПВП-облика демонстрируют преемственность от раннего этапа к позднему. В микрорасщеплении это выражается в трансляции коврижской и юбецу-большаякорской техник подготовки клиновидного нуклеуса и редукции бифаса. Для раннего этапа больше, чем для позднего, характерны долотовидные орудия, для позднего этапа — трансверсальные резцы. На Коврижке-IV (ранний этап) выявлены остатки жилищных конструкций, открыты предметы искусства, многочисленные свидетельства использования охры. На Большом Ягоре-I, Коврижке-III (поздний этап) представлены разнообразные очажные комплексы и специфические постройки из гнейсовых плит. Культурно-типологически ПВП Нижнего Витима соотносится со студеновской культурой Южного Забайкалья на раннем этапе, дюктайской культурой Якутии и верхоленской культурой Юго-Западного Прибайкалья на позднем этапе. В раннем голоцене ПВП традиции нашли продолжение в ряде стоянок. Однако уже наряду с появившимися комплексами мезолитического облика.

**Ключевые слова:** Восточная Сибирь, Байкало-Патомское нагорье, поздний верхний палеолит, сартанское оледенение, финальный плейстоцен, каменная индустрия, микропластинчатое расщепление, жилище, охра, искусство

**Благодарности:** исследование осуществлено при поддержке гранта РФФИ, проект №21-59-93002.

---

*Для цитирования:* Поздний верхний палеолит Нижнего Витима (по материалам стоянок Коврижка-III–IV и Большой Якорь-I) // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 54–80. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-04](https://doi.org/10.14258/tpai(2022)34(3).-04)

---

## Introduction

The active, systematic research has been carried out in the archaeology of the Stone Age of Lower Vitim for more than 45 years. The main efforts were directed to the study of the Upper Paleolithic and Mesolithic. The first Paleolithic site of Avdeikha was explored in the 1970s. (Mochanov, 1975, 1977). In 1985–2010 the Bol'shoi Yakor-I site was studied (Ineshin and Tetenkin, 2010). It gave rich, complex information about the life of ancient people at the end of the Sartan Glaciation (MIS 2). These representations were supplemented by materials from Kovrizhka-III site, which was excavated in 2003–2012. Its Paleolithic horizons are somewhat later in relation to Bol'shoi Yakor-I (Tetenkin, 2016). Since 2007, studies have been carried out at the Kovrizhka-IV site, which made it possible to characterize the time of the end of the Last Glacial Maximum (LGM) (Tetenkin, 2017b). Another site, Mamakan-VI, characterized the Lower Vitim Paleolithic in the interval preceding the time of Kovrizhka-IV (Tetenkin, 2014a). The materials of Mamakan-VI showed a significant difference from the lithic industry of Kovrizhka-IV and Bol'shoi Yakor'-I. As a result, archaeological work opened up the possibility of a diachronic characterization of the Late Upper Paleolithic (LUP) of 19–13 Kyr BP (hereinafter, the age is calibrated), represented at an early stage (Kovrizhka Stage) by Kovrizhka-IV and at late stage (Bol'shoi Yakor' Stage) by Bol'shoi Yakor'-I and Kovrizhka-III (Tetenkin, 2018). This article is devoted to a comprehensive characterization of the LUP of the Lower Vitim in terms of paleoecology, settlement structures, stone industry, mobility, and sign-symbolic activity.



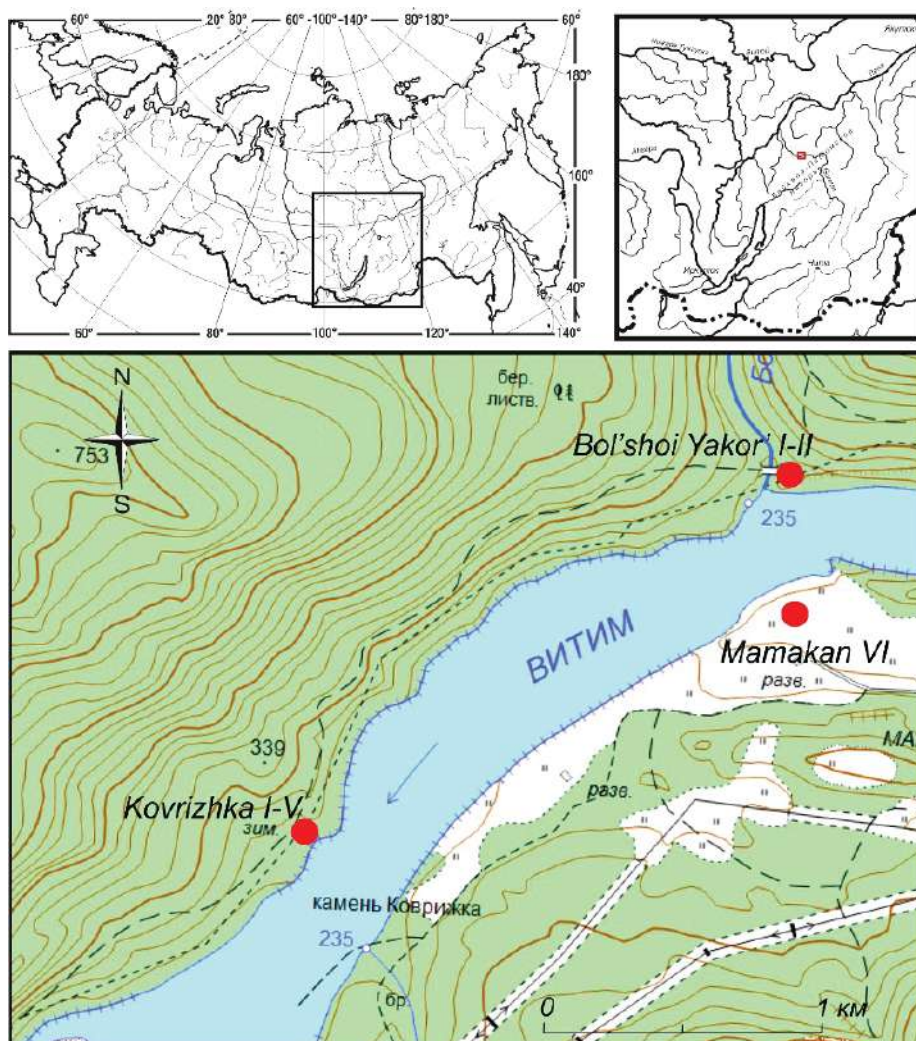


Fig. 1. Maps of the location of Bol'shoi Yakor'-I, Kovrizhka I-V, Mamakan-VI sites

Рис. 1. Карты-схемы местоположения стоянок Большой Якорь-I, Коврижка-I-V, Мамакан-VI

### Materials (General Characteristics of Reference Sites of the Late Upper Paleolithic of the Lower Vitim)

The Kovrizhka Stage (19–17 Kyr BP) is most clearly represented by 12 horizons of Kovrizhka-IV site in the Lower Vitim, dated in the interval 19000–18000 cal. BP (Fig. 1, 2) (Tetenkin, Henry, Klementiev, 2017; Tetenkin, 2017b, 2018; Tetenkin et al., 2020). On an 11-meter terrace, the remains of dwellings (Fig. 3.-1), as well as hearth zones, were discovered and studied. The activity situations of living on the site are characterized as a variability of functional options. The oldest objects of art in the Northern Baikal region have been discovered, including an anthropomorphic figurine made of mammoth tusk (Fig. 3.-2) (Tetenkin, Henry, Klementiev, 2017; Tetenkin et al., 2018).

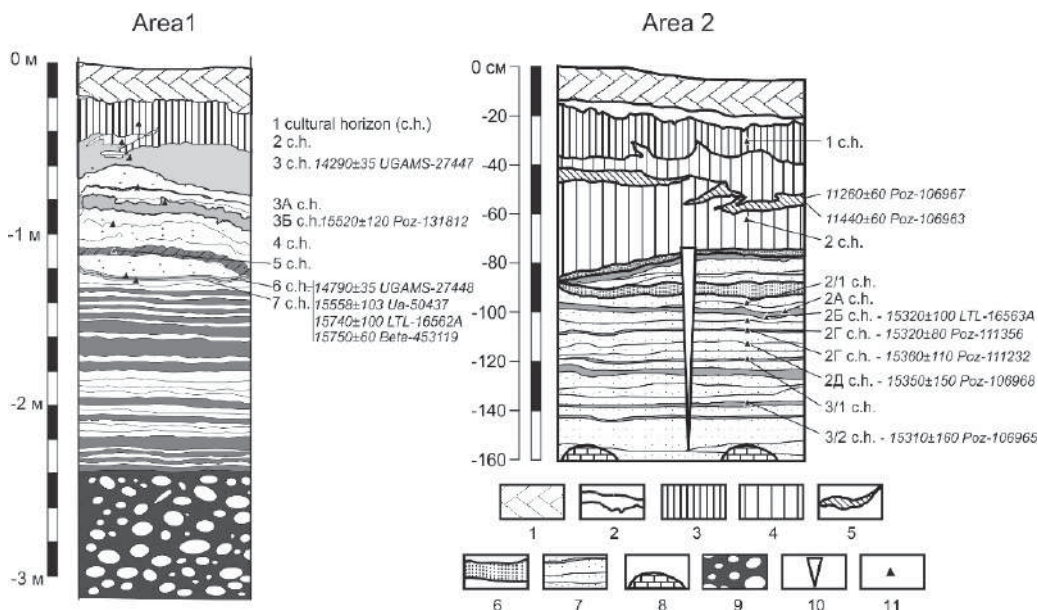


Fig. 2. Stratigraphy of the Kovrizhka-IV site. The numbers indicate: 1 – modern soil, 2 – podzol, 3 – orange-yellow sandy loam, 4 – light green sandy loam, 5 – dark brown sandy loam (buried soil), 6 – light yellow sand with grit, 7 – sands, sandy loams and aleurites horizontally and rhythmically layered, light and dark gray, 8 – bedrock, 9 – pebble bed, 10 – cryogenic crack, 11 – cultural horizon (after: Tetenkin et al., 2021, with additions)

Рис. 2. Стратиграфия стоянки Коврижка-IV. Цифрами обозначены: 1 – дерн, 2 – подзол, 3 – супесь оранжево-желтая, 4 – супесь светло-зеленая, 5 – супесь темно-коричневая (погребенная почва), 6 – песок светло-желтый с дресвой, 7 – пески, супеси и алевриты горизонтально и ритмичнослоистые, светло- и темно-серые, 8 – цоколь, 9 – галечник, культурный горизонт, 10 – криогенная трещина, 11 – культурный горизонт (по: Тетенкин и др., 2021, с добавлениями)

The phenomenon of several horizons is the widespread use of ocher up to the treatment of the hearth zone with it (Tetenkin et al., 2020). The technique for preparing the wedge-shaped core was reconstructed in detail and most completely for the Northern Baikal region, which was designated as “Kovrizhka Type of Microcore Preparation” (Fig. 4) (Tetenkin, 2017a). It represents a line of preparation of a wedge-shaped preform of a high contour from a biface or a flake and the design and revitalization of the striking platform with blows from the lateral and front. Along with this, products of the Yubetsu technique developed in the region in the Final Sartan (Fig. 3.-14) were found on Kovrizhka-IV (Tetenkin, 2017a). Traceologic analysis delineated cases of mounting tools in handles and using segments of microblades as inserts for slotted hunting points (Gauvrit Roux, Teten'kin, Henry, 2021).

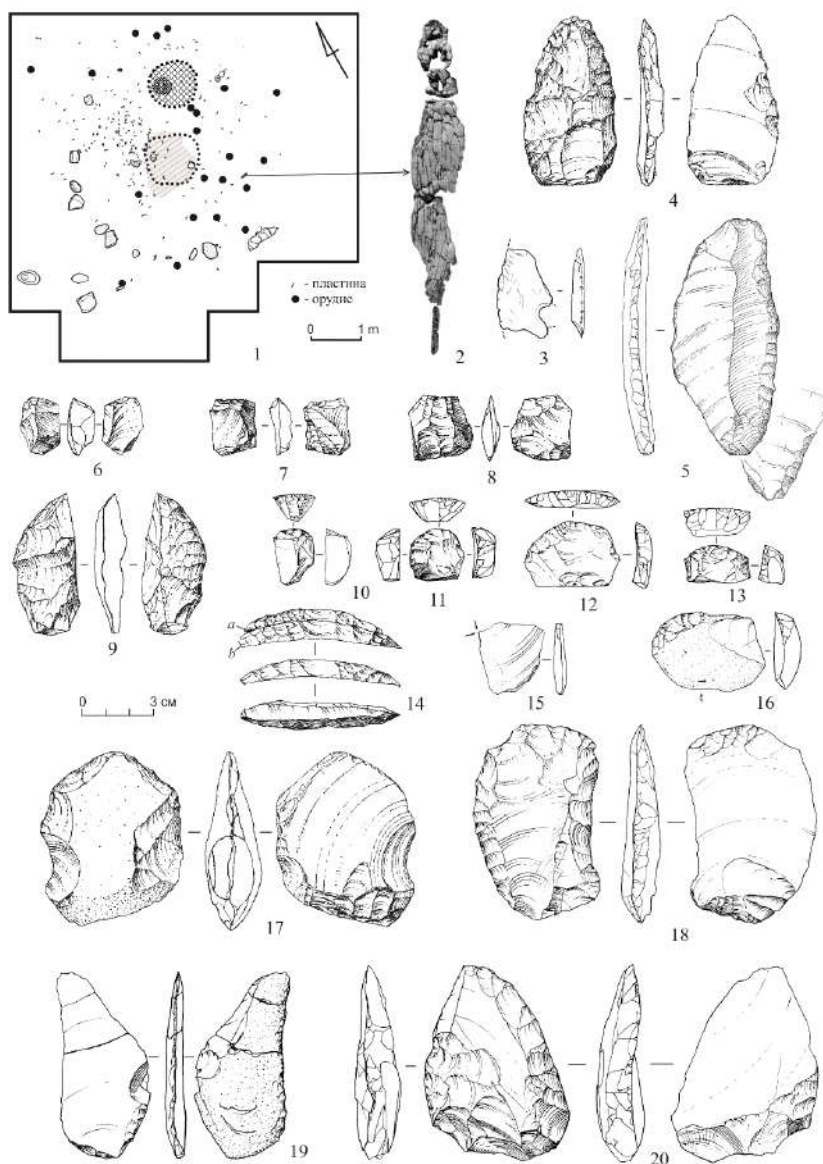


Fig. 3. Kovrizhka-IV site, cultural horizon 6 – 1, 2, 10–13, 15, 16, 18–20, c.h. 4 – 3, c.h. 3B – 4, 5, c.h. 2B – 6–9, 14, 17; 1 – scheme of the dwelling in c.h. 6, 2 – anthropomorphic figurine, 3 – fragment of graphite pendant, 4, 5, 19, 20 – knives, 6–8 – *pieces esquillees*, 9 – biface, 10–13, 16, 17 – end-scrapers, 14 – crest spall and ski spall, 15 – burin, 18 – side-scraper (after: Tetenkin, 2017b)

Рис. 3. Стоянка Коврижка-IV, к.г. 6 – 1, 2, 10–13, 15, 16, 18–20, к.г. 4 – 3, к.г. 3B – 4, 5, к.г. 2B – 6–9, 14, 17; 1 – схема жилища в к.г. 6, 2 – антропоморфная фигура, 3 – фрагмент подвески из графитита, 4, 5, 19, 20 – ножи, 6–8 – долотовидные орудия типа *pieces esquillees*, 9 – бифасы, 10–13, 16, 17 – скребки, 14 – реберчатый и лыжевидный сколы, 15 – резец, 18 – скребло (по: Тетенькин, 2017б)



Fig. 4. Kovrizhka-IV site, cultural horizon 2B – 1–5, c.h. 6 – 7–9, 1–9 – wedge-shaped microcores (after: Tetenkin, 2017b)

Рис. 4. Стоянка Коврижка-IV, к.г. 2В – 1–5, к.г. 6 – 7–9, 1–9 – клиновидные микроядрасы (по: Тетенькин, 2017б)

In addition to microcores the Kovrizhka-IV lithic production culture contains unifaces with longitudinal retouched working edges, traceologically identified as knives and scrapers, round and end scrapers, retouched flakes, traceologically identified as meat knives, hide scrapers, bone and horn carvers, chisel-shaped *pièce esquillée*, atypical angled burins, pebble cores of parallel and radial splitting principle (Fig. 3, 4) (Tetenkin, 2017b). The closest analogs of this industry are found in the Studenoe culture of Transbaikalia (Studenoe-1, 2, Ust-Menza-1, 2) and the Dyuktai culture of Yakutia (Konstantinov, 1994; Moroz, 2014; Mochanov, 1977). At Studenoe-1, 2, Ust-Menza-1, 2 (Transbaikalia), microcores, scrapers, chisel-shaped tools, side-scrapers are morpho-typologically similar or same (Konstantinov, 1994). The Tolbaga analogy is found in large blades (Konstantinov, 1994; Tashak, 2016). The impression from the analogies between the tools and cores of the lower horizons of Kovrizhka-IV with the Studenoe culture is enhanced by the discovery of dwellings on the Lower Vitim. The main correlate for them is exactly the dwellings of southern Transbaikalia (Konstantinov, 2001; Razgildeeva, 2018). In sum, the structurally complex dwellings and the morpho-typologically close appearance of the tools and cores of the lower horizons of Kovrizhka-IV and the complexes of southern Transbaikalia work towards a version of cultural closeness and, finally, cultural transmission from southern Transbaikalia to Lower Vitim in the considering chronological period.

In relation to the Dyuktai culture, several local specific features are visible. The lithic industry of the lower cultural horizons of Kovrizhka-IV contains a significant series of chisel-shaped tools of the *pièce esquillée* type, which is poorly represented in the Dyuktai culture. There are no transversal burins on Kovrizhka-IV site.

The study of the mineral composition of ocher established that it was obtained by mechanical crushing of brought pieces of hematite. The search for sources of ocher showed, according to the data available today, that it was delivered from iron ore deposits containing the accompanying mineral hematite, more than 500 km away from Kovrizhka (Tetenkin et al., 2020). In all three horizons 6, 2G, and 2B ocher of the quartz-hematite association was delivered from deposits located southeast of Kovrizhka, that is, upstream of the Vitim. But at the same time, in the 2G c.h. ocher of a different composition and origin from the deposits of the Angaro-Il'insk or Severo-Baikal regions was also revealed, and in addition, ocher from the Neolithic burial ground Turuka in the north of the Upper Lena turned out to be similar in composition. The case of ocher transportation reveals for us the ability of people of that time to obtain resources from sources hundreds of kilometers away and is an example of the so-called "delayed consumption" of resources prepared well ahead of time (Testart, 1982). The southwestern and southeastern transmission vectors of hematite connect the regions of the northwestern and northeastern Baikal region in one economic episode.

In terms of dwelling constructions on Kovrizhka-IV, 19–18 Kyr BP, we reconstruct the cultural and technological complex developed by the inhabitants of Vitim valley under the conditions of the lasting Last Glacial Maximum (LGM). This is important to note, since in Paleolithic studies there is an already overcome point of view about the depopulation of Northern Siberia during the LGM period (Goebel, 2002; Pitulko, 2019).

The site of the previous time Mamakan-VI does not reveal morphological and typological similarities with the Kovrizhka-IV culture. Microcores and burins on Mamakan-VI shows a complete difference. There are no bifaces on Mamakan-VI site. Most likely, this can be ex-

plained by a chronological gap with the Kovrizhka-IV complexes and the multicultural nature of these assemblages. As regards younger sites, the cultural horizons of Kovrizhka-IV stand at the beginning of the process of the development of material culture that finally took shape in the Final Pleistocene — Early Holocene.

The most striking site of the Bol'shoi Yakor' Stage (17–12 Kyr BP) is Bol'shoi Yakor'-I on Vitim River (Fig. 1) (Ineshin and Tetenkin, 2010). It represents the several temporal, and seasonal hunting camps of the same culture to each other, and as a result forms the most complete cultural composition (Fig. 5). A series of radiocarbon dates includes the age of a pack of cultural horizons (9–3A c.h.) of about 15.1–13.6 Kyr BP. The leading forms in the assemblage are Yubetsu microcores from bifaces, transversal burins and end-scrapers from flakes (Fig. 6.-1–5, 6.-6, 7.-6). The technology of modification and multi-purpose weapon and core use of bifaces has been reconstructed within the framework of the technique of longitudinal reducing known as the Yubetsu technique (Fig. 7.-6) (Morlan, 1976; Nakazawa et al., 2005). A characteristic typological feature of several bifaces from cultural horizons 9, 8, 6, and 5 was an oblique butt (with reference to the cutting edge) (Fig. 7.-1, 2). All the bifaces of this form were residual — that is, they were not subjected to further reduction. This specific morphology is the example of specialization only as a tool (not tool and core-preform) seen in the bifaces from site (Ineshin and Tetenkin, 2010, p. 218; Ineshin and Tetenkin, 2017, p. 252). This type is also characteristic of a number of sites of the Dyuktai culture of Yakutia, in particular, the Khaiyrigas Cave site, located 310 km to the northeast (Mochanov, 1977, pp. 28.10, 28.11; Stepanov et al., 2003, fig. 5.13, 5.14). The set of bone tools of the Bol'shoi Yakor' consists of slotted points, blunt points, a harpoon, mallet, and needles (Fig. 6.-10–13). Graphite artifacts represent sign-symbolic activity.

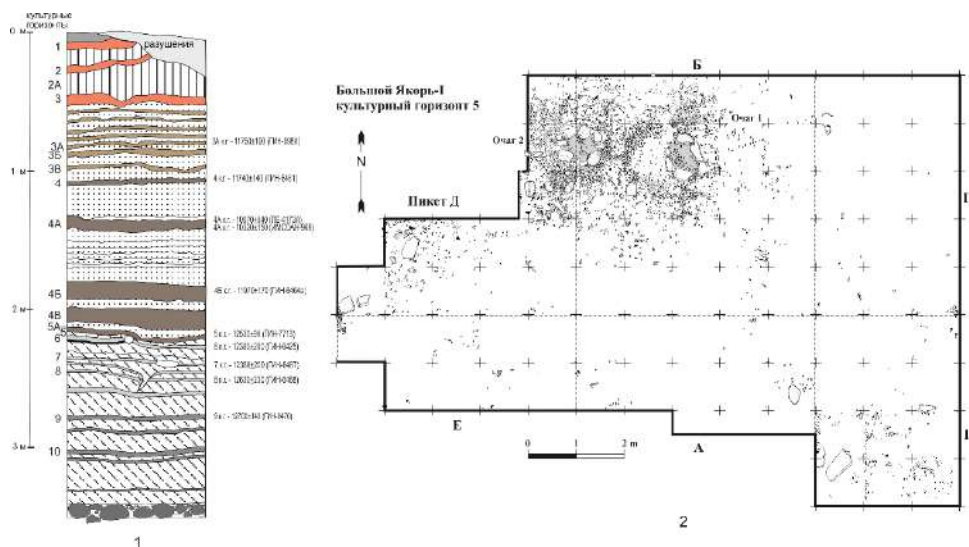


Fig. 5. Bol'shoi Yakor'-I site: 1 — stratigraphy, 2 — plan of the cultural horizon 5 (after: Ineshin, Tetenkin, 2010, with changes).

Рис. 5. Стоянка Большой Якорь-I: 1 — стратиграфическая колонка, 2 — план 5-го культурного горизонта (по: Инешин Е.М., Тетенькин А.В., 2010, с изменениями)

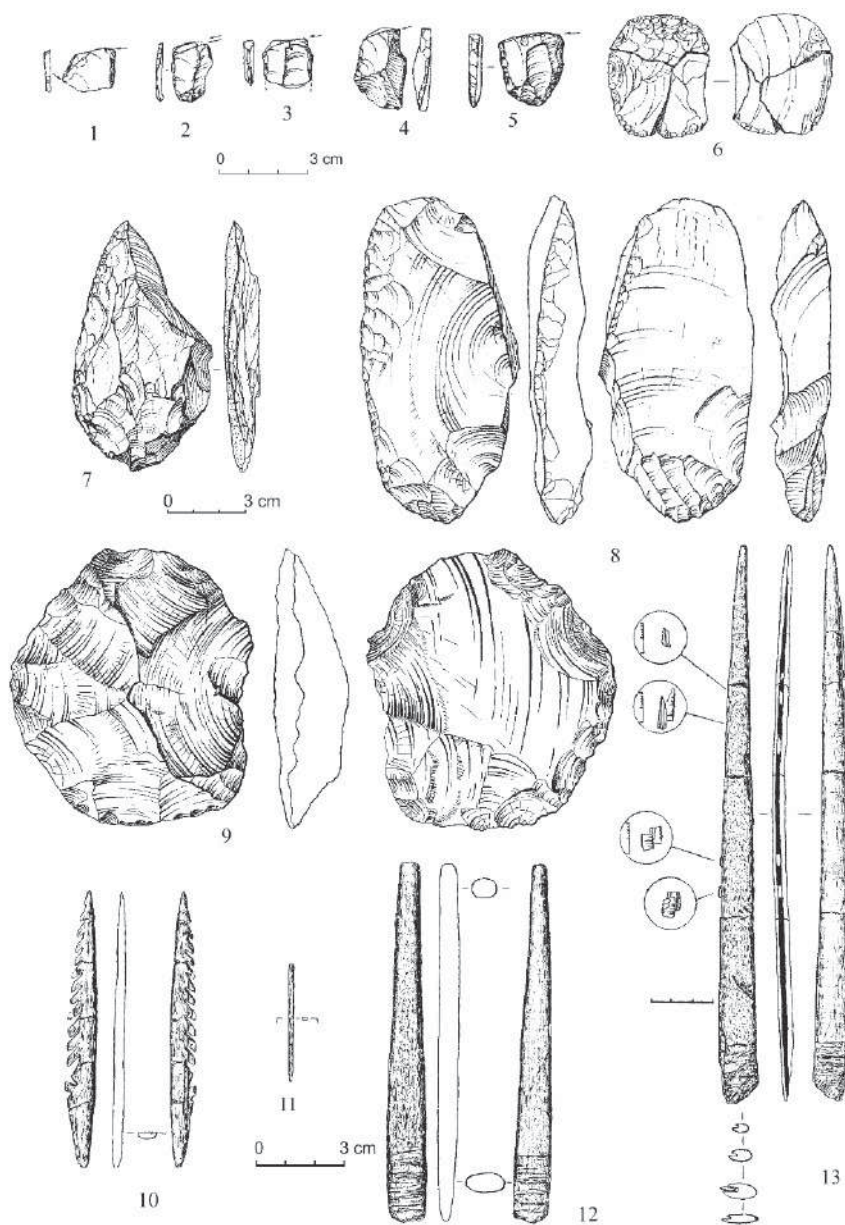


Fig. 6. Bol'shoi Yakor'-I site, cultural horizon 7 – 1–5, c.h. 5 – 6, 8, c.h. 6 – 9–13; 1–5 – transversal burins, 6 – end-scraper, 7, 8 – side-scrapers, 9 – discoid core, 10 – barbed harpoon, 11 – bone needle, 12 – bone blunted point, 13 – slotted point (after: Ineshin, Tetenkin, 2011)

Рис. 6. Стоянка Большой Якорь-I: 1–5 – 7-й культурный горизонт, 6 – 5-й культурный горизонт, 9–13 – 6-й культурный горизонт; 1–5 – трансверсальные резцы, 6 – скребок, 7, 8 – скребла, 9 – дисковидный нуклеус, 10 – гарпун, 11 – игла, 12 – затупленный наконечник, 13 – вкладышевый наконечник (по: Ineshin, Tetenkin, 2011)

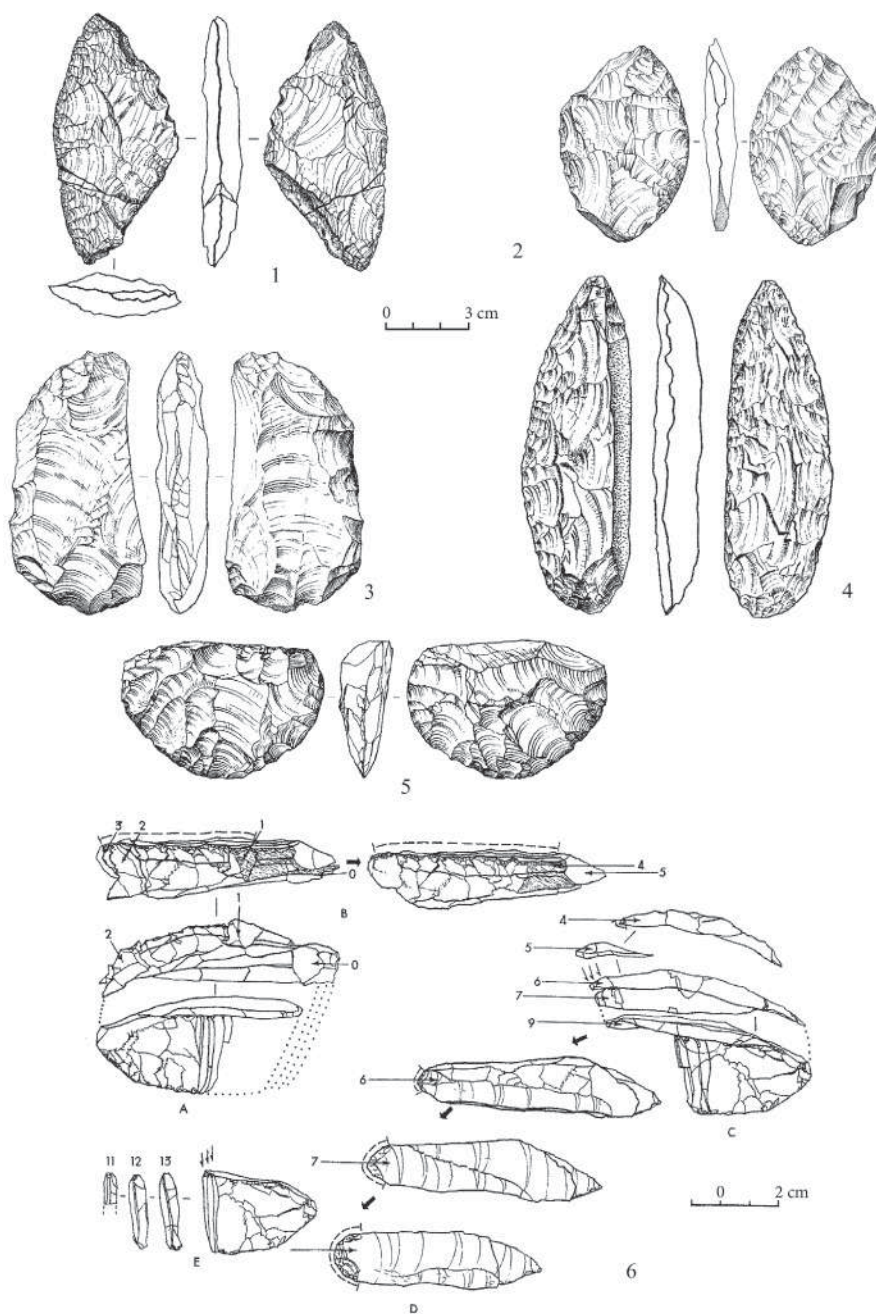


Fig. 7. Bol'shoi Yakor'-I site, cultural horizon 6 – 1–5, c.h. 3B – 6; 1–5 – bifaces, 6 – refitting block of the biface – wedge-shaped microcore (after: Ineshin, Tetenkin, 2011)

Рис. 7. Стоянка Большой Якорь-1, к.г. 6 – 1–5, к.г. 3B – 6; 1–5 – бифасы, 6 – аппликационный блок бифаса – клиновидного микронуклеуса (по: Ineshin, Tetenkin, 2011)



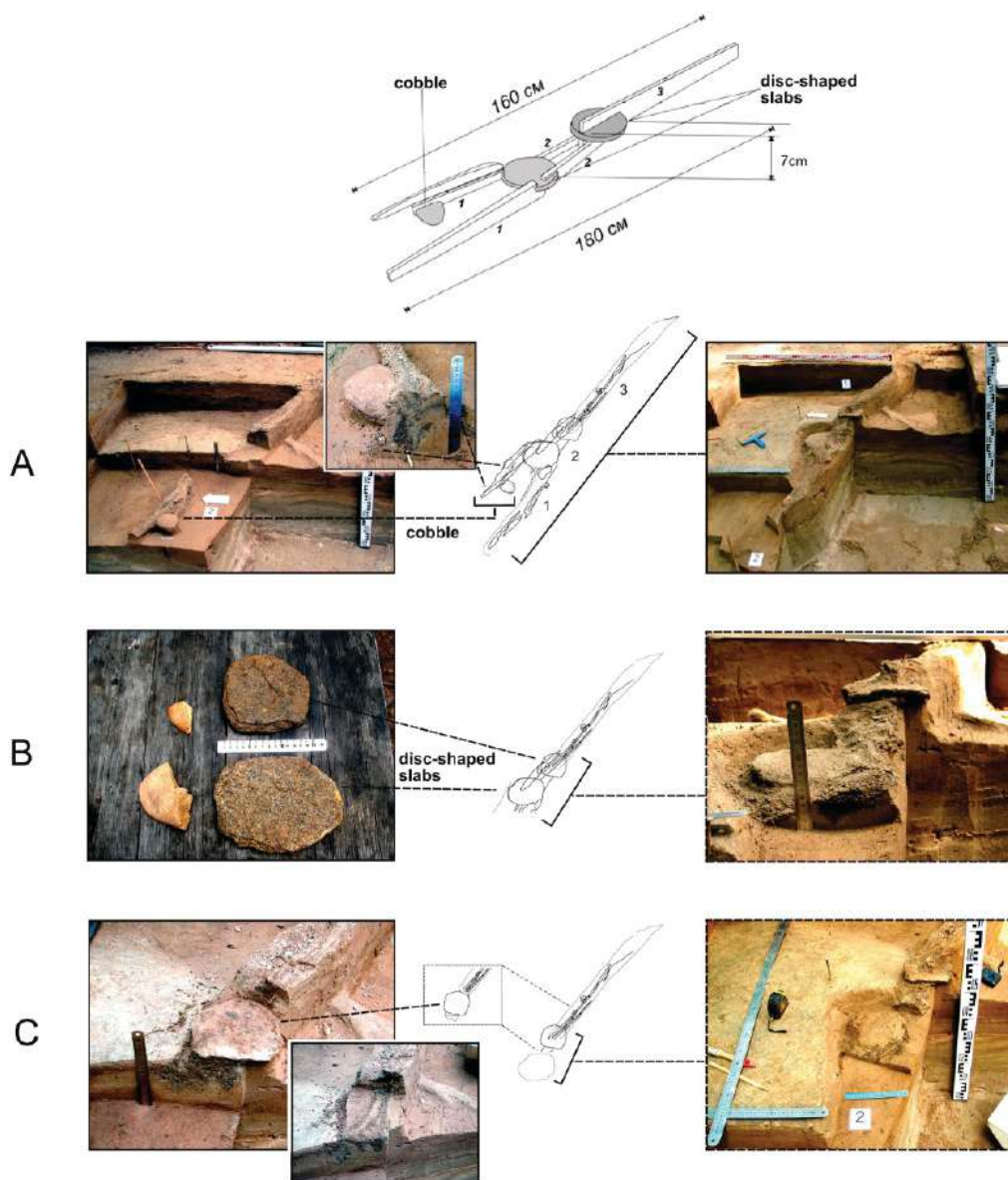


Fig. 8. Kovrizhka-III site. Composite graphic showing the slab feature from the upper level of cultural horizon 2: top and center column. Schematic diagrams of the Y-shaped slab feature: (A, left) photo of gneiss slab embedded in sediment and supported by cobble; (A, right) photo of entire feature in situ partially covered by alluvial lens; (B, left) photo of manufactured disc-shaped oval gneiss slabs and cobble pieces used to support slabs; (B, right) photo of disc-shaped slabs in situ showing vertical displacement; (C, left) photo of upper disc-shaped slab exposed in situ showing cross-sections of decomposed linear slabs arranged in an interlocking position (inset); (C, right) photo of upper disc-shaped slab in situ, alluvial lens to the left, and sediment beneath lower disc shaped slab (after: Teten'kin, Smith, Henry, 2016)

Рис. 8. Стоянка Коврижка-III. Графические рисунки показывают конструкцию из плит из верхнего уровня 2-го культурного горизонта: вверху и центральная колонка. Схематические диаграммы Y-образной плиты: (А, слева) фотография гнейсовой плиты, погруженной в отложения и поддерживаемой галькой; (А, справа) фотография всего объекта на месте, частично перекрытого аллювиальной линзой; (В, слева) фотография изготовленных дискообразных овальных гнейсовых плит и кусков гальки, используемых для поддержки плит; (В, справа) фотография дискообразных плит на месте, показывающая разные по вертикали уровни вложения; (С, слева) фотография верхней дискообразной плиты, обнаженной на месте, показывающая поперечные сечения разложившихся линейных плит, расположенных в сцепленном положении (врезка); (С, справа) фотография верхней дискообразной плиты на месте, аллювиальная линза слева и отложения под нижней дискообразной плитой

The lithic assemblage of Bol'shoi Yakor'-I is attributed to the Duktai culture of Yakutia and the Verkhholenskaya culture of the southwestern Baikal region (Belousov et al., 1990; Ineshin, Tetenkin, 2010, 2017). In the Northern Baikal region, the closest analogues to the Bol'shoi Yakor'-I cultural complex were found in the 2<sup>nd</sup> and 1<sup>st</sup> consolidated pre-Neolithic horizons of Kurla-I-III in Northern Baikal, chronologically somewhat earlier (Shmygun, 1981; Molchanov G.N., Molchanov D.N., Lipnina, 2019), as well as in the lithic industry of 8, 8a and 7 cultural horizons of Ust'-Karenga-I-XVI on Upper Vitim (Vetrov, 2011). Within the framework of the local typological systematics of the assemblages of the Lower Vitim, the lower cultural horizons were combined into a group of assemblages of the "Bol'shoi Yakor' Type" (Tetenkin, 2011).

Close in age to Bol'shoi Yakor'-I is the Avdeikha site (Mochanov, 1975; 1977; Mochanov and Fedoseeva, 1996). However, it demonstrates, although Duktai in appearance, but different in typological specific industry. Its inhabitants were familiar with the method of Yubetsu, but the wedge-shaped cores of the Kovrizhka method of preparation dominate. Transversal burins are rare. Angled burins made of randomly shaped flakes predominate. This type of industry was designated as "assemblages of the Avdeikha Type" (Tetenkin, 2011).

In the final Pleistocene, at a somewhat later time, ca. 13.5–12.2 Kyr BP there were 2, 3 c.h. in the Kovrizhka-III site (Tetenkin, 2016). In the 2 c.h. the remains of hearths equipped with gneiss slab fragments were excavated, which are apparently a superposition of episodes of habitation at different times. A repeated phenomenon of the orientation of gneiss slabs in the south-east direction to an outstanding rock ledge on the horizon line on the opposite side of the Vitim River was revealed. The most complex construction of slabs had a Y-shape and was built using the methods of digging in, supporting with stones in a vertical position, and grooving horizontal and vertical elements (Fig. 8) (Tetenkin, 2016). "Key" stones had an artificial form of oval discs. For the first time in the Paleolithic of Eastern Siberia, we are talking about such an activity as the processing of building stone — gneiss slabs. The purpose of these structures is not clear. In the c.h. 2 in Kovrizhka-III site, pieces of volcanic pumice were found and it was established that it comes from the Udokan volcanic field, more than 500 km away from Kovrizhka along the river valleys (Demonterova et al., 2014). Following the data obtained on the transportation of ocher in the c.h. 6, 2G and 2B in Kovrizhka-IV, these materials mean the ability of the inhabitants to trip hundreds of kilometers to obtain specific mineral resources.

Lithic assemblages of c.h. 2 and 3 of Kovrizhka-III, combining the features of bifaces, microcores of the Kovrizhka Type, cores of parallel and radial principles of splitting the flakes,

end-scrapers, side-scrapers, burins, flakes with marginal retouching, and choppers, are assemblages of the Avdeikha Type (Fig. 9) (Tetenkin, 2016). A noticeable feature of c.h. 2 is macroblades up to 12 cm long (Fig. 9.-9).

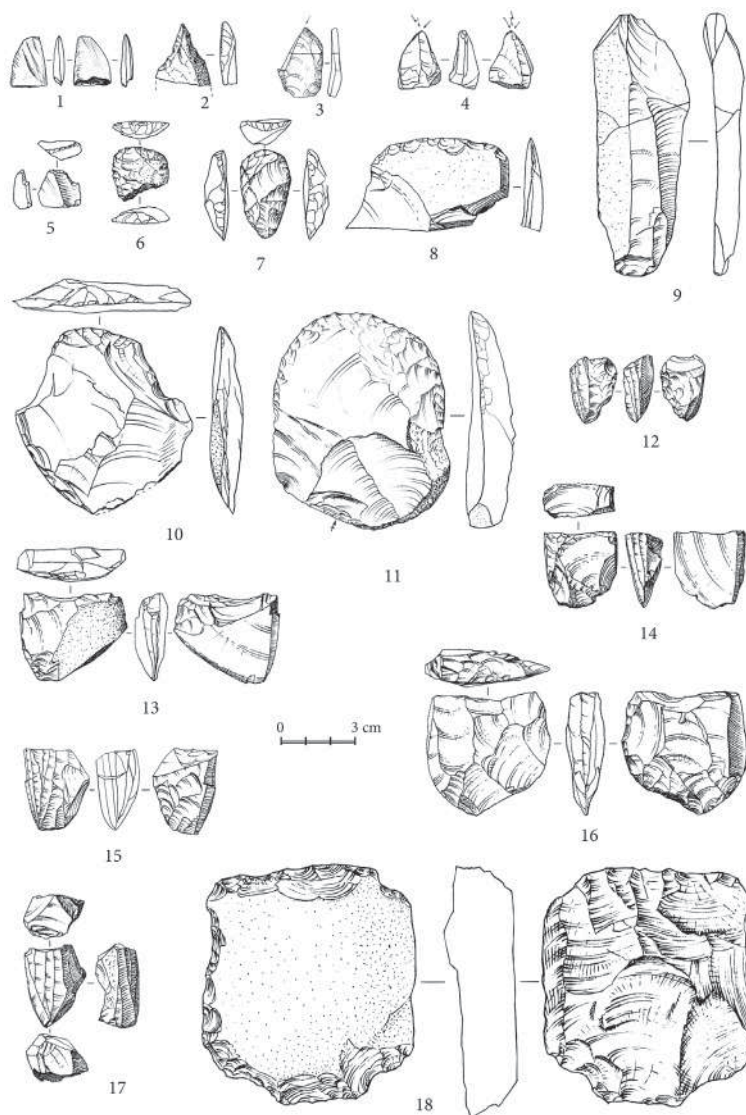


Fig. 9. Kovrizhka-III site, cultural horizon 2: 1 – graphite artifact, 2 – perforator, 3, 4 – burins, 5–7, 9 – end-scrapers, 8, 10, 11 – side-scrapers, 9 – blade, 12–17 – microblade cores, 18 – core (after: Tetenkin, 2014)

Рис. 9. Стоянка Коврижка-III, культурный горизонт 2: 1 – графитовый артефакт, 2 – провертка, 3, 4 – резцы, 5–7, 9 – скребки, 8, 10, 11 – скребла, 9 – пластина, 12–17 – микронуклеусы, 18 – нуклеус (по: Тетенькин, 2014)

### **Paleoenvironmental Context and Settling**

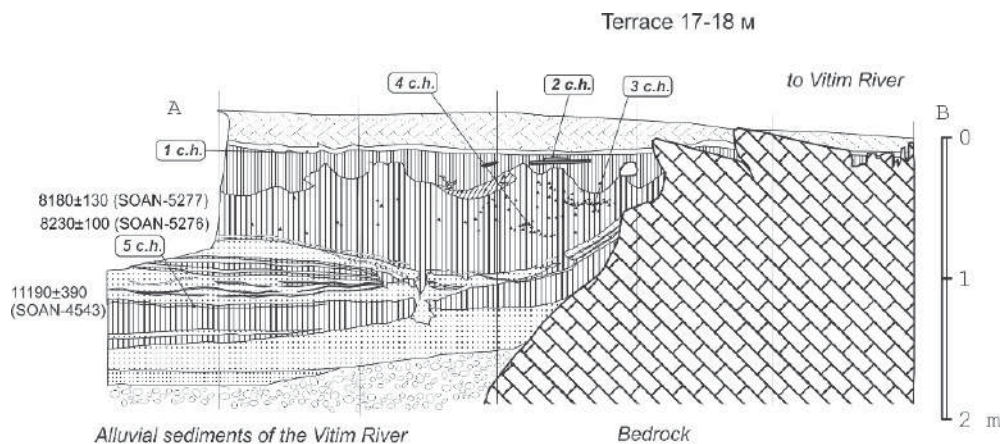
The taphonomic conditions of the Kovrizhka-IV site, unfortunately, hinder the satisfactory preservation of the bone. Only a snow sheep (*Ovis Nivicola*) was identified by teeth in several cases, and in a single case, an elk (Tetenkin, Anri, Klementiev, 2017, p. 48). However, the good preservation of charcoal made it possible to conduct anthracological studies, which established the nature of the landscape as a forest-tundra with a predominance of shrub willow in forest vegetation, in combination with dwarf birch, larch, and juniper in the form of isolated local areas of forest vegetation (Henry et al., 2018).

Radiocarbon dating of the 12 lower horizons of Kovrizhka-IV determined their age to be 19–18 kyr BP, which corresponds to the end of the LGM (Bezrukova et al., 2010, p. 194). However, two dates ca. 35 Kyr BP for the c.h. 2G and the date ca. 22 Kyr BP for c.h. 3/2 for charcoal suggest that the inhabitants probably also used ancient wood which could have been brought by a river flood. The position of the site immediately behind the steep cliff of Cape Kovrizhka indicates not only that the possibility of shelter in the wind and water shade was used, but, probably, the cape was also used for hunting purposes, since, in fact, it is a “bottle-neck” in the valley. The location of the site features right on the sandy beach near the edge indicates a flood-safe season from autumn to spring, and a conclusion about the winter season made on the data of the animals teeth from c.h. 6 and 2B (Tetenkin, Henry, Klement'ev, 2017, p. 48; Tetenkin et al., 2016, p. 15).

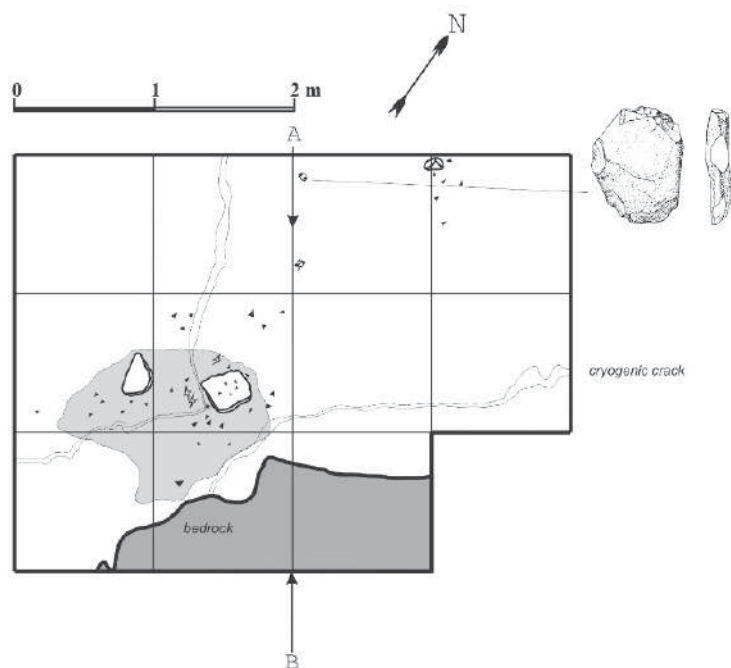
The paleontological composition of the Bol'shoi Yakor'-I collection gave rich ideas about the paleo environment and hunting activity of people (Ineshin and Tetenkin, 2010, pp. 95–103; Ineshin and Tetenkin, 2017, pp. 105–113). The combination of such species as horse, bison, musk ox, snow sheep and elk, sable, wolf indicates a mosaic, mainly tundra-steppe cold landscape with isolated areas of forest near-valley vegetation. The range of certain fauna allows reconstructing the trade as non-specialized hunting for large animals — seasonal hunting and carrying away, and life support at the site itself due to the hunting of small species — hare, arctic fox, fish, and birds. Based on seasonal determinations made by the teeth of animals a part of the horizons are attributed to late autumn — early winter, and another part — to early spring (Ineshin and Tetenkin, 2010, p. 233; Ineshin and Tetenkin, 2017, p. 267). The site features of Bol'shoi Yakor'-I were located on the beach cape (now it's a 15-m terrace), i.e., like Kovrizhka-IV, at the bottom of the valley. On the contrary, Kovrizhka-III is located 7–8 m above Bol'shoi Yakor'-I (22-m terrace), in a place that is safer from floods. It can be assumed that this is due to the summer time of habitation.

### **Site Living Features**

The hearth and the accumulation of cultural remains near it are the main planigraphic structural unit of the LUP sites of the Lower Vitim. Of the four such features excavated at Kovrizhka-IV in c.h. 2B, 2D, 3/2, and 6, three ones were identified as the remains of dwellings (Fig. 3.-1) (Tetenkin, Henry and Klement'ev, 2017; Tetenkin et al., 2021). In the c.h. 6 selectivity in the choice of stones for the building of a dwelling found expression in four pairs of rounded boulders and an unrounded slab. The most important distinctive feature of Kovrizhka-IV, unique for the Northern Baikal region, is the widespread use of ocher up to the coloring of the hearth space (Tetenkin et al., 2020).



1



2

Fig. 10. Kovrizhka-II site: 1 – stratigraphic profile, 2 – plan of the hearth of cultural level 5 (after: Tetenkin, 2010, with changes)

Рис. 10. Стоянка Коврижка-II: 1 - стратиграфический профиль А-В, 2 – план очага 5 культурного горизонта (по: Тетенькин, 2010, с изменениями)

At Bol'shoi Yakor'-I, the planigraphy of cultural horizons contains various examples of hearth complexes. In several cases, patterns of doubled (paired) hearths were recorded, reconstructed as both belong to a single episode of habitation (Fig. 5.-2). Perhaps this was a certain characteristic method of heating, spending the night, but there are no distinguished structural features of dwellings. In three horizons 3B, 7, and 8, however, light dwellings are still identified due to the limits of the areas of the accumulations of artifacts (Ineshin, Tetenkin, 2010, pp. 115, 133, 197; Ineshin, Tetenkin, 2017, pp. 126–127, 145, 228). Both on Kovrizhka-IV and on Bol'shoi Yakor'-I, hearth stones were heated on a fire, not only in the form of single stones, or several along the perimeter, but also in the form of special buildings. In these cases, we find the existed technology of heat accumulation and long-term heating of the hearth space.

On Kovrizhka-III, linear buildings made of gneiss slabs became an individual feature (Fig. 8). The study of the most complex of them, the Y-shaped building, showed that some of its elements had artificial contours and dimensions (Tetenkin, 2016, pp. 279–282; Teten'kin, Smith, Henry, 2016). In fact, this brings us into a completely new field of activity in the processing of stone building materials.

On Kovrizhka-II, in cultural horizon 5, ca. 13,0 Kyr BP, a hearth with two gneiss slabs lying on charcoals was found near a rocky outcrop. The residual outcrop played the role of a wind and visual shelter from the side of the Vitim River (Fig. 10) (Tetenkin, 2010, p. 81).

### Lithic Production

In the LUP of Lower Vitim, the technology of microblade production — the splitting of wedge-shaped cores was being developed. The technique of slotted insert tools is associated with it. They constitute, so called, progressive part of the assemblages, the background for which is the production of stone tools from spalls and flakes, large blades of the Upper Paleolithic appearance, in general, but also with some preserved more archaic elements.

The leading for the Bol'shoi Yakor'-I concentrations Yubetsu technique was known to the inhabitants of Kovrizhka-IV. Ski-spalls were found in three of its horizons 2B, 4 and 5 (Fig. 3.-14). Bifaces, although not such expressive as on Bol'shoi Yakor'-I, on Kovrizhka-IV are undoubtedly a significant part. Most of its wedge-shaped cores are made of bifaces. Large, well-finished tools are characterized by bifacial processing of the edges (Fig. 3.-5, 18, 20). Obvious analogies with Bol'shoi Yakor'-I are also found in end-scrapers made from short flakes. Among the differences, one should mention the absence of chisel-shaped *pièce esquillée* tools on Bol'shoi Yakor'-I, and the absence of transversal burins on Kovrizhka-IV. Macroblades of Kovrizhka-IV, found in cultural horizons 3/2, 3B, can be compared with macroblades of c.h. 2 Kovrizhka-III, on the Bol'shoi Yakor'-I there are no analogues for them.

The method of preparation of the wedge-shaped core, well presented on Kovrizhka-IV, and designated as “Kovrizhka Method” (Fig. 4), was used in the industry of Avdeikha and Kovrizhka-III sites. Assemblages of the Avdeikha Type and the Bol'shoi Yakor' Type make antithesis to each other based on the general Duktay/LUP background. As an explanation for the differences in the techniques of the wedge-shaped microcore, the idea of the Kovrizhka method of its preparation, renewal, and reshaping, which is more flexible exploitation of microcores, and the Yubetsu-Bol'shoi Yakor' method aimed more at the flexible exploitation of the biface, rather than the core, were proposed (Tetenkin, 2017a). Functional factors (economic, raw material, seasonal) are proposed as reasons for the variability. On Kovrizh-

ka-IV, this opposition is removed by the presence of the Yubetsu technique, albeit in a minority in relation to the Kovrizhka microcore technique. This circumstance reinforces the thesis that the presence or absence of Yubetsu in the LUP assemblages of the Lower Vitim was due to functional reasons. From Kovrizhka-IV to Bol'shoi Yakor'-I and Kovrizhka-III, the composition of stone raw materials remained unchanged: mainly effusive rocks, with a minority of argillite, quartz, and graphite, from which "crayons", "powder boxes" and pendants are made. In the case of the c.h. 2G of Kovrizhka 4, with an extremely small number of stone debitage, more than half of all artifacts were from quartz. As a result, the general appearance of this horizon has received a significant difference: there are no wedge-shaped and flake cores, microblades, side-scrapers characteristic of LUP (Tetenkin et al., 2021). According to the combination of indirect planigraphic and litho-technological features for the c.h. 2G the winter season for this complex and the snow cover are proposed as the reason for the quantitative and petrographic limitations of the lithic industry. During the Early Holocene the lithic raw material situation changes dramatically with the appearance of sites with an industry of microblade pressure of prismatic chert cores (sites Bol'shaya Severnaya, Invalidny-III — locations 2, 3, Pavlova, etc.), while the sites of a Paleolithic appearance based on the effusive, and argillite sources also existed (sites Kovrizhka-II — c.h. 1-4A, Invalidny-III — location 1) (Ineshin and Tetenkin, 2005; Tetenkin, 2018).

#### **The Inhabitants' Mobility**

Reconstructions of population mobility should consider the limiting factor of the presence of glaciers in the Baikal-Patom highland and Stanovoy upland (Margold et al., 2016). The ability of ancient inhabitants to obtain resources from remote sources is reconstructed by studying exotic mineral rocks such as hematite (ocher), brown argillite, volcanic pumice (Demonterova et al., 2014; Tetenkin, Vetrov, Demonterova et al., 2018; Tetenkin, Zhmur, Demonterova et al., 2018). For Kovrizhka-IV, c.h. 6 and 2B, it was found that some flakes and preforms were brought to the site along with ocher; these artifacts bear traces of contact with it. Based on the materials of Bol'shoi Yakor'-I and Kovrizhka-IV, we reconstruct the transporting to the site of already processed bifaces. In addition, the absence of cores and the debitage of the production of single macroblades of Kovrizhka-IV and III also indicate their bringing in site. The Vitim Valley was an important "natural corridor" for the mobility of people. Volcanic pumice stones were transported to Kovrizhka-III along the Vitim valley. The discovery of the LUP Niryakan site on the Mama River, left tributary of the Vitim River, indicates a people habitation of ca. 13.3 Kyr BP of the middle reaches of the Mama River and interior areas of the Baikal part of the Baikal-Patom Highlands in environment of the ongoing final stage of glaciation (Tetenkin, 2021, p. 18).

#### **Sign-Symbolic Activity and Art**

A unique feature of Kovrizhka-IV was the discovery of an anthropomorphic figurine from a mammoth tusk in c.h. 6 (Fig. 3.-2) (Tetenkin et al., 2018). In the c.h. 4h of Kovrizhka-IV a fragment of a graphite pendant was found (Fig. 3.-3). At Bol'shoi Yakor'-I and Kovrizhka-III various pieces of graphite were found with traces of abrasion and scraping, some of them were given the form of "crayons", "powder boxes" (Ineshin, Tetenkin, 2010, pp. 227-228). At least in some part of the cases, ocher on Kovrizhka-IV was used for sign and symbolic purposes. The found figurine had ocher spots on the "back of the head" and the front part of the "body".

Another conditionally anthropomorphic tusk figure had several pieces of ocher at the “head” (c.h. 6). And the discovery of a large piece of ocher together with a split tubular bone at the edge of the hearth in the c.h. 2B suggests its role in the ritual with a hearth (Tetenkin, Demonterova, Kaneva et al., 2020, fig. 3.k, 3.c). At Bol’shoi Yakor’-I, in c.h. 4A, a flat pebble with traces of rubbing ocher (palette) was found (Ineshin, Tetenkin, 2010, fig. 6.68).

### Conclusions

The LUP sites of the Lower Vitim, of course, were a cultural - an adaptive response to environment. The main sites Bol’shoi Yakor’-I, and Kovrizhka-III, IV characterize the time of 19–12 Kyr BP in such aspects as choosing a place for settlement, building of dwellings and shelters, organization of living space, hunting, exploitation of mineral resources, sign-symbolic activity and art. A further strategy for studying them is aimed precisely at a comprehensive, multifaceted lightning of the culture and life of the population of the Late Upper Paleolithic.

The question of the cultural and genetic connection between the early and late stages of the LUP of the Lower Vitim should be discussed, first of all, on the basis of the most massive data — stone debitage. Both Kovrizhka-IV and Bol’shoi Yakor’-I have lithic assemblages in general of a similar LUP appearance. The Kovrizhka method for preparing the wedge-shaped microcore continued in the final Sartan — Early Holocene. The Yubetsu technique characteristic of Bol’shoi Yakor’-I, although singly, was encountered already at an early stage, on Kovrizhka-IV. The expressive series of chisel-like *piece esquillee* tools were not represented at a later stage. Bifaces with an oblique butt and transversal burins, markers for Bol’shoi Yakor’-I, are not typical for Kovrizhka-IV. Scrapers, uniface scraper-like tools with a bifacial retouching made from large blades and flakes are presented both on Kovrizhka I and Bol’shoi Yakor’-I. The resource base of lithic production, including exotic rocks brought from remote sources, remains unchanged throughout the LUP. The disappearance of some artifacts and the appearance of new ones in the transition from an early stage to a late one is the nature of the development of the culture of lithic production while maintaining continuity of the rest of the set.

The planigraphic data of Kovrizhka-IV and Bol’shoi Yakor’-I lead us to the conclusion that the technical tradition of lining - strengthening the walls of the dwelling with stones was not revealed or was not developed at a later stage. As well as the use of ocher in the coloring of living space has not been developed. At the early and late stages of the LUP of Lower Vitim, both on Kovrizhka-IV and Bol’shoi Yakor’-I, the inhabitants laid stones on the hearths. Calcined, they were used as heat accumulators for heating a limited hearth or living space, possibly also for cooking. In the appearance of the lithic assemblages pronounced cultural indicators of extensive and resource-curation behavior (Bol’shoi Yakor’-I, Kovrizhka-III, IV), planning of operations and delayed consumption (multifunctional transported bifaces at Bol’shoi Yakor’-I and Kovrizhka-IV, bringing ocher from different, distant from each other sources to Kovrizhka-IV). Circumstances of seasonality, availability of lithic raw materials, food resources, duration of habitation, and landscape topics acted as control factors. The integrated vector of activity was determined within the framework of the principle of adaptive variability, which expresses the mobility of ancient people in the choice of current technological knowledge, techniques, methods in the available cultural arsenal (Ineshin, Tetenkin, 2000, p. 228). The most studied and informative sites of Kovrizhka-IV and Bol’shoi Yakor’-I provide a reference idea of the culture of the population of the Northern Baikal region, which find a cor-



relation response in most of the reference sites of the East Siberian Late Upper Paleolithic: Krasny Yar-I, Verkholskaya Gora, Ust-Kyakhta-17, Studenoe-1, 2, Ust-Menza-1, 2, Sukhotino-4, Dyuktayskaya Cave, Ushki-I–VII and others (Medvedev, 1966; Aksenov, 1980; Tashak, 2005; Konstantinov, 1994; Moroz, 2014; Sukhotinsky..., 2016; Mochanov, 1977; Dikov, 1993). On these grounds, an overall judgment about the LUP culture of Lower Vitim is constructed as a judgment about a local variant of the East Siberian Late Upper Paleolithic cultural complex (Derevyanko, Markin, Vasiliev, 1994, p. 260; Vasiliev, 2002, p. 120; Pitulko, Pavlova, 2010, p. 74). The LUP cultural complex of Lower Vitim is largely representative of the population determined by DNA obtained from a tooth from cultural horizon 5 of the Khaiyrgas Cave site (the northern face of the Baikal-Patom Highlands, the Lena River, 310 km north-east of Kovrizhka-IV and Bol'shoi Yakor'-I), ca. 16.7 Kyr BP (Kilinç et al., 2021). The typological similarities in lithic assemblage and dwelling features with the Studenoe culture, visible at Kovrizhka-IV at an early stage of the LUP, may be the result of cultural transmission from South Transbaikalia to Vitim basin.

## REFERENCES

Aksenov M. P. Archaeological Stratigraphy and Layer-by-layer Description of the Inventory of the Verkholskaya Gora I Site. In: Mesolithic of Upper Angara. Irkutsk : Izd-vo Irkut. un-ta, 1980. Issue 2: Sites of the Irkutsk district. Pp. 45–93. (*In Russ.*)

Henry A., Bezrukova E. V., Tetenkin A. V., Kuzmin M. I. New Data for the Reconstruction of Vegetation and Climate in the Baikal-Patom Highlands (Eastern Siberia) during the Maximum of the Last Glaciation — the Early Holocene. *Doklady Akademii nauk = Reports of the Academy of Sciences*. 2018;478(5):584–587. (*In Russ.*) DOI: 10.1134/S1028334X18020113

Belousov V. M., Ineshin E. M., Burakov K. S., Nachasova I. E. Some Results of the Study of the Pleistocene Deposits of the Archaeological Sites of Lower Vitim. In: Chronostratigraphy of the Paleolithic of North, Central and East Asia and America. Novosibirsk : IAET SO RAN, 1990. Pp. 60–65. (*In Russ.*)

Vasil'ev S. A. Paleolithic of Siberia: New Facts, New Concepts. In: Steppes of Eurasia in Antiquity and the Middle Ages. St. Petersburg : Izd-vo Gos. Ermitaga, 2002. Pp. 118–120. (*In Russ.*)

Vetrov V. M. Archeology of the Vitim plateau: Ust-Karenga Culture (13000–5000 BP). In: Actual problems of archeology of Siberia and the Far East. Ussuriysk : Izd-vo UGPI, 2011. Pp. 173–187. (*In Russ.*)

Demonterova E. I., Ivanov A. V., Ineshin E. M., Tetenkin A. V. On the Question of the Mobility of the Ancient Population of the North of Baikal Siberia at the End of the Pleistocene. *Stratum plus*. 2014;1:165–180. (*In Russ.*)

Derevyanko A. P., Markin S. V., Vasil'ev S. A. Paleolithic Studies: An Introduction and Fundamentals. Novosibirsk : Nauka, 1994. 288 p. (*In Russ.*)

Dikov N. N. Paleolithic of Kamchatka and Chukotka in Connection with the Problem of the Initial Settlement of America. Magadan : SVKNII DVO RAN, 1993. 68 p. (*In Russ.*)

Ineshin E. M., Tetenkin A. V. Adaptive Variability in Splitting Systems in the Final Pleistocene Deposits of the Lower Vitim. In: Archaic and Traditional Cultures of Northeast Asia. Problems of Origin and Transcontinental Connections. Irkutsk : Izd-vo Irkut. un-ta, 2000. Pp. 57–24. (*In Russ.*)

Ineshin E. M., Tetenkin A. V. Problems of Studying the Archaeological Sites of the Early Holocene on the Lower Vitim. In: Sociogenesis in North Asia. Irkutsk : Izd-vo IrGTU, 2005. Part 1. Pp. 96–104. (*In Russ.*)

Ineshin E. M., Tetenkin A. V. Human and Natural Environment in the North of Baikalian Siberia in Late Pleistocene. Archaeological site Bol'shoy Yakor'-I. Novosibirsk : Nauka, 2010. 270 p. (*In Russ.*)

Konstantinov A. V. Ancient Dwellings of Transbaikalia: Paleolithic, Mesolithic. Novosibirsk : Nauka, 2001. 224 p. (*In Russ.*)

Konstantinov M. V. Stone Age of the Eastern Region of Baikal Asia. Ulan-Ude; Chita : Izd-vo ION BNC SO RAN, 1994. 180 p. (*In Russ.*)

Medvedev G. I. Archaeological Studies of the Multilayer Paleolithic site Krasny Yar I on the Angara in 1964–1965. In: Reports of Archaeological Expeditions for 1963–1965. Irkutsk : Irkut. obl. kraeved. muzej, 1966. Pp. 5–25. (*In Russ.*)

Molchanov G. N., Molchanov D. N., Lipnina E. A. Technomorphological Analysis of the Stone and Bone Industry from Cultural Horizon 2 of the Kurla I Multilayer Locality in Northern Baikal. *Izvestiya Irkutskogo gosudarstvennogo universiteta. Seriya Geoarheologiya. Ethnoarheologiya. Antropologiya = Bulletin of the Irkutsk State University. Series Geoarchaeology. Ethnoarchaeology. Anthropology.* 2019;28:3–37. (*In Russ.*) DOI <https://doi.org/10.26516/2227-2380.2019.28.3>

Moroz P. V. Stone Industries at the Turn of the Pleistocene and Holocene of Western Transbaikalia. Chita : ZabGU, 2014. 182 p. (*In Russ.*)

Mochanov Yu. A. Stratigraphy and Absolute Chronology of the Paleolithic of Northeast Asia (according to the works of 1963–1973). Yakutia and Its Neighbors in Antiquity. Yakutsk : JaF SO AN SSSR, 1975. Pp. 9–31. (*In Russ.*)

Mochanov Yu. A. The Earliest Stages of Human Settlement in Northeast Asia. Novosibirsk : Nauka, 1977. 264 p. (*In Russ.*)

Pitulko V. V. Race against Time: in Search of the Initial Stage of Human Development of the Siberian Arctic. The Past of Humanity in the Works of St. Petersburg Archaeologists at the Turn of the Millennium (to the 100<sup>th</sup> anniversary of the creation of Russian academic archeology). St. Petersburg : Peterburgskoe vostokovedenie, 2019. Pp. 103–136. (*In Russ.*)

Pitulko V. V., Pavlova E. Yu. Geoarchaeology and Radiocarbon Chronology of the Stone Age of Northeast Asia. St. Petersburg : Nauka, 2010. 264 p. (*In Russ.*)

Razgildeeva I. I. Planigraphic Analysis of Dwelling-Living Features of the Upper Paleolithic in Transbaikalia. Chita : ZabGU, 2018. 208 p. (*In Russ.*)

Stepanov A. D., Kirillin A. S., Vorobyov S. A., Solovieva E. N., Efimov N. N. Khaiyrgas Cave on the Middle Lena (results of research in 1998–1999). In: Ancient Cultures of Northeast Asia. Astroarcheology. Paleoinformatics. Novosibirsk : Nauka, 2003. Pp. 98–113. (*In Russ.*)

Sukhotino Geoarchaeological Complex: a Scientific Guide to the Paleolithic Sites of the Sukhotino Geoarchaeological Vcomplex / comp. E.A. Filatov; Zabaikalsky state. un-t. Chita : ZabGU, 2016. 44 p. (*In Russ.*)

Tashak V. I. Paleolithic and Mesolithic Sites of Ust-Kyakhta. Ulan-Ude : Izd-vo BNC SO RAN, 2005. 130 p. (*In Russ.*)

Tashak V. I. Eastern Complex of the Paleolithic site Podzvonkaya in Western Transbaikalia. Irkutsk : Izd-vo In-ta geografii im. V. B. Sochavy SO RAN, 2016. 185 p. (In Russ.)

Tetenkin A. V. Research Materials of the Ensemble of Archaeological Sites Kovrizhka on Nizhny Vitim (1995–2009). *Izvestiya Laboratorii drevnih tehnologij = Proceedings of the Laboratory of Ancient Technologies*. 2010;8:64–134. (In Russ.)

Tetenkin A. V. The Problem of Determining the Archaeological Specifics of the Baikal-Patom Highlands at the End of the Pleistocene — the First Half of the Holocene. In: Proceedings of the III (XIX) All-Russian Archaeological Congress. Vol. I. St. Petersburg; Moscow; Veliky Novgorod : IIMK RAN, 2011. Pp. 94–95. (In Russ.)

Tetenkin A. V. Late Paleolithic Site Mamakan-VI on Vitim River. *Izvestiya Laboratorii drevnih tehnologij = Proceedings of the Laboratory of Ancient Technologies*. 2014a;4(12):9–26. (In Russ.)

Tetenkin A. V. The Kovrizhka-III Site in the Archaeology of the Lower Vitim and the Baikal-Patom Highlands. In: Proceedings of the IV (XX) All-Russian Archaeological Congress in Kazan. Vol. I. Kazan : Otechestvo, 2014b. Pp. 163–168. (In Russ.)

Tetenkin A. V. Multilayer site of Kovrizhka-III on Lower Vitim. *Stratum plus*. 2016;1:265–315. (In Russ.)

Tetenkin A. V. Technological Context for the Production and Splitting of Microblade Cores Based on the Materials of Cultural Horizons 2B and 6 of the Kovrizhka-IV Site (Vitim, Baikal-Patom Highlands). *Izvestiya IGU. Seriya: Geoarheologiya. Etnoarheologiya. Antropologiya = Bulletin of Irkutsk State University. Series: Geoarchaeology. Ethnology. Anthropology*. 2017a;21:107–135. (In Russ.)

Tetenkin A. V. The Late Paleolithic of Vitim Based on the Materials of the Multilayer Site Kovrizhka-IV (Baikal-Patom Highlands, Eastern Siberia). In: Proceedings of the V (XXI) All-Russian Archaeological Congress in Barnaul — Belokurikha: in 3 volumes. Barnaul : Izd-vo Alt. un-ta, 2017b. Vol. I. Pp. 101–105. (In Russ.)

Tetenkin A. V. Archaeology of the Late Upper Paleolithic and Mesolithic of Lower Vitim and the Baikal-Patom Highlands. *Izvestiya AltGU. Istoricheskie nauki i arheologiya = Bulletin of Altai State University. Historical Sciences and Archaeology*. 2018;2(100):182–187. (In Russ.) DOI 10.14258/izvasu(2018)2-30

Tetenkin A. V. New Paleolithic Component of the Niryakan I Site on the Mama River (Baikal-Patom Highlands). *Izvestiya Laboratorii drevnih tehnologij = Proceedings of the Laboratory of Ancient Technologies*. 2021;17(3):9–21. (In Russ.) DOI: <https://doi.org/10.21285/2415-8739-2021-3-9-21>

Tetenkin A. V., Henry A., Klementiev A. M. Kovrizhka-IV site: Late Paleolithic Complex of the Cultural Horizon 6. *Arheologicheskie vesti = Archaeological News*. 2017;23:33–55. (In Russ.)

Tetenkin A. V., Henry O., Jacquier J., Klementiev A. V., Ulanov A. A. Studies of the New Paleolithic Complex of the Cultural Horizon 2B of the Kovrizhka-IV Site on the Vitim River in 2015–2016 (preliminary report). *Izvestiya laboratorii drevnih tehnologij = Proceedings of the Laboratory of Ancient Technologies*. 2016;4(21):9–18. (In Russ.) DOI: 10.21285/2415-8739-2016-4-9-18

Tetenkin A. V., Vetrov V. M., Demonterova E. I., Pashkova G. V., Kaneva E. V. Argillite Artifacts and Final Pleistocene to Middle Holocene Cultural Links Across the Vitim River Basin

(Baikal Region). *Arheologiya, etnografiya i antropologiya Evrazii = Archeology, Ethnography and Anthropology of Eurasia*. 2018;46(2):16–24. DOI: 10.17746/1563-0110.2018.46.2.016-024

Tetenkin A. V., Demonterova E. I., Kaneva E. V., Henry O., Gauvrit Roux E. Ocher in Late Paleolithic Contexts at the Kovrizhka-IV Site, the Baikal-Patom Highlands (Eastern Siberia, Russia). *Arheologiya, etnografiya i antropologiya Evrazii = Archeology, Ethnography and Anthropology of Eurasia*. 2020;48(3):33–42. DOI: 10.17746/1563-0110.2020.48.3.033-042

Tetenkin A. V., Demonterova E. I., Poplevko G. N., Razgildeeva I. I., Salnaya N. V., Henry O. Late Paleolithic Complex of Cultural Horizon 2G of the Kovrizhka-IV Site on the Vitim River (Baikal-Patom Highlands). *Stratum Plus*. 2021:259–300. (In Russ.)

Tetenkin A. V., Zhmur O. V., Demonterova E. I., Kaneva E. V., Salnaya N. V. Ivory Figurines and the Symbolic Context of a Paleolithic Dwelling at Kovrizhka-IV on the Lower Vitim River, Eastern Siberia. *Arheologiya, etnografiya i antropologiya Evrazii = Archeology, Ethnography and Anthropology of Eurasia*. 2018;46(4):3–12. DOI: 10.17746/1563-0110.2018.46.4.003-012

Shmygun P. E. Pre-ceramic Complexes from the Quaternary Deposits of Northern Baikal. In: Relief and Quaternary Deposits of the Stanovoy Upland. Moscow : Nauka, 1981. Pp. 120–128. (In Russ.)

Bezrukova E. V., Tarasov P. E., Solovieva N., Krivonogov S. K., Riedel F. Last Glacial-Interglacial Vegetation and Environmental Dynamics in Southern Siberia: Chronology, Forcing and Feedbacks. *Palaeogeography, Palaeoclimatology, Palaeoecology*. 2010;296:185–198. doi:10.1016/j.palaeo.2010.07.020

Gauvrit Roux E., Teten'kin A. V., Henry A. Which Uses for the Late Glacial Microblades of Eastern Siberia? Functional Analysis of the Lithic Assemblage of the Lithic Assemblage of Kovrizhka-IV, Level 6. *Izvestiya Laboratorii drevnih tekhnologij = Proceedings of the Laboratory of Ancient Technologies*. 2021;17(2):9–22. DOI: <https://doi.org/10.21285/2415-8739-2021-2-9-22>

Goebel T. The “Microblade Adaptation” and Recolonization of Siberia during the Late Upper Pleistocene. *Archeological Papers of the American Anthropological Association*. 2002;12:117–131.

Ineshin E. M., Teten'kin A. V. Late Paleolithic and Mesolithic Technological Variability in the Lower Vitim Valley, Eastern Siberia. In: From the Yenisei to the Yukon. College Station : Texas A&M University Press, 2011. Pp. 58–74.

Ineshin E. M. and Tetenkin A. V. Humans and the Environment in the Late Pleistocene of Northern Baikalian Siberia. Trans. and ed. P. Hommel and N. Reynolds. Newcastle : Cambridge Scholars Publishing, 2017. 337 p.

Kılınç G. M., Kashuba N., Koptekin D., Bergfeldt N., Dönertaş H. M., Rodriguez-Varela R., Shergin D., Ivanov G., Kichigin D., Pestereva K., Volkov D., Mandryka P., Kharinskii A., Tishkin A., Ineshin E., Kovychev E., Stepanov A., Dalén L., Günther T., Kırdök E., Jakobsson M., Somel M., Krzewińska M., Storå J., Götherström A. Human Population Dynamics and Yersinia Pestis in Ancient Northeast Asia. *Science Advances*. 2021;7(2):eabc4587; doi: 10.1126/sciadv.abc4587 (<https://advances.sciencemag.org/content/7/2/eabc4587>)

Margold M., Jansen K. N., Gurinov A. L., Codilean A. T., Fink D., Preusser F., Reznichenko N. V., Mifsud C. Extensive Glaciation in Transbaikalia, Siberia, at the Last Glacial Maximum. *Quaternary Science Review*. 2016;132:161–174. (<http://dx.doi.org/10.1016/j.quascirev.2015.11.018>)

Mochanov Y. A., Fedoseeva S. A. Chapter 3. Aldansk: Aldan River Valley, Sakha Republic. In: *American Beginnings. The Prehistory and Palaeoecology of Beringia*, Edited by West C. F. Chicago and London : The University of Chicago Press, 1996. Pp. 157–214.

Morlan R. E. Technological Characteristics of Stone Wedge-shaped Cores in Northwestern North America and Northern Asia. *Asian Perspectives*. 1976; 19:96–106.

Nakazawa Y., Izuho M., Takakura J., Yamada S. Toward an Understanding of Technological Variability in Microblade Assemblages in Hokkaido, Japan. *Asian Perspectives*. 2005;44(2):276–292.

Testart A. The Significance of Food Storage among Hunter-Gatherers: Residence Patterns, Population Densities, and Social Inequalities. *Current Anthropology*. 1982;23(5):523–537.

Teten'kin A. V., Smith H.L., Henry A. Archaeological Evidence for the Construction of Features at the Kovrizhka Site, Siberia, during the Pleistocene-Holocene Transition. *Paleoamerica*. 2016;2(4):343–361. DOI: 10.1080/20555563.2016.1204842

### СПИСОК ИСТОЧНИКОВ

Аксенов М. П. Археологическая стратиграфия и послыное описание инвентаря Верхоненской горы I // Мезолит Верхнего Приангарья. Иркутск : Изд-во Иркут. ун-та, 1980. Вып. 2: Памятники Иркутского района. С. 45–93.

Анри А., Безрукова Е. В., Тетенькин А. В., Кузьмин М. И. Новые данные к реконструкции растительности и климата в Байкало-Патомском нагорье (Восточная Сибирь) в максимум последнего оледенения — раннем голоцене // Доклады Академии наук. 2018. Т. 478, №5. С. 584–587. DOI: 10.1134/S1028334X18020113

Белоусов В. М., Инешин Е. М., Бураков К. С., Начасова И. Е. Некоторые итоги изучения плейстоценовых отложений археологических памятников Нижнего Витима // Хроностратиграфия палеолита Северной, Центральной и Восточной Азии и Америки. Новосибирск : ИАЭТ СО РАН, 1990. С. 60–65.

Васильев С. А. Палеолит Сибири: новые факты, новые концепции // Степи Евразии в древности и средневековье. СПб. : Изд-во Гос. Эрмитажа, 2002. С. 118–120.

Ветров В. М. Археология Витимского плоскогорья: Усть-каренгская культура (13000–5000 л.н.) // Актуальные проблемы археологии Сибири и Дальнего Востока. Уссурийск : Изд-во УГПИ, 2011. С. 173–187.

Демонтерова Е. И., Иванов А. В., Инешин Е. М., Тетенькин А. В. К вопросу о мобильности древнего населения севера Байкальской Сибири в конце плейстоцена // *Stratum plus*. 2014. №1. С. 165–180.

Деревянко А. П., Маркин С. В., Васильев С. А. Палеолитоведение: Введение и основы. Новосибирск : Наука, 1994. 288 с.

Диков Н. Н. Палеолит Камчатки и Чукотки в связи с проблемой первоначального заселения Америки. Магадан : СВКНИИ ДВО РАН, 1993. 68 с.

Инешин Е. М., Тетенькин А. В. Адаптивная вариабельность в системах расщепления в финально-плейстоценовых отложениях Нижнего Витима // Архаические и традиционные культуры Северо-Восточной Азии. Проблемы происхождения и трансконтинентальных связей. Иркутск : Изд-во Иркут. ун-та, 2000. С. 57–24.

Инешин Е. М., Тетенькин А. В. Проблемы изучения археологических памятников раннего голоцена на Нижнем Витиме // Социогенез в Северной Азии. Иркутск : Изд-во ИрГТУ, 2005. Ч. 1. С. 96–104.

Инешин Е. М., Тетенькин А. В. Человек и природная среда севера Байкальской Сибири в позднем плейстоцене. Местонахождение Большой Якорь I. Новосибирск : Наука, 2010. 270 с.

Константинов А. В. Древние жилища Забайкалья: палеолит, мезолит. Новосибирск : Наука, 2001. 224 с.

Константинов М. В. Каменный век восточного региона Байкальской Азии. Улан-Удэ; Чита : Изд-во ИОН БНЦ СО РАН, 1994. 180 с.

Медведев Г. И. Археологические исследования многослойной палеолитической стоянки Красный Яр I на Ангаре в 1964–1965 гг. // Отчеты археологических экспедиций за 1963–1965 годы. Иркутск : Иркут. обл. краевед. музей, 1966. С. 5–25.

Молчанов Г. Н., Молчанов Д. Н., Липнина Е. А. Техноморфологический анализ каменной и костяной индустрии из культуросодержащего горизонта 2 многослойного местонахождения Курла I на Северном Байкале // Известия Иркутского государственного университета. Серия Геоархеология. Этноархеология. Антропология. 2019. Т. 28. С. 3–37. DOI <https://doi.org/10.26516/2227-2380.2019.28.3>

Мороз П. В. Каменные индустрии рубежа плейстоцена и голоцена Западного Забайкалья. Чита : ЗабГУ, 2014. 182 с.

Мочанов Ю. А. Стратиграфия и абсолютная хронология палеолита Северо-Восточной Азии (по данным работ 1963–1973 гг.) // Якутия и ее соседи в древности. Якутск : ЯФ СО АН СССР, 1975. С. 9–31.

Мочанов Ю. А. Древнейшие этапы заселения человеком Северо-Восточной Азии. Новосибирск : Наука, 1977. 264 с.

Питулько В. В. Гонка со временем: в поисках начального этапа освоения человеком Сибирской Арктики // Прошлое человечества в трудах петербургских археологов на рубеже тысячелетий (к 100-летию создания российской академической археологии). СПб. : Петербургское востоковедение, 2019. С. 103–136.

Питулько В. В., Павлова Е. Ю. Геоархеология и радиоуглеродная хронология каменного века Северо-Восточной Азии. СПб. : Наука, 2010. 264 с.

Разгильдеева И. И. Планиграфический анализ жилищно-хозяйственных комплексов верхнего палеолита Забайкалья. Чита : ЗабГУ, 2018. 208 с.

Степанов А. Д., Кириллин А. С., Воробьев С. А., Соловьева Е. Н., Ефимов Н. Н. Пещера Хайыргас на Средней Лене (результаты исследований 1998–1999 гг.) // Древние культуры Северо-Восточной Азии. Астроархеология. Палеоинформатика. Новосибирск : Наука, 2003. С. 98–113.

Сухотинский геоархеологический комплекс: научный путеводитель по палеолитическим памятникам Сухотинского геоархеологического комплекса / сост. Е.А. Филатов; Забайкальский гос. ун-т. Чита : ЗабГУ, 2016. 44 с.

Ташак В. И. Палеолитические и мезолитические памятники Усть-Кяхты. Улан-Удэ : Изд-во БНЦ СО РАН, 2005. 130 с.

Ташак В. И. Восточный комплекс палеолитического поселения Подзвонкая в Западном Забайкалье. Иркутск : Изд-во Ин-та географии им. В.Б. Сочавы СО РАН, 2016. 185 с.

Тетенькин А.В. Материалы исследований ансамбля археологических местонахождений Коврижка на Нижнем Витиме (1995–2009 гг.) // Известия Лаборатории древних технологий. 2010. Вып. 8. С. 64–134.

Тетенькин А.В. Проблема определения археологической специфики Байкало-Патомского нагорья в конце плейстоцена — первой половине голоцена // Труды III (XIX) Всероссийского археологического съезда. Т. I. СПб.; М.; Великий Новгород : ИИМК РАН, 2011. С. 94–95.

Тетенькин А.В. Геоархеологическое местонахождение эпохи позднего палеолита Мамакан VI на Витиме // Известия Лаборатории древних технологий. 2014а. №4(12). С. 9–26. DOI: <https://doi.org/10.21285/2415-8739-2021-3-9-21>

Тетенькин А.В. Стоянка Коврижка III в археологии Нижнего Витима и Байкало-Патомского нагорья // Труды IV (XX) Всероссийского археологического съезда в Казани. Т. I. Казань : Отечество, 2014б. С. 163–168.

Тетенькин А.В. Многослойный памятник Коврижка III на Нижнем Витиме // *Stratum plus*. 2016. №1. С. 265–315.

Тетенькин А.В. Технологический контекст производства и расщепления микропластинчатых нуклеусов по материалам культурных горизонтов 2Б и 6 стоянки Коврижка IV (Витим, Байкало-Патомское нагорье) // Известия ИГУ. Серия: Геоархеология. Этнология. Антропология. 2017а. Т. 21. С. 107–135.

Тетенькин А.В. Поздний палеолит Витима в материалах многослойного местонахождения Коврижка-IV (Байкало-Патомское нагорье, Восточная Сибирь) // Труды V (XXI) Всероссийского археологического съезда в Барнауле — Белокурихе: в 3 т. Барнаул : Изд-во Алт. ун-та, 2017б. Т. I. С. 101–105.

Тетенькин А.В. Археология позднего верхнего палеолита и мезолита Нижнего Витима и Байкало-Патомского нагорья // Известия Алтайского государственного университета. Исторические науки и археология. 2018. №2 (100). С. 182–187. DOI 10.14258/izvasu(2018)2-30

Тетенькин А.В. Новый палеолитический комплекс местонахождения Нирыкан I на р. Мама (Байкало-Патомское нагорье) // Известия Лаборатории древних технологий. 2021. Т. 17, №3. С. 9–21. DOI: <https://doi.org/10.21285/2415-8739-2021-3-9-21>

Тетенькин А.В., Анри А., Клементьев А.М. Коврижка IV: позднепалеолитический комплекс 6 культурного горизонта // Археологические вести. 2017. Вып. 23. С. 33–55.

Тетенькин А.В., Анри О., Жакье Дж., Клементьев А.В., Уланов А.А. Исследования нового палеолитического комплекса культурного горизонта 2Б стоянки Коврижка IV на Витиме в 2015–2016 гг. (предварительное сообщение) // Известия лаборатории древних технологий. 2016. №4(21). С. 9–18. DOI: 10.21285/2415-8739-2016-4-9-18

Тетенькин А.В., Ветров В.М., Демонтерова Е.И., Пашкова Г.В., Канева Е.В. Аргиллитовые артефакты как источник информации о связях населения бассейна Витима в эпоху финального плейстоцена — среднего голоцена // Археология, этнография и антропология Евразии. 2018. №2. С. 16–24.

Тетенькин А. В., Демонтерова Е. И., Канева Е. В., Анри О., Говри Ру Э. Охра в позд-непалеолитических контекстах стоянки Коврижка IV на Байкало-Патомском нагорье // *Археология, этнография и антропология Евразии*. 2020. Т. 48, №3. С. 33–42.

Тетенькин А. В., Демонтерова Е. И., Поплевко Г. Н., Разгильдеева И. И., Сальная Н. В., Анри О. Позднепалеолитический комплекс культурного горизонта 2Г стоянки Коврижка IV на р. Витим (Байкало-Патомское нагорье) // *Stratum Plus*. 2021. С. 259–300.

Тетенькин А. В., Жмур О. В., Демонтерова Е. И., Канева Е. В., Сальная Н. В. Фигуры из бивня мамонта и знаково-символический контекст палеолитического жилища на стоянке Коврижка IV в низовье Витима // *Археология, этнография и антропология Евразии*. 2018. Т. 46, №4. С. 3–12.

Шмыгун П. Е. Докерамические комплексы из четвертичных отложений Северного Байкала // *Рельеф и четвертичные отложения Станового нагорья*. М. : Наука, 1981. С. 120–128.

Bezrukova E. V., Tarasov P. E., Solovieva N., Krivonogov S. K., Riedel F. Last Glacial-Interglacial Vegetation and Environmental Dynamics in Southern Siberia: Chronology, Forcing and Feedbacks // *Palaeogeography, Palaeoclimatology, Palaeoecology*. 2010. No. 296. Pp. 185–198. doi:10.1016/j.palaeo.2010.07.020

Gauvrit Roux E., Teten'kin A. V., Henry A. Which Uses for the Late Glacial Microblades of Eastern Siberia? Functional Analysis of the Lithic Assemblage of the Lithic Assemblage of Kovrizhka-IV, level 6 // *Известия Лаборатории древних технологий*. 2021. Т. 17, №2. С. 9–22. DOI: <https://doi.org/10.21285/2415-8739-2021-2-9-22>

Goebel T. The “Microblade Adaptation” and Recolonization of Siberia during the Late Upper Pleistocene. *Archeological Papers of the American Anthropological Association*. 2002;12:117–131.

Ineshin E. M., Teten'kin A. V. Late Paleolithic and Mesolithic Technological Variability in the Lower Vitim Valley, Eastern Siberia. In: *From the Yenisei to the Yukon*. College Station : Texas A&M University Press, 2011. Pp. 58–74.

Ineshin E. M. and Tetenkin A. V. *Humans and the Environment in the Late Pleistocene of Northern Baikalian Siberia*. Trans. and ed. P. Hommel and N. Reynolds. Newcastle : Cambridge Scholars Publishing, 2017. 337 p.

Kılınç G. M., Kashuba N., Koptekin D., Bergfeldt N., Dönertaş H. M., Rodriguez-Varela R., Shergin D., Ivanov G., Kichigin D., Pestereva K., Volkov D., Mandryka P., Kharinskii A., Tishkin A., Ineshin E., Kovychev E., Stepanov A., Dalén L., Günther T., Kırdök E., Jakobsson M., Somel M., Krzewińska M., Storå J., Götherström A. Human Population Dynamics and Yersinia Pestis in Ancient Northeast Asia. *Science Advances*. 2021;7(2):eabc4587; doi: 10.1126/sciadv.abc4587 (<https://advances.sciencemag.org/content/7/2/eabc4587>)

Margold M., Jansen K. N., Gurinov A. L., Codilean A. T., Fink D., Preusser F., Reznichenko N. V., Mifsud C. Extensive Glaciation in Transbaikalia, Siberia, at the Last Glacial Maximum. *Quaternary Science Review*. 2016;132:161–174. (<http://dx.doi.org/10.1016/j.quascirev.2015.11.018>)

Mochanov Y. A., Fedoseeva S. A. Chapter 3. Aldansk: Aldan River Valley, Sakha Republic. In: *American Beginnings. The Prehistory and Palaeoecology of Beringia*, Edited by West C. F. Chicago and London : The University of Chicago Press, 1996. Pp. 157–214.



Morlan R. E. Technological Characteristics of Stone Wedge-shaped Cores in Northwestern North America and Northern Asia. *Asian Perspectives*. 1976; 19:96–106.

Nakazawa Y., Izuho M., Takakura J., Yamada S. Toward an Understanding of Technological Variability in Microblade Assemblages in Hokkaido, Japan. *Asian Perspectives*. 2005;44(2):276–292.

Testart A. The Significance of Food Storage among Hunter-Gatherers: Residence Patterns, Population Densities, and Social Inequalities. *Current Anthropology*. 1982;23(5):523–537.

Teten'kin A. V., Smith H. L., Henry A. Archaeological Evidence for the Construction of Features at the Kovrizhka Site, Siberia, during the Pleistocene-Holocene Transition. *PaleoAmerica*. 2016;2(4):343–361. DOI: 10.1080/20555563.2016.1204842

---

#### INFORMATION ABOUT THE AUTHOR / ИНФОРМАЦИЯ ОБ АВТОРЕ

---

**Aleksei Vladimirovich Tetenkin**, Candidate of Historical Sciences, Docent at Irkutsk National Research Technical University, Irkutsk, Russia.

**Тетенькин Алексей Владимирович**, кандидат исторических наук, доцент Иркутского национального исследовательского технического университета, Иркутск, Россия.

*The article was submitted 28.04.2022;*

*approved after reviewing 27.07.2022;*

*accepted for publication 16.08.2022.*

*Статья поступила в редакцию 28.04.2022;*

*одобрена после рецензирования 27.07.2022;*

*принята к публикации 16.08.2022.*

Research Article / Научная статья

УДК 903.222(571.16)

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-05](https://doi.org/10.14258/tpai(2022)34(3).-05)

## GROUPS OF BONE ARROWHEADS OF THE ELOVKA SETTLEMENT OF THE LATE BRONZE PERIOD (TOMSK REGION)

**Sergey S. Tikhonov**

*Institute of Archaeology and Ethnography of SB RAS, Omsk, Russia;  
semchi957@gmail.com, <https://orcid.org/0000-0001-6909-0727>*

**Abstract.** The article is devoted to the identification of groups of bone arrowheads found during the excavations of the Elovka settlement of the late Bronze Age, located on the left bank of the Siman (channel Ob river), 0.5 km north of the village of Elovka of the Kozhevnikovskiy district in the Tomsk region. During the excavations of the settlement in 1982 by V. I. Matyushchenko stone, bone and bronze arrowheads were found, which, judging by the location in the cultural layer, can be attributed to the late phase of the functioning of the site. The bone arrowheads, which make up a series of 60 items, are quite like each other. Unfortunately, it is too early to talk about the typology of these items. However, they can be divided by size: short up to 12 cm, and long over 12 cm. This suggests two ways of their use. Short arrowheads were used for archery, which suggests active hunting of animals. Long arrowheads could have been used to mount crossbows, indicating the existence of passive hunting. There is information on active and passive hunting as in the archaeological materials of the 1st millennium BC in the sites of the Upper Ob region, and in ethnographic materials relating to the natives of Siberia in the 18<sup>th</sup>–20<sup>th</sup> centuries. The third group of arrowheads differs from the previous ones in the presence of spikes on the blades of the arrowheads, made so that they do not fall out of the wound. Judging by the fact that they were «standardized» in size, section, and proportions, it can be assumed that the ancient archers were intent on making their shooting as accurate as possible. This usually becomes necessary in combat conditions. This suggests that at the late stage of the functioning of the Elovka settlement, relations between its inhabitants and neighbors could become aggravated.

**Key words:** bone arrowheads, Elovka settlement, Late Bronze Age, Upper Ob region

**For citation:** Tikhonov S. S. Groups of Bone Arrowheads of the Elovka Settlement of the Late Bronze Period (Tomsk Region). *Teoriya i praktika arheologicheskikh issledovaniy = Theory and Practice of Archaeological Research*. 2022;34(3):81–87. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-05](https://doi.org/10.14258/tpai(2022)34(3).-05)

## ГРУППЫ КОСТЯНЫХ НАКОНЕЧНИКОВ СТРЕЛ ЕЛОВСКОГО ПОСЕЛЕНИЯ ПЕРИОДА ПОЗДНЕЙ БРОНЗЫ (ТОМСКАЯ ОБЛАСТЬ)

**Сергей Семенович Тихонов**

*Институт археологии и этнографии СО РАН, Омск, Россия;  
semchi957@gmail.com, <https://orcid.org/0000-0001-6909-0727>*

**Резюме.** Статья посвящена выделению групп костяных наконечников стрел, найденных при раскопках Еловского поселения эпохи поздней бронзы, расположенного на левом берегу протоки Оби Симан в 0,5 км к северу от д. Еловка Кожевниковского района Томской области. Во время раскопок поселения в 1982 г. В. И. Матющенко были найдены каменные, костяные и брон-

зовые наконечники стрел, которые, судя по расположению в культурном слое, можно отнести к поздней фазе функционирования памятника. Костяные наконечники стрел, составляющие серию из 60 предметов, довольно похожи друг на друга. К сожалению, пока рано говорить о типологии этих предметов. Однако их можно разделить по размерам: короткие — до 12 см, и длинные — более 12 см. Это позволяет предполагать два способа их использования. Короткие наконечники стрел применялись при стрельбе из лука, что предполагает активную охоту на животных. Длинные наконечники стрел могли быть использованы при установке самострелов, что свидетельствует о существовании пассивной охоты. Данные об активной и пассивной охоте есть как в археологических материалах I тыс. до н.э. в памятниках Верхнего Приобья, так и в этнографических материалах, касающихся аборигенов Сибири XVIII–XX вв. Третья группа стрел отличается от предыдущих наличием шипов на лопасти наконечников стрел, сделанных для того, чтобы они не выпадали из раны. Судя по тому, что они были «стандартизированы» по размерам, сечению и пропорциям, можно предположить, что древние лучники были намерены сделать стрельбу максимально точной. Обычно это становится необходимым в боевых условиях. Это позволяет предполагать, что на позднем этапе функционирования Еловского поселения отношения между его жителями и соседями могли обостряться.

**Ключевые слова:** костяные наконечники стрел, Еловское поселение, эпоха поздней бронзы, Верхнее Приобье

---

*Для цитирования:* Тихонов С. С. Группы наконечников стрел Еловского поселения эпохи поздней бронзы (Томская область) // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 81–87. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-05](https://doi.org/10.14258/tpai(2022)34(3).-05)

---

## Introduction

In 1982 V. I. Matyushchenko explored the Late Bronze settlement - Elovka (the Kozhevnikovskiy district of the Tomsk region) on an area about 1350 square meters. The materials were sent to the Museum of Archaeology and Ethnography of Omsk State University (MAE OmsU). Folders with a field report and documentation (numbers 34-1 — 34-11) are stored in fund II (archaeological materials). The collection of finds was assigned the number 3-2 in the same museum (Tikhonov, 2022, p. 250–258). After 1982 V.I. Matyushchenko focused on excavations of archaeological sites in the Omsk region, but the idea of publishing the materials from Elovka did not leave him. And in the beginning of 2000s, he published three monographs on the Elovka-I and II burial grounds (Matyushchenko, 2001; 2004; 2006). In addition, he was preparing a generalizing book about the Elovka settlement, which he did not have time to finish, and therefore the materials of the excavations of 1982 were not published with a few exceptions (Matyushchenko, Tikhonov, 1991, pp. 73–68; Tikhonov, 1993), which makes it difficult to use its for specialists who did not work with it at the MAE OmGU.

Among other finds (ceramic dishes, bone, clay and bronze tools, etc.), bone arrowheads were found. In the beginning of 1970s, while preparing his doctoral dissertation, he picked out the following types of arrowheads based on the materials of the Elovka settlement, Irmen-I, Ust-Kyrgyzka, Irinsky Borik, Plotinnaya and other sites of the Upper Ob region:

- trihedral or tetrahedral in cross section with a spatulate petiole and a smooth transition from feather to petiole;
- flattened with spatulate petiole;
- with a short three- to foursided point, the edges of which, when moving to a round petiole, have a sharp ledge (ie, spines. — S. T.);

— single specimens: «tomar», bullet-shaped, flat with notched base, acicular, etc. (Matyushchenko, 1974, pp. 60–61).

### Discussion of the Material

Arrowheads of the same types were also found in 1982. But in this paper we will not talk about their typology, but about groups of arrowheads that differ in the way they are used.

But before proceeding to the description of these groups, I would like to draw the attention of my colleagues to the fact that most of the items in question were found on the 3<sup>rd</sup> and 4<sup>th</sup> horizons. I assume that this roughly corresponds to the ancient day surface (i.e., no deeper than a black, highly humus layer with a high density. No regularities in the distribution of arrowheads over the excavation area, as well as their relationship with excavated dwellings, have yet been identified, and, probably, they the location is random. The only thing that can be said for sure is that in the squares along the lines A-K (i.e. on the slope of the terrace) they are almost never found (Fig. 1).

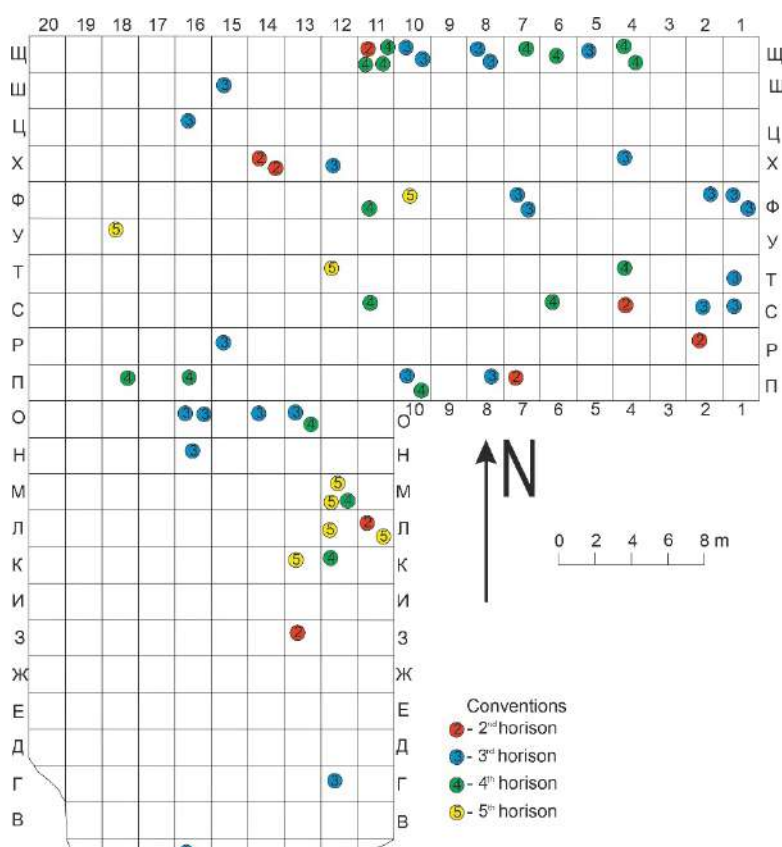


Fig. 1. Distribution of arrowheads by levels and squares

Рис. 1. Распределение наконечников стрел по штыкам и квадратам

Most arrowheads are between 6.5 and 15 cm long, although there are examples both shorter and longer. Their width varies from 1 to 2 cm (Fig. 2). Almost all of them are petiolate, flat

in cross section, lenticular, triangular, rhombic, etc. Therefore, the construction of their typology based on morphological features and proportions of products is still premature. This is because the sample is not too large: only 60 copies, of which only 45 are as many as 45 pieces. But with a graphical comparison of the length and width of arrowheads (Fig. 2), it can be assumed that there are two groups of arrowheads. The first has a length of 6.5–11.5 cm (Fig. 3.-1–7), the second — 12 or more centimeters (Fig. 3.-12–16). All these tips are leaf-shaped or close to it, and do not have spikes on the blade.

Most of the group of arrowheads of the third group (Fig. 3.-8–11) has a length of 8 to 13 cm, and it should be distributed between the first two. But all these arrowheads have a well-defined petiole, a diamond-shaped section, and their blades end in spikes. If we talk about their proportions, then they are generally wider than the arrowheads of the first and second groups (Fig. 2). I also note that they are all carefully crafted.

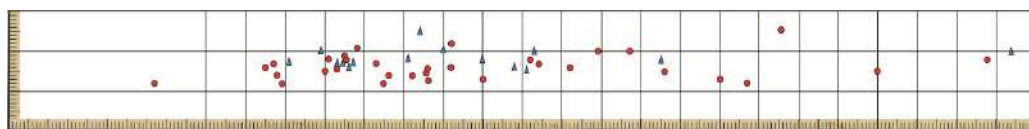


Fig. 2. The ratio of the length of arrowheads and the width of their blades

Рис. 2. Соотношение длины наконечников стрел и ширины их лопастей

### Interpretation

In 1989 T.N. Troitskaya published parts of the Ph. D. thesis of her aspirant E. A. Sidorov, who died on the expedition and did not have time to complete his work. Studying the arrowheads of the Late Bronze Age (Elovskaya and Irmenskaya archaeological cultures), the early Iron Age (Zavyalovskaya, Bolsherechenskaya, Kulaiskaya archaeological cultures), he concluded that the petiole diameter and the length of the arrowhead were paired, and identified three groups of arrowheads that differed from each other in size. He correlated two of them with bows of the taiga and Scythian types. Speaking about the third group of arrowheads, he suggested that they were used when installing crossbows on animal trails in the border zone of the taiga and forest-steppe and were not used as part of darts. The grounds for this were as follows: darts as a weapon were uncharacteristic for foot hunters in the southern taiga, but they were used by equestrian warriors of the steppes (Sidorov, 1989, pp. 17–19). Taking the point of view of E. A. Sidorov, you can interpret the groups of arrowheads as follows:

- Arrowheads 6.5–11.5 cm long (Fig. 3.-1–7) are known from archaeological materials from different eras from the Neolithic to the late Middle Ages. These are non-standardized products of a leaf-shaped, or approaching form, flat, lenticular, triangular, etc. in section. They are easy to remove from the body of the animal, or they could fall out on their own, since the penetration of the arrow into the body could not always be deep. Most likely, they were used by foot hunters who made them themselves.
- Arrowheads with a length of 12 or more centimeters (Fig. 3.-12–16) are also known in the archaeological materials of Western Siberia from the Neolithic to the late Middle Ages. Their considerable size suggests the use of powerful bows, which were crossbows. With a high-tension force, such arrows could penetrate deep into the body, inflicting severe (or fatal) wounds on animals. The manufacture of such tips could be

the prerogative of the hunters themselves. Remember that the elk was one of the main objects of hunting for the inhabitants of the Elovka settlement.



Fig. 3. Arrowheads of the Elovka settlement

Рис. 3. Наконечники стрел Еловского поселения

— arrowheads with spikes (Fig. 3.-8-11) have a length of 8 to 13 cm. They are predominantly rhomboid in cross section. The slightly larger size of the arrowheads compared to the objects of the first group suggests the existence of a strong (combat?) bow, the owner of which set the task of hitting the target so that removing the arrowhead from the wound was a difficult task. This is typical of war arrows, the widespread use of which begins in the early Iron

Age. It is possible that such arrows could be used in crossbows. For example, in sq. 13-3 on the 2<sup>nd</sup> horizon (Fig. 3.-13) an arrowhead with spikes was found, which, judging by the size, was made for a crossbow. If we assume that the recesses on the blades of the tip are a trace of sharpening, then we can conclude that it was repeatedly used.

### Conclusion

The study of the location of bone arrowheads in the cultural layer of the Elovka settlement shows that it is too early to talk about the patterns of their distribution. They are found at different depths, and their relationship with dwellings or with places of their manufacture has not yet been identified. We can say that there are three groups of arrowheads on the site, the use of which had peculiarities. The tips of one group were used by the inhabitants of the Elovka settlement for individual hunting of animals. Judging by the abundance of elk bones in the settlement, elks were the main object of hunting. The second group of arrowheads was larger in size than the first. Most likely, they were used in permanently installed crossbows. It is known that crossbows on animal trails were used by the natives of Siberia, who led a traditional way of life. The third group of arrowheads is comparable in size to the arrowheads of the first group but differs from them in the presence of spikes on the blades. Perhaps these are arrows used in combat conditions since the spikes prevent the arrowhead from falling out of the wound and making it difficult to remove. The discovery of such items suggests that there was a threat to the inhabitants of the southern taiga, and they tried to defend themselves. Massively spiked tips appear in the sites of the early Iron Age, at the time when war became commonplace.

These are the preliminary results of the study of the collection of bone arrowheads found by V. I. Matyushchenko at the Elovka settlement in 1982. A number of arrowheads were found by him at the settlement in 1960–1961, as well as during the excavations of Elovka-I and II burial grounds in the 1960–1970s. An analysis of these objects made of stone, bone and bronze will allow us to expand our knowledge about the hunting, and possibly military, weapons of the population of the late 2<sup>nd</sup> — early 1<sup>st</sup> millennium BC, who left the Elovka archaeological complex.

### REFERENCES

- Matyushchenko V. I. The Ancient History of the Population of the Forest and Forest-Steppe Ob region (Neolithic and Bronze Age). Part 4. Elovka-Irmen Culture. Tomsk : Izdatel'stvo Tomskogo universiteta, 1974. 196 p. (From the history of Siberia. Issue 12) (*In Russ.*)
- Matyushchenko V. I. Elovsky Archaeological Complex. Part 1. Elovsky I Kurgan Burial Ground. Omsk : Omsk. gos. un-t, 2001. 62 p. (*In Russ.*)
- Matyushchenko V. I. Elovsky Archaeological Complex. Part 2. Elovsky II Burial Ground. Pre-Irmen Complexes. Omsk : Izd-vo OmGU, 2004. 468 p. (*In Russ.*)
- Matyushchenko V. I. Yelovsky Archaeological Complex. Part 3. Yelovsky II Burial Ground. Irmen and Early Iron Age Complexes. Omsk : Izd-vo OmGU, 2006. 120 p. (*In Russ.*)
- Matyushchenko V. I., Tikhonov S. S. Elovskaya Ceramics of the South of the Tomsk Region. In: Sources of the Ethnocultural History of Western Siberia. Tyumen' : Tyumenskij gosudarstvennyj universitet, 1991. Pp. 73–86. (*In Russ.*)
- Sidorov E. A. The Assimilian Types of Economic Activity of the Population of Forest-Steppe Priob'ye in the 1<sup>st</sup> Millennium BC. In: Economics and Social System of Ancient and Medieval Tribes of Western Siberia. Novosibirsk : Izd-vo NGPI, 1989. C. 16–41. (*In Russ.*)

Tikhonov S. S. Analysis of the Population Structure of the Upper Ob Region in the Late Bronze Age : Abstract of Dissertation of the Candidate of Historical Sciences. Novosibirsk, 1993. 19 p. (*In Russ.*)

Tikhonov S. S. Collection of the Elovka Settlement in the Collections of the Museum of Archaeology and Ethnography of Omsk State University (excavations of V.I. Matyushchenko, 1982). *Teoriya i praktika arheologicheskikh issledovanij = Theory and Practice of Archaeological Research*. 2022;34(1):250–258. [https://doi.org/10.14258/tpai\(2022\)34\(1\).-14](https://doi.org/10.14258/tpai(2022)34(1).-14).

### СПИСОК ИСТОЧНИКОВ

Матющенко В. И. Древняя история населения лесного и лесостепного Приобья (неолит и бронзовый век). Ч. 4. Еловско-ирменская культура. Томск : Издательство Томского университета, 1974. 196 с. (Из истории Сибири. Вып. 12).

Матющенко В. И. Еловский археологический комплекс. Ч. 1. Еловский I курганный могильник. Омск : Омск. гос. ун-т, 2001. 62 с.

Матющенко В. И. Еловский археологический комплекс. Ч. 2. Еловский II могильник. Доирменские комплексы. Омск : Изд-во ОмГУ, 2004. 468 с.

Матющенко В. И. Еловский археологический комплекс. Ч. 3. Еловский II могильник. Комплексы ирмени и раннего железного века. Омск : Изд-во ОмГУ, 2006. 120 с.

Матющенко В. И., Тихонов С. С. Еловская керамика юга Томской области // Источники этнокультурной истории Западной Сибири. Тюмень : Тюменский государственный университет, 1991. С. 73–86.

Сидоров Е. А. Присваивающие виды хозяйственной деятельности населения лесостепного Приобья в I тыс. до н.э. // Экономика и общественный строй древних и средневековых племен Западной Сибири. Новосибирск : Изд-во НГПИ, 1989. С. 16–41.

Тихонов С. С. Анализ структуры населения Верхнего Приобья в эпоху поздней бронзы : автореф. дис. ... канд. ист. наук. Новосибирск, 1993. 19 с.

Тихонов С. С. Коллекция поселения Еловка в фондах Музея археологии и этнографии ОмГУ (раскопки В. И. Матющенко 1982 г.) // Теория и практика археологических исследований. 2022. Т. 34, No1. С. 250–258. [https://doi.org/10.14258/tpai\(2022\)34\(1\).-14](https://doi.org/10.14258/tpai(2022)34(1).-14).

### INFORMATION ABOUT THE AUTHOR / ИНФОРМАЦИЯ ОБ АВТОРЕ

**Sergey Semenovich Tikhonov**, Candidate of Historical Sciences, Associate Professor, Senior Researcher Omsk Laboratory of Archaeology, Ethnography and Museum Studies, Institute of Archaeology and Ethnography of SB RAS, Omsk, Russia.

**Тихонов Сергей Семенович**, кандидат исторических наук, доцент, старший научный сотрудник Омской лаборатории археологии, этнографии и музееведения Института археологии и этнографии СО РАН, Омск, Россия.

*The article was submitted 11.07.2022;*

*approved after reviewing 01.08.2022;*

*accepted for publication 16.08.2022.*

*Статья поступила в редакцию 11.07.2022;*

*одобрена после рецензирования 01.08.2022;*

*принята к публикации 16.08.2022.*



# USE OF NATURAL–SCIENTIFIC METHODS IN ARCHAEOLOGICAL RESEARCH

---

Research Article / Научная статья

УДК 902.26(571.1)

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-06](https://doi.org/10.14258/tpai(2022)34(3).-06)

## ONLINE SUPPORT FOR COMPREHENSIVE ARCHAEOLOGICAL AND GEOGRAPHICAL SURVEYS IN THE SOUTH OF WESTERN SIBERIA

**Oksana Yu. Zimina<sup>1\*</sup>, Oleg S. Sizov<sup>2</sup>, Petr R. Tsymbarovich<sup>3</sup>**

<sup>1</sup>*Tyumen Scientific Centre, Siberian Branch, Russian Academy of Sciences, Tyumen, Russia;  
o\_winter@mail.ru, <https://orcid.org/0000-0002-5220-8634>*

<sup>2</sup>*Institute of Oil and Gas Problems, Russian Academy of Sciences, Moscow, Russia;  
kabanin@yandex.ru, <https://orcid.org/0000-0003-1509-8912>*

<sup>3</sup>*V.V. Dokuchaev Soil Science Institute, Moscow, Russia;  
petr@tsymbarovich.ru, <https://orcid.org/0000-0001-8591-2612>*

\*Corresponding Author

**Abstract.** One of the current trends in archaeological geoinformatics in Russia is the creation of web mapping portals that integrate spatial and thematic data on the given areas of concentration of archaeological sites. As part of the study of the life support system of the ancient population of the Tura and Pyshma interfluves (Tyumen region) developed a geoportal on the basis of free and open source software. The server part developed on the basis of GeoServer, provides storage of the information and authorized access to it. Vector data is stored in PostgreSQL database management system using PostGIS add-in. Raster data is stored on the server as GeoTIFF and MrSID files. The technologies used in the development of the client web-application allow using it in modern web-browsers without installing additional software on the user's devices. The geoportal user interface is an interactive map of spatial data layers as well as map control elements. The general control elements include the zoom buttons, the scale setting on the available layer extents, the zoom slider, the scale bar, the geographic coordinates field of the cursor installation, the button enabling the attribute information display mode. Thematic content of the geoportal includes space images with medium (10 m) and extra high (up to 0.3 m) spatial resolution, AW3D relief model (25 m), topographic maps, UAV images of certain areas (orthophotomaps and DEM), vector layers of archaeological sites, hydrography, landscapes restoration, results of archaeological sites borders mapping using GPS-receivers, as well as the results of bathymetry survey. The layer of archaeological site (366 objects) contains attributive information including type, period, description, dating. Geoportal is a convenient tool for management and visualization of the accumulated information arrays for specialists without extensive knowledge in cartography and GIS.

**Key words:** GIS, Archaeological Geoportal, paleolandscape, resource potential of the territory, paleodemography, Western Siberia

**Acknowledgements:** this research was carried out within the state assignment No. 121041600045-8 (O. Yu. Zimina).

**For citation:** Zimina O. Yu., Sizov O. S., Tsymbarovich P. R. Online Support for Comprehensive Archaeological and Geographical Surveys in the South of Western Siberia. *Teoriya i praktika arheologicheskikh issledovaniy = Theory and Practice of Archaeological Research*. 2022;34(3):88–111. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-06](https://doi.org/10.14258/tpai(2022)34(3).-06)

## ВЕБ-ИНФОРМАЦИОННОЕ ОБЕСПЕЧЕНИЕ КОМПЛЕКСНЫХ АРХЕОЛОГО-ГЕОГРАФИЧЕСКИХ ИССЛЕДОВАНИЙ НА ЮГЕ ЗАПАДНОЙ СИБИРИ

**Оксана Юрьевна Зимина<sup>1\*</sup>, Олег Сергеевич Сизов<sup>2</sup>,  
Петр Романович Цымбарович<sup>3</sup>**

<sup>1</sup>Тюменский научный центр СО РАН, Тюмень, Россия;  
o\_winter@mail.ru, <https://orcid.org/0000-0002-5220-8634>

<sup>2</sup>Институт проблем нефти и газа РАН, Москва, Россия;  
kabanin@yandex.ru, <https://orcid.org/0000-0003-1509-8912>

<sup>3</sup>Почвенный институт им. В.В. Докучаева, Москва, Россия;  
petr@tsymbarovich.ru, <https://orcid.org/0000-0001-8591-2612>

\*Автор, ответственный за переписку

**Резюме.** Одним из актуальных трендов в археологической геоинформатике в России является создание веб-картографических порталов, интегрирующих пространственные и тематические данные по заданным районам концентрации археологических памятников. В рамках изучения системы жизнеобеспечения древнего населения Туро-Пышминского междуречья (Тюменская область) разработан геопортал на основе свободного программного обеспечения с открытым исходным кодом. Серверная часть, разработанная на основе GeoServer, обеспечивает хранение информации и авторизованный доступ к ней. Хранение векторных данных осуществляется в системе управления базами данных PostgreSQL с использованием надстройки PostGIS. Растровые данные хранятся на сервере в виде файлов в формате GeoTIFF и MrSID. Примененные при разработке клиентского веб-приложения технологии позволяют пользоваться им в современных веб-браузерах без установки на пользовательские устройства дополнительного ПО. Пользовательский интерфейс геопортала представляет собой интерактивную карту слоев пространственных данных, а также элементы управления картой. В состав общих элементов управления входят кнопки изменения масштаба, выставления масштаба по экстенду доступных слоев, ползунков изменения масштаба, масштабная линейка, поле отображения географических координат установки курсора, кнопка включения режима отображения атрибутивной информации. Тематическое наполнение геопортала включает космические снимки со средним (10 м) и сверхвысоким (до 0,3 м) пространственным разрешением, модель рельефа AW3D (25 м), топографические карты, результаты съемки отдельных участков с БПЛА (ортофотопланы и ЦММ), векторные слои археологических памятников, гидрографии, восстановленных ландшафтов, результатов картографирования границ археологических памятников с помощью GPS-приемников, а также результаты батиметрической съемки. Слой археологических памятников (366 объектов) содержит атрибутивную информацию, включающую тип, период, описание, датировку. Геопортал является удобным инструментом для управления и визуализации накопленных массивов информации для специалистов, не обладающих широкими знаниями в области картографии и ГИС.

**Ключевые слова:** ГИС, Археологический геопортал, палеоландшафт, ресурсный потенциал территории, палеодемография, Западная Сибирь

**Благодарности:** работа выполнена по госзаданию, проект №121041600045-8 (О. Ю. Зимина).

**Для цитирования:** Зимина О. Ю., Сизов О. С., Цымбарович П. Р. Веб-информационное обеспечение комплексных археолого-географических исследований на юге Западной Сибири // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 88–111. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-06](https://doi.org/10.14258/tpai(2022)34(3).-06)

## Introduction

Inflowing lake systems are characterized by the abundance and diversity of natural resources capable of sustaining local populations. The high concentration of archaeological sites from different periods testifies to the attractiveness of the territory. Nowadays, there are many comprehensive studies of human adaptations to paleoenvironmental conditions. Natural paleo records (lake and boggy deposits) are used to reconstruct the background natural conditions, correlate them with the pace and structure of the human settlement, identify the extent of economic changes and anthropogenic effects (land degradation, deforestation) (Giesecke et al., 2011; Krause, Koryakova, 2013; Borisov, Korobov, 2013; Korobov, 2014; Rosch et al., 2014; Schwarz, Oeggl, 2013; Alenius et al., 2020, and many others). Work has been carried out to create and maintain the Database of the Global Environmental History (HYDE) containing qualitative indicators of demographic and agricultural evolution in the Holocene (Klein Goldewijk et al., 2011; Klein Goldewijk, 2016).

The Andreevsky lake system between the Tura and Pyshma Rivers (south of Western Siberia) was intensively developed in ancient times. To date, more than 350 archaeological sites from the Mesolithic to the Middle Ages have been found in the area (Zakh et al., 2014). The site has been repeatedly surveyed, yet the paleoreconstruction of the environmental conditions, analysis of spatial development and paleodemographic load in various periods, or modelling of the key sustainability features of the ancient population is still insufficient.

After the results of such work are integrated, it becomes necessary to map a vast body of archaeological information, and create a database of archaeological sites. Reconstruction of natural conditions implies creation of a spatial reconstruction of paleolandscapes and paleohydrography. Geoinformation systems appear as the most suitable tools for the spatial integration of heterogeneous data. Web-based geographic information system (GIS) or geoportals are becoming more widespread.

Geoportals, as a means for presenting spatial information, proved to be effective in many areas of economic activities, humanities, and natural sciences (Yamashkin et al., 2019). Geoportals can be applied extensively to both solving global problems, such as data coordination for sustainable global society development (Global Forest Watch Impacts<sup>2</sup>; de Sousa et al., 2020; Mhangara et al., 2019), and a visualization tool for local research data<sup>3</sup>.

The use of geoportals in archeology has rather strong potential. Field archaeological surveys are always spatially referenced. It means that the acquired data can be visualized on a map,

<sup>2</sup> <https://www.globalforestwatch.org/about/>

<sup>3</sup> <https://eea.maps.arcgis.com/home/index.html>; <https://www.geoportal.org/community/guest/general-information>

including an online map. An example is Arches, an open-source software platform for cultural heritage data management. It supports spatial data and can be used by researchers to create their archaeological geoportals<sup>4</sup>. In some cases when more customization and functionality is required, researchers prefer to develop dedicated solutions, such as:

- Nurnet: a geoportal for managing and sharing information about the Bronze Age in Sardinia, Italy (Spanu et al., 2017).
- The Italian Geoportal of Archaeological Resources: a project run by the Central Institute of Archeology and the VAST-LAB group to develop a geoportal, a national aggregator for archaeological datasets (Ronzino, Acconcia, Falcone, 2018).
- Yenisei-GIS: a local GIS of the Krasnoyarsk Region (Russia). It contains many maps, including a map of the local cultural heritage (Kadochnikov, 2020).
- The proposal to develop a comprehensive geospatial web platform capable of handling all cultural and natural heritage sites in Nabón, Ecuador (Lerma et al., 2020).
- The Russian Archaeological Sites national GIS within the framework of the Terek information processing system. It features automated mapping and is intended to characterize the spatial and chronological distribution of the available information across the entire territory of Russia. It presents the extent of development of vast territories at various periods, and it can be used to analyze the archaeological sites of certain periods in Russian regions (Makarov et al., 2016).

The study of the Andreevsky lake system aims to reconstruct its natural conditions and dynamics of its development in the ancient times as a flow-through lake system. A probabilistic assessment of the paleodemographic load in different archaeological periods, taking into account the resource potential of the study area, was among the tasks of the comprehensive study of the Andreevsky lake system. The geoportal was chosen as a tool to complete the task since it allows combining different kinds of spatial data.

This paper shares the experience of creating the archaeological geoportal of the Andreevsky lake system (ageoportal.ipos-tmn.ru<sup>5</sup>), including the site architecture, contents, and applications and the result of the reconstruction of the paleodemographic load, taking into account the resource potential of the territory, for one of the periods (2850–2600 cal BP, or the transition period from the Bronze Age to the Early Iron Age, in archaeological terms).

### **Area of Study**

The Andreevsky lake system is located in the southwestern part of Western Siberia between the Tura and Pyshma Rivers, in their lower reaches at their confluence, in the Tobol River basin. It is a large, well-developed flow-through lake system. Nowadays it includes a chain of five lakes (Bolshoye and Maloye Andreevsky, Butorlyga, Pesyanka, Gryaznoye). The area is about 40 sq. km. The lakes are connected by the Duvan River (Fig. 1).

The Andreevsky system at the junction of forest-steppe and sub-taiga landscape zones is categorized as a floodplain-valley water body. Its basin is probably of the erosion-accumulative type. Geologically the Andreevsky lakes and the Duvan River are paleochannels of the Pyshma River. Most lakes of the Tura-Pyshma interfluvial area (Chepkul, Kurya, Mostovoye, etc.)

<sup>4</sup> <https://www.archesproject.org/what-is-arches/>

<sup>5</sup> Under construction.

are connected to it by waterlogged depressions (Sizov, Zimina, 2012). The Tura and Pyshma Rivers are the north, south and east boundaries of the Andreevsky lakes. We can assume that the major economic activity of ancient people mainly occurred within this interfluvial area. For this reason, the area of study was limited to the Tura and Pyshma Rivers. At the northwest along the line connecting Antipino and Perevalovo settlements, the watershed is crossed close to the Zubarevskoye lake. The total study area is 1,100 sq. km.

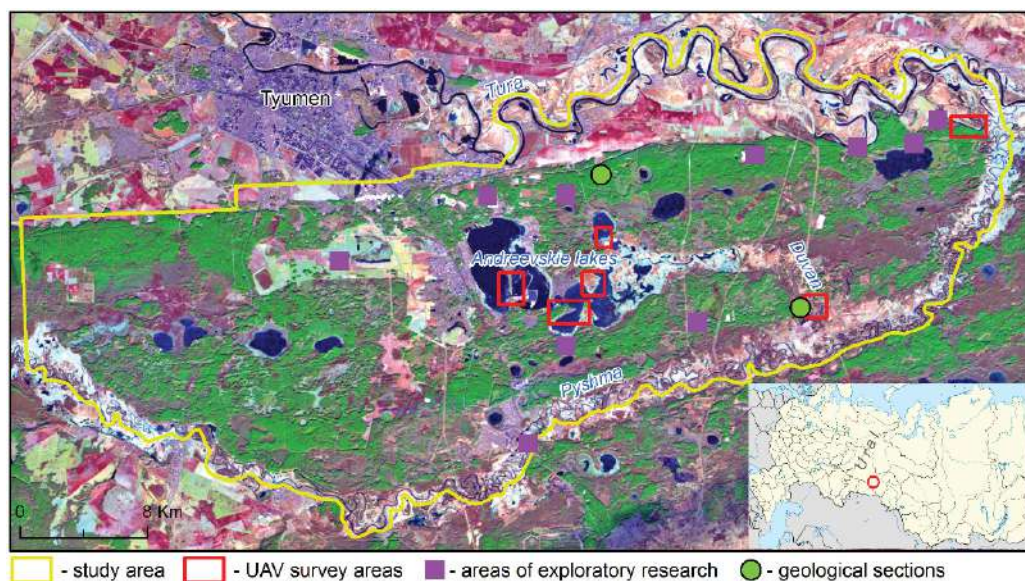


Fig. 1. Overview map of collection of factual material of paleolandscape studies

Рис. 1. Обзорная карта мест сбора фактического материала палеоландшафтных исследований

A large number of archaeological sites indicates the significance of the Andreevsky lake system for the ancient population. Archaeological surveys on the shores of the Andreevsky lakes in the Tura-Pyshma interfluvial area are over 100 years old. I.Ya. Slotvsov (Slotvsov, 1885, 1890; Bezborodova, Parkhimovich, 1995, p. 15) was the first to study the shores of Andreevsky lakes more than 100 years ago. In the 20<sup>th</sup> century researchers from Moscow, Sverdlovsk (Yekaterinburg) and Tyumen studied the archaeological sites in the Andreevsky lake system. As a result of many years of research on the shores of the Andreevsky lake system and the Tura and Pyshma Rivers 366 archaeological sites were discovered. They are fortified and unfortified settlements, walled settlements, burial mounds, subsoil burial grounds, and sanctuaries. Many of them were studied by excavation. In some cases, the archaeological sites contain layers from various periods (Zakh et al., 2014). Despite such regular and long-term studies, new sites can still be found in the Andreevsky archaeological area. This was confirmed by the 2016–2018 surveys when 18 archaeological sites were discovered in the eastern part of the Andreevsky lake system. Today, the archaeological database of the Andreevsky lake system lists 384 archaeological sites.

Since the lake system was quite attractive for habitation throughout the Holocene, many sites are multi-layered. Some of them contain cultural deposits from the Neolithic to the Middle Ages. The area has sites from the Mesolithic (a single site Zvezdny 1); the Neolithic (80 sites); the Chalcolithic (108 sites); the Bronze Age (162 sites); the Early Bronze Age (38 sites); the Late Bronze Age (28 sites); the transitional period from the Bronze to the Iron Age (28 sites); the Early Iron Age (91 site); Middle Ages (75 sites); Late Middle Ages (1 site.) Approximately one third of the sites are not culturally and chronologically attributed. In total, 61 sites in the area as excavated (Fig. 2).

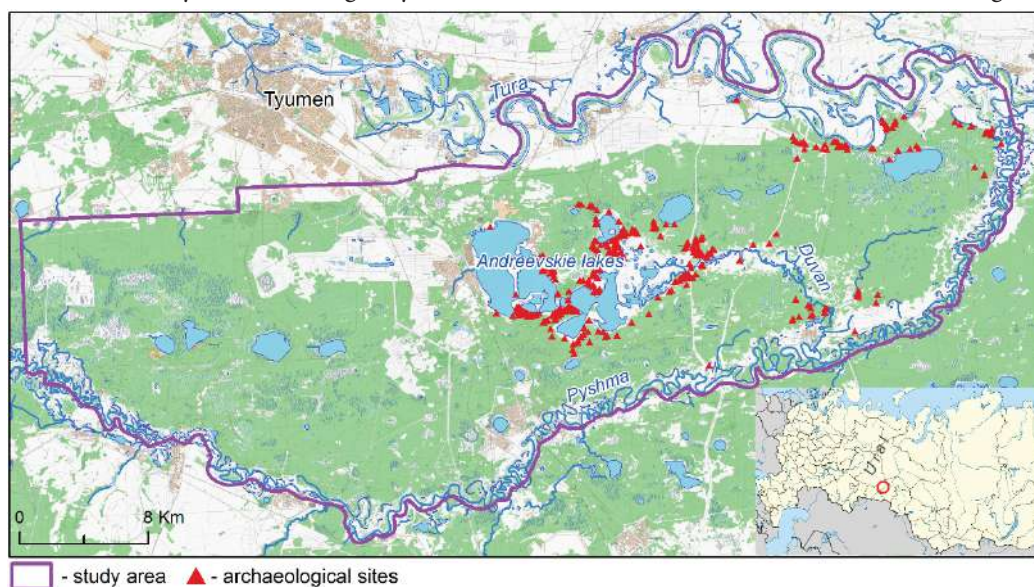


Fig. 2. Overview map of the archaeological sites in the Tura-Pyshma interfluvium

Рис. 2. Обзорная карта археологических памятников в Тура-Пышминском междуречье

Among the discovered sites, the majority (265) are not fortified. There are 50 sites with various defense features (from low ramparts not more than 0.2 ... 0,5 m high to impressive ramparts 3 ... 5.5 m high). Of the four dozen discovered burial sites, 14 are subsoil burial sites, 27 are burial mounds. There are 13 findspots, 2 accidental discoveries, and one isolated depression.

Most of the Andreevsky lake system is covered with forest, except for the floodplain meadows and inhabited areas. For this reason, the only way to find archaeological sites is through a field survey. In few cases, remote sensing was used to survey ploughed or deforestation areas for archaeological sites. In general, the exact geomorphological position of an archaeological site is important for spatial analysis, reconstruction of the ancient sustainability systems, finding if the cap was seasonal or permanent, identifying the burial patterns and the status of the buried, etc.

### Materials and Methods

#### *The Archaeological Geoportal Architecture*

We used GIS approaches for creating the geoportal (Sizov et al., 2021). The available data is organized layer-by-layer.

1. Spatial data: the microtopography and geomorphology of the Andreevsky flowing lake system, and the reconstructed paleolandscapes.

2. Archaeological data: site location, cultural and chronological attribution.

The Geoportal uses the conventional client-server architecture (Fig. 3). The server part stores the information and authorizes access to it. The key component of the server part is GeoServer (geoserver.org, developed by OSGeo.) The software is written in Java using Open Geospatial Consortium (OGC) standards, such as Web Map Service (WMS), Web Map Tile Service (WMTS), Web Feature Service (WFS), etc.

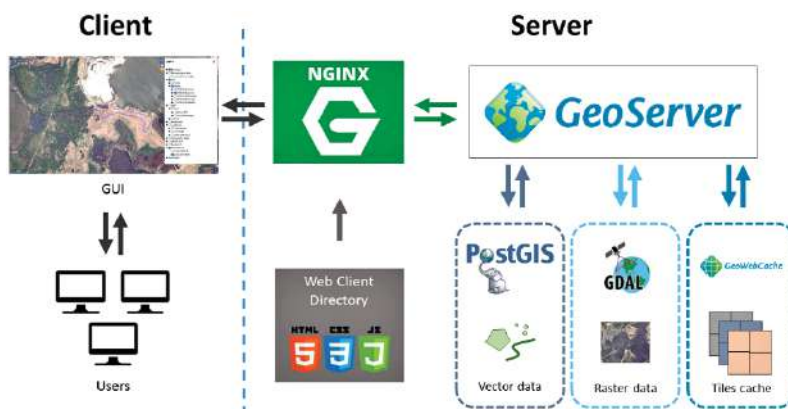


Fig. 3. The Archaeological Geoportal architecture

Рис. 3. Архитектура археологического геопортала

The vector images are stored in the PostgreSQL database management system ([www.postgresql.org](http://www.postgresql.org)) using the PostGIS ([postgis.net](http://postgis.net)) add-in developed by OSGeo and implementing the OGC Simple Features standard for SQL providing support for storing and handling geographical objects in a database. The raster images are stored on the server as GeoTIFF and MrSID files. The raster images are processed with the Geospatial Data Abstraction Library (GDAL, [www.gdal.org](http://www.gdal.org)) also developed by OSGeo. The raster images are accessed under the WMTS standard: the viewed area is provided by the server as fragments (tiles) created by GeoServer tools. The vector data are accessed under the WFS and Vector Tiles standards developed by Mapbox ([www.mapbox.com](http://www.mapbox.com)) and implemented by GeoServer. Layers with a small number of objects are downloaded from the server in the GeoJSON format. Layers containing a large number of objects and complex geometry are downloaded as Mapbox PBF tiles. This approach ensures an optimal balance between image quality and performance. All the tiles generated by GeoServer are stored on the server for subsequent use (GeoWebCache function).

Client requests to GeoServer are routed through an Nginx reverse proxy server ([www.nginx.com](http://www.nginx.com)). It encrypts and compresses the server-client traffic, and handles access to the client web application.

The client web application is in TypeScript with the Preact framework ([preactjs.com](http://preactjs.com)) and the OpenLayers library ([openlayers.org](http://openlayers.org)). Preact implements Virtual DOM and supports

the JSX syntax for rapid GUI development. It is a compact and fast package. OpenLayers is a library for rapid GUI development to handle spatial data, including GeoServer. The client web application technologies work in popular web browsers. No extra software installation is required.

The geoportal stores any raster, vector, or datasets. The users can upload documents and images in common formats (.pdf, .jpg, .xls, etc.). With such extensive functionality, we were able to store virtually all kinds of spatial information obtained during the project. Below are the brief overviews of each information source.

### ***Basic Geographical Layers of the Archaeological Geoportal***

The basic geographic layers include the key types of available spatial data: topographic maps, digital terrain models, and space imagery. All the used data have a precise geographical reference. Heterogeneous data are re-projected and combined “on the fly” by means of GeoServer.

1. Topographic map, 1:25,000 scale. Geoportal offers a current version of the map developed by Gosgiscenter with sparse altitude information (the area is shown as of 2005). With the large-scale topographic map it is possible to convert all the elevations to the unified Baltic System of Heights and to use the official place names. The map is also used to identify man-made objects. Using the topographic map, the current hydrographic network was vectorized with the EasyTrace software (ver. 8.65.). All the lakes, rivers and oxbow lakes in the area of study were digitized, and each object was assigned its elevation.

2. AlosWorld3D30 (AW3D) Digital Surface Model (DSM). Medium spatial resolution DSMs obtained by continuous direct surface elevation measurements are a realistic representation of landforms as a continuous, regular and uninterrupted field of elevation values. DSM makes it possible to identify man-made changes occurring due to sand mining, deforestation, and construction of roads, residential, and industrial structures. The AW3D30 DSM based on automatic processing of 2007–2011 ALOS satellite stereo images was selected for the geoportal (cell size: 25 m/pix).

3. Medium and Ultra-High Spatial Resolution Space Imagery. The geoportal uses a medium-resolution multispectral image from Sentinel-2 (10 m/pix taken on July 1, 2018) in two color synthesis versions: visible and IR colors (RGB and CIR). The Sentinel-2 data are freely available and distributed by the European Space Agency (ESA). The key purpose of such a mid-scale imaging is the landscape mapping and identification of short-term average annual and seasonal evolution of the water levels in lakes depending on the man-made impact and climatic changes. The WorldView-3 ultra-high resolution space image (0.28 m/pix taken on May 25, 2016) is also presented in two color synthesis versions: RGB and CIR. The image was obtained with the GDBX geoplatform. It is intended to better identify the boundaries of the archaeological site and accurately reference the ground-based observations.

4. Here, Bing and OSM Map Layers. These layers fully cover the area and show the current state of the territory at a large scale (larger than the topographic map), including additional objects not shown on the topographic map. They are provided by third-party services. The layers are connected directly in the web-client source code as tile layers. The OSM layer contains publicly available data distributed under the Open Data Commons Open Database License (ODBL) by OpenStreetMap Foundation. It is required to specify the data source and a link to the license. The Here and Bing layers contain proprietary data so their free use



is quota-based. Only one base layer can be activated at a time. The layers available in the geportal are shown in Table.

### Archaeological Geoportal map layers

#### Слои карт археологического геопортала

Title	Type	Source	Description
HERE – Hybrid	Hybrid	HERE Technologies	Satellite image mosaic from Here with a label layer
HERE – Satellite	Satellite	HERE Technologies	Satellite image mosaic from Here
Bing – Hybrid	Hybrid	Microsoft Corporation	Satellite images mosaic from Bing with a label layer
Bing – Satellite	Satellite	Microsoft Corporation	Satellite image mosaic from Bing
OSM	Map	OpenStreetMap	Vector map from OpenStreetMap

#### *Thematic layers of the Archaeological Geoportal*

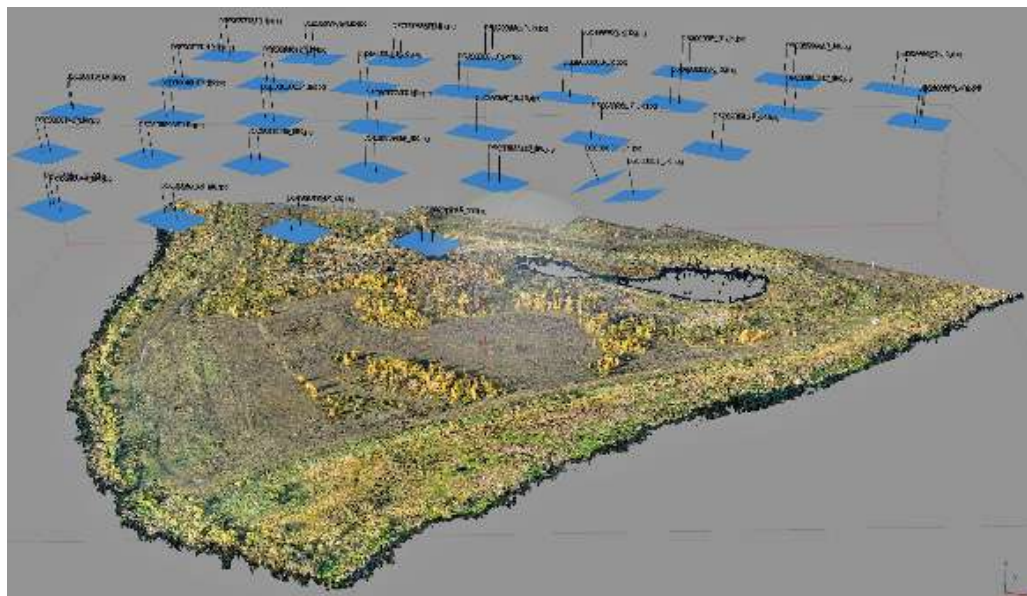


Fig. 4. General arrangements of the photo centers and the resulting point cloud in Agisoft Photoscan. Cape Butorlyzhsky, taken on 12.09.2016

Рис. 4. Общее расположение центров фотографирования и результирующее облако точек в Agisoft Photoscan. Мыс Буторлыжский, снято 12.09.2016

The studies of the Andreevsky lake system produced various thematic data:

1. UAV surveys. For detailed mapping, we used UAV aerial photography. We used a Tarot T960 hexacopter with a SonyAlpha a6000 camera mounted on a three-axis suspension (the 2016 survey), a DJI Phantom 3 Advanced quadcopter (the 2017 survey). We applied the Drone De-

ploy software to plan the survey. It enabled to survey the surface along a specified route at a specified altitude and speed as required to obtain clear, non-blurry images, and to provide the required image overlap (at least 70%). We tested different altitude and flight speed combinations. The total surveyed area was about 670 ha. The images were processed (making orthophotomaps and DSM) in Agisoft Photoscan v.1.3 (Fig. 4). The spatial resolution for the orthophotomaps is 5–8 cm/pix, and 10–15 cm/pix for the DSMs. It is sufficient to accurately identify small surface features and archaeological heritage sites. The methodology aspects and the aerial survey results are presented in detail in papers (Prikhodko et al., 2017; Sizov et al., 2018).

2. Bathymetric Survey Results. To build a digital model of some bottom areas of the Andreevsky Lake we applied continuous high-density echo sounding. The depths in the Butorlyzhsky Peninsula areas were measured on 20.09.2017, and near the Maloe Andreevsky Lake, on 11.10.2017. For the depth measurements we used:

- a remote-controlled ship model carrying a Garmin echoMAP CHIRP 42CV echo sounder (Fig. 5a);
- a small motorboat with a Garmin GPSMap 421s echo sounder (Fig. 5b).

The vessels moved from shore to shore and along the coastal and central lines of the studied water area. The remotely controlled ship model operated on the most vegetation-free part of the water surface. The ship navigated autonomously along the predefined route loaded into its memory. The echo sounder depth measurements were automated as the model navigated along its route. The bottom surface elevation maps were interpolated with 3D Analyst tools in the ArcGIS software package (Sizov et al., 2019.)



a)

b)

Fig. 5. Bathymetric survey equipment:

a) autonomous bathymetric vessel; b) boat with an echo sounder

Рис. 5. Оборудование для батиметрической съемки:

а) автономное батиметрическое судно; б) катер с эхолотом

3. Vector maps of the reconstructed plant communities. The reconstructed periods are: 13,000–11,000 cal BP, 7,100–5,500 cal BP, 3,500–3,200 cal BP, and 3,200–2,850 cal BP. The natural conditions were reconstructed by analyzing the bottom sediments of the small closed lake Kyrtym (in the southern part of the Andreevsky lake system) and the Oshukovsky peat bog (in the northern part of the Andreevsky lake system).



tracked with the AshTech ProMark 120 (L1 band, 0.5–1.0 m positioning accuracy) and Garmin GPSMAP 64st (5 m positioning accuracy) GPS navigators. (Fig. 6).

### Results and Discussion

Geoportal-based data can have many applications (environmental monitoring, cultural heritage preservation, etc.) (Global Forest Watch Impacts) and different spatial coverage: from regional to global databases (Makarov et al., 2016; Spanu et al., 2017; de Sousa et al., 2020; Mhangara et al., 2019; Kadochnikov, 2020). The geoportal presented in this article is intended to systematize the materials of the local archaeological site near Tyumen. However, its architecture and technical capacity make it possible to expand the geography of cartographic and remote sensing data research, and to supplement the database with new datasets.

We studied landscapes of ancient rivers with a DSM of the Andreevsky lake system area and simulated the flooding based on the UAV survey data (Sizov et al., 2018). The landscape formation was traced. We focused on the reconstruction of vegetation and climate using palynological and geochemical methods, analysis of macrofossils in the bottom sediments and peats (Ryabogina et al., 2019). We also undertook accurate hypsometric referencing of cultural layers in more than 360 ancient settlements. The modern landforms were mapped on a large scale (Sizov, Idrisov, Molchanova, 2017) as a basis for generating paleolandscape maps for various periods (Zimina et al., 2019) (Fig. 7).

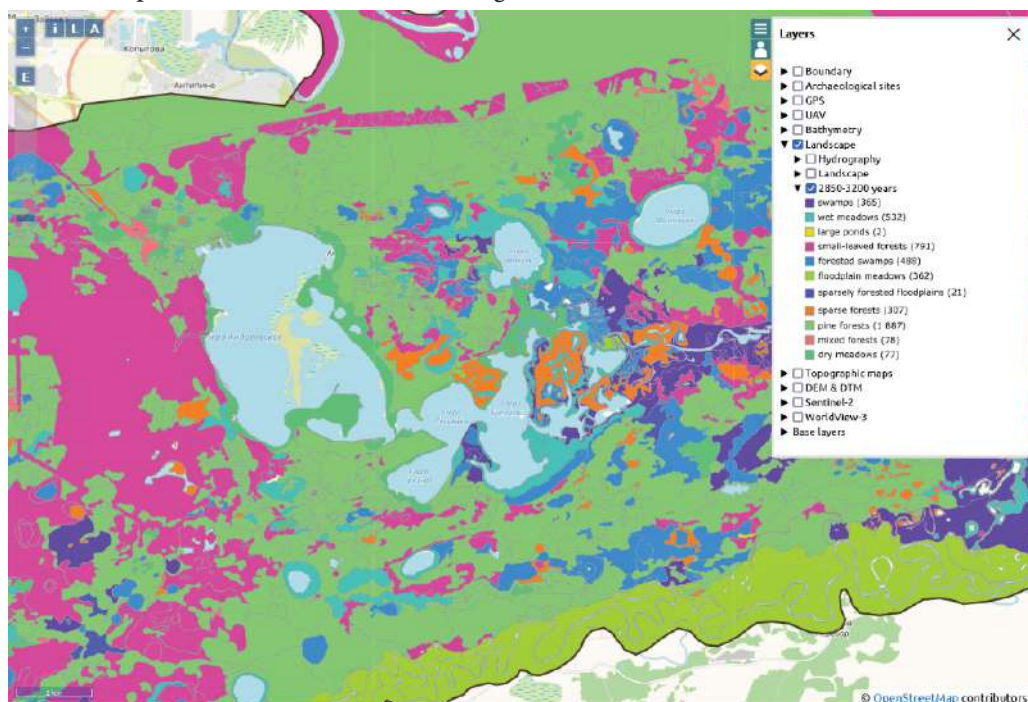


Fig. 7. Generalized paleolandscape map of the Tura and Pyshma interfluvium in 3200–2850 cal BP

Рис. 7. Обобщенная палеоландшафтная карта Тура-Пышминского междуречья 3200–2850 л.н.

In particular, the current patterns of plant community changes in a range of habitat types were extrapolated for the period of 2850–2600 cal BP by simulating the degree of drainage and territory drainability and plant succession. During this period, the climatic conditions stabilized with a gradual increase in moisture and snow cover thickness. The water level in reservoirs and water content of the rivers were comparable with that of the present-day or slightly higher, but the lake shores were not outlined by a wide belt of reed and cattail thickets, as they are now. Birch and, to a lesser extent, mixed and pine forests, damp and dry meadows were widespread in the vicinity of the Andreevsky lakes. In the lowland peatlands, a transition to the mesotrophic stage and, later, to the oligotrophic peat accumulation was noted (Zimina et al., 2019).

Based on the assumption that the number of wild animals is consistent with the area occupied by certain plant formations, and applying the modern distribution patterns of ungulates, fur-bearing animals, and birds, we estimated the possible number of major game species for the period of 2850–2600 cal BP. The calculations showed that the number of large ungulates was small (31 elks, 302 roe deer, 14 wild boars). The highest potential could be expected from fishing (total amount of fish caught from the of the Andreevsky lake system: up to 234 tons). For the detailed calculation methods refer to (Sizov et al., 2018; Zimina et al., 2019).

The online geoinformation system enabled paleoeconomic and paleodemographic simulation. The reconstruction of the natural conditions and paleolandscape mapping of the Andreevsky lake system allowed estimation and making assumptions about the resource potential of the area and the number of people who could support themselves with the products of the producing and appropriating economy. The period of 2850–2600 cal BP was chosen to refine the population density estimations. This was the time of transition from the Bronze Age to the Early Iron Age and the time when settlements of the Itkul Culture emerged in the valley of the Tobol River and its tributaries, Tura and Pyshma (Zimina, Zakh, 2009). In the Tura-Pyshma interfluvium, 35 settlements of the Itkul Culture are known. All of them are surrounded within ramparts and ditches.

The cultural layer of these settlements contains almost no bone remains preserved. Only few single specimens have been recovered, as the sites are located on sandy soils that poorly preserve organic remains. We consider, that with a large number of sites in the area, and in the absence of direct archaeological evidence for the economic activity and dating (the sites have been understudied by excavations since most of them were discovered or culturally attributed only in the last 10–15 years), the resource availability of the area may be indicative for estimation of the maximum population limit and the number of simultaneously existing settlements of the Itkul Culture. By analogy with monocultural settlements in the Urals, where osteological remains of domestic and wild animals have been found in the cultural layer of the Itkul Culture sites (Kosintsev, Stefanov, 1989), we assume that in the Tura-Pyshma interfluvium the population of the Itkul Culture also maintained a complex economy that included producing and appropriating activities, but faunal remains have not been preserved in the aggressive environment of sandy soils.

The determination of population size and its dynamics in various historical periods is one of the subjects of social archaeology. It considers the interaction between humans and the natural environment, use of natural resources, origins of social organization and its major characteristics in the context of producing and appropriating economy (foraging, gatherer-hunt-

er communities vs agricultural and pastoral society), family and household, property inheritance rules, mortality rates, cross-cultural interactions (Chamberlein, 2006; Müller, 2017; etc.).

The population size/density estimations may use different initial data (Müller, 2015), such as "...house size, settlement size and of the area, accessibility and productivity of land surrounding settlements... a cemetery is known to serve a particular settlement... can serve as an independent check on population estimates derived from settlement size or site catchment analysis." (Chamberlein, 2006, p. 12); an observable density of archaeological evidence in the study region (Drennan et al., 2015); investigating long-term regional trends: "...1) Settlement data including site counts; 2) summed estimated settlement sizes, effectively a weighted version of site counts; and 3) SPDs (summed probability distributions) of radiocarbon dates." (Palmisano, Bevan, Shennan, 2017, p. 60).

One of the parameters closely related to demography and population density is the ecological capacity of the territory. Site exploitation territories are identified around settlements, using the Site catchment analysis and the Site Territorial analysis (Vita-Finzi, Higgs, 1970; Jarman, Vita-Finzi, Higgs, 1972; Bailey, Davidson, 1983; Malone, Stoddart, 1994, p. 81–93; Renfrew, Bahn, 2005; Nedashkovsky, 2013; etc.). Among other characteristics, they demonstrate the dynamics of climate change (Nikulina et al., 2018). The area of agricultural activity can be outlined by mapping of ware fragments in stratigraphic sections around settlements; indicators of pastoral-agricultural activity in soil are phosphate content and urease activity (Korobov, Borisov, 2020).

In this case, identifying potential resource zones around specific fortified settlements of the Itkul Culture or their clusters would be the next step in the study. At present, the fortified settlements in this archaeological area are mostly unexcavated, and we have only limited data on the external features and relative dating based on surface findings or findings from survey pits. It is necessary to analyze the localisation patterns for the sites (in the western part of the Andreevsky lake system they are relatively dispersed, while in the eastern part there is one large cluster of sites, the rest are dispersed), and their chronology. Therefore, the purpose of our study was to estimate the number of fortified settlements that could exist simultaneously in the area of the Andreevsky lake system, and the approximate population size based on resource availability.

In the Andreevsky lake system, the sites are grouped into several clusters. The approximate distance between them is 8–10 km. As we assume that the dwellers of the Itkul settlement were engaged in a complex economy — animal husbandry and hunting and fishery (Zimina, Zakh, 2009) — the distance between the settlements in different parts of the Andreevsky lake system roughly correspond to the allocated potential resource areas for hunting-gathering and animal husbandry communities: 10 km for hunting and gathering, and 5 km for the more labor-intensive activities of agriculture, in terms of walking time — two hours and one hour, respectively (Vita-Finzi, Higgs, 1970; Renfrew, Bahn, 2005, p. 173). At the same time, there is evidence of different arrangement of the potential resource areas, depending on the nature of economic activities (Renfrew, Bahn, 2005, p. 174.) For example, indigenous peoples of Western Siberia used hunting grounds located many (20 km or more) kilometers away from their permanent residence place (Martinova, Pivneva, 1999, p. 5, 7).

The calculation of the population size in 2850–2600 cal BP and the number of the Itkul Culture settlements that simultaneously existed on the territory of the Andreevsky lake system are based on indicators obtained from the natural resource estimations: the amount of green biomass required for the cattle; the amount of wild harvest; the amount of fish; the number of wild animals and birds. Based on the fact that the Itkul Culture communities maintained an integrated economy and used the products of both stock-rearing and hunting-fishery sectors (Zimina, Zakh, 2009), calculations were made for both. The energy value of products of animal husbandry, gathering, hunting, and fishing was correlated with human energy expenditures (approximately 3,000–4,000 kcal/day per person; e.g., Smith et al. (2012, p. 7620) give ca. 4,000 kcal-cap-1-d-1 in simple farming societies.) The calculations were adjusted to account for the historical data on the economic activities of the settlement dwellers in the vicinity of Tyumen in the 19<sup>th</sup> century (Patkanov, 2003), and considering the calculations based on the area of residential structures in the fortified settlements. The parameters of the structures are known from excavations of the Itkul settlements in various Trans-Ural areas (Zimina, Zakh, 2009).

According to calculations, the number of large ungulates was relatively small with larger numbers of game and waterfowl, which is quite consistent with the total area of forests and water bodies. However, the potential for fishing was the most significant. According to the DSM-simulated water level rise, the area of large water bodies in 2850–2600 cal BP was slightly different from modern and equalled 7,800 ha. At present, the fish yield of the Andreevsky lakes is 30 kg/ha. The reconstructed area of potential pastures and hayfields in the analysed period in the territory of the Andreevsky lake system was about 214 km<sup>2</sup>. The area and yield of the pastures were significantly higher compared to the areas suitable for hay production, while wet meadows, as estimated, represented the most efficient plant communities for the producing economy. Also, the dwellers of the ancient settlements had fairly good opportunities for gathering wild fruits. In general, the population size calculations detailed in (Zimina et al., 2019) showed that in 2850–2600 cal BP, in the territory of the Andreevsky lake system, including the ancient lakes of the eastern part of the interflaves, about five settlements could exist simultaneously, and the number of dwellers (“carrying capacity”: the size of the population that the environment can support) might have been about 300–400 people.

### Conclusions

Analysing the life support system of the ancient population in the Tura-Pyshma interflaves, we tried to develop a comprehensive geoinformation system, an archaeological geoportal integrating the results of many years of archaeological, paleogeographical, and landscape research. The database enables application of spatial analysis to simulate the location of archaeological sites in various eras, identification of potential resource zones of settlements, prediction of possible location of new archaeological sites taking into account the resource potential of the territory.

Geoportal is a convenient tool for collaborative management and visualization of the available archaeological and spatial data. Geoportal does not require installation of any software and can be accessed from anywhere. With its ease of use, Geoportal is accessible for those without extensive knowledge in cartography and GIS.

The key archaeological geoportal applications are:

1. Visualization of the available spatial data in the study area, including 3D representation. The visualization can be used both for ongoing research or presentations.

2. Storage of the database of attributes, including photographs and plans of excavations on a single server (physical or virtual), accessible from any workstation with the Internet access.

3. Fieldwork planning based on the assessment of the study area, transport accessibility, and neighborhood analysis. Geoportal also supports field navigation by directly connecting to a GPS receiver, recording waypoints, and routes.

4. Multi-user editing of spatial data enabled by the client-server architecture supports collaboration when studying large areas or during extensive projects involving multiple research teams.

5. Basic geoanalytical operations:

- search for information by attributes (sampling);
- measurement of distances, areas, coordinates;
- grouping vector objects by type (generating derived thematic maps) (in progress);
- GIS-analysis (in progress): dynamic generation of buffer zones, object density maps, elevation profiles, visibility zones, search for object intersections between layers, etc.

Work on filling the thematic layers is still being carried on. We keep refining the sections on the archaeological sites specifying more accurate coordinates and boundaries, monitoring their conditions and adding new sites.

## REFERENCES

Bezborodova L. G., Parkhimovich S. Yu. Archaeological Heritage of I. Ya. Slotstov. In: Slotstovskie Chteniia: Materials of the Scientific-Practical Conference, Dedicated to the 150<sup>th</sup> Anniversary of I. Ya. Slotstov. Tyumen : Izdatel'sko-poligraficheskoe predpriyatie «Tyumen'», 1995. Pp. 14–17. (*In Russ.*)

Borisov A. V., Korobov D. S. Ancient and Medieval Agriculture in the Kislovodsk Basin: Results of Soil and Archaeological Research. Moscow : Taus, 2013. 272 p. (*In Russ.*)

Zakh V. A., Usacheva I. V., Zimina O. Yu., Skochina S. N., Chikunova I. Yu., Antiques of the Andreevsky Lake System. Vol. 1. Archaeological Sites. Novosibirsk : Nauka, 2014. 225 p. (*In Russ.*)

Zimina O. Yu., Zherybateva N. V., Idrisov I. R., Sizov O. S., Moskvina N. N., Afonin A. S., Ivanov S. N., Ryabogina N. E. The Andreevskoye Lake System at the Turn of the Bronze and Early Iron Ages: Paleo-Landscape Mapping, Bioproductivity Assessment and Demographic Capacity of the Territory (Tura and Pyshma interfluvium, West Siberia). *Vestnik arheologii, antropologii i etnografii = Bulletin of Archaeology, Anthropology and Ethnography*. 2019;2(45):69–84. (*In Russ.*) <https://doi.org/10.20874/2071-0437-2019-45-2-069-084>

Zimina O. Yu., Zakh V. A. Lower Tobol Basin at the Turn of the Bronze and Iron Ages. Novosibirsk : Nauka, 2009. 232 p. (*In Russ.*)

Korobov D. S., Borisov A. V., New Data on Studying Ancient and Medieval Settlement Offsites in the Kislovodsk Basin. *Rossiiskaya arheologiya = Russian Archaeology*. 2020;4:53–69. (*In Russ.*) <https://doi.org/10.31857/S086960630008885-2>

Kosintsev P. A., Stefanov V. I. Peculiarities of the Economy of the Population of the Forest Trans-Ural and Priishima Forest-Steppe in the Transition Time from the Bronze Age to



the Iron Age. In: Formation and Development of the Producing Economy in the Urals. Sverdlovsk : Izd-vo UrO RAN, 1989. Pp. 105–119. (*In Russ.*)

Makarov N. A., Zelentsova O. V., Korobov D. S., Chernikov A. P., Voroshilov A. N. Russia as an Archaeological Space: Initial Results of Creating of the Russian Archaeological Sites National Geography Information System. *Rossijskaya arheologiya = Russian Archaeology*. 2016;4:5–15 (*In Russ.*)

Martinova E. P., Pivneva E. A. Present State of Traditional Systems of Natural Resources Among the Natives of the Taiga Zone of the Lower Priobje (Ochiabrskij and Khanty-Mansijskij Regions of the Khanty-Mansijskij Autonomous Okrug). Studies on Applied and Emergency Ethnology. M. : Izd-vo Instituta etnologii i antropologii RAN, 1999. Vol. 130. 25 p. (*In Russ.*)

Nedashkovskiy L. F. Methodical Aspects of Researches of the Complexes of Archaeological Sites in the Region of the Largest Golden Horde Cities of the Lower Volga area. *Povolzhskaya Arheologiya = The Volga River Region Archaeology*. 2013;4(6):118–129. (*In Russ.*) <https://doi.org/10.24852/pa2013.4.6.118.129>

Nikulina A. V., Zolnikov I. D., Kuzmin Y. V., Sofeikov O. V., Chupina D. A., Glushkova N. V., Pchel'nikov D. V. Using GIS Technologies to Analyze the Spatial Localization of Settlements. Case Study: Bronze Age, Early Iron Age and Middle Ages in the Central Part of the Barabinsk Lowland. *Vestnik Tomskogo gosudarstvennogo universiteta = Tomsk State University journal*. 2018;428:117–125. (*In Russ.*) <https://doi.org/10.17223/15617793/428/16>

Patkanov S. K. Works in 5 volumes. Vol. 3: Economic Life of State Peasants and Foreigners of Tobolsk District, Tobolsk Province. Part 2. Tyumen : Mandr i K, 2003. 12 p. (*In Russ.*)

Prikhodko N. V., Sizov O. S., Ilyaschenko V. A., Zimina O. Yu. An Attempt at the Use of an Unmanned Aircraft (Hexacopter) for Creating Highly Detailed Relief Models for Archaeological Investigations. In: Archaeology and Geoinformatics. Moscow : Izd-vo Instituta arheologii RAN, 2017. Pp. 41–43. (*In Russ.*)

Sizov O. S., Zimina, O. Yu. Particulars of a Life Support System and Spatial Distribution Regarding Settlements of the Itkul Culture in the Low Tobol Basin (VIII–VI cc. BC). *Vestnik arheologii, antropologii i etnografii = Bulletin of Archaeology, Anthropology and Ethnography*. 2012;4(19):155–167. (*In Russ.*)

Sizov O. S., Zimina O. Yu., Prikhodko N. V., Kostomarov V. M., Zakh V. A., Soromotin A. V. Application of Unmanned Aerial Photography and Bathymetric Systems for Reconstruction of Water Level Dynamics in the Andreyevskoe Lake System (Tyumen region). In: Archaeology and Geoinformatics (Electronic resource): on CD-ROM. Issue. 9. Moscow : IA RAN, 2019. (*In Russ.*)

Sizov O. S., Idrisov I. R., Molchanova K. V. An Attempt to Reconstruct the Original Landscapes Using a Large-Scale Mapping of the Territory of the Andreevskoe Lake System (Interfluvium of the Tura and Pyshma Rivers). *Vestnik arheologii, antropologii i etnografii = Bulletin of Archaeology, Anthropology and Ethnography*. 2017;4(39):183–190. (*In Russ.*) <https://doi.org/10.20874/2071-0437-2017-39-4-205-212>

Sizov O. S., Prikhodko N. V., Zakh V. A., Soromotin A. V., Kostomarov V. M. Application of Unmanned Aerial Survey and Bathymetric Systems for Reconstruction of Water Level Evolution in the Andreevskoe Lake System (Tyumen Region.). In: Application of Unmanned Aerial Vehicles in Geographical Research. Irkutsk : Izd-vo IG SO RAN, 2018. Pp. 107–111. (*In Russ.*)

Sizov O. S., Tsymbarovitch P. R., Zimina O. Yu., Zakh V. A. Web-GIS Technologies in the Study of the Life Support System of the Ancient Population on the Example of the Turo-Pyshma Interfluve (Tyumen Region) In: *Archaeology and Geoinformatics*. No. 10. Moscow : IA RAN, 2021. DVD-ROM. (*In Russ.*) <https://doi.org/10.25681/IARAS.2021.978-5-94375-342-8.17>

Slotvsov I. Ya. Stone Age Artifacts Found near Tyumen in 1883. In: *Zap. ZSORGO*. Omsk, 1885. Vol. 7, Issue 1. 59 p. (*In Russ.*)

Slotvsov I. Ya. On the Distribution of Barrows and Ancient Settlements in Tobolsk Province. In: *Tomsk Imperial Univ. Bulletin*. 1890. Part A. Vol. 2. Pp. 76–97. (*In Russ.*)

Alenius T., Gerasimov D., Sapelko T., Ludikova A., Kuznetsov D., Golyeva A., and Nordqvist K. Human-Environment Interaction during the Holocene along the Shoreline of the Ancient Lake Ladoga: A Case Study Based on Palaeoecological and Archaeological Material from the Karelian Isthmus, Russia. *The Holocene*. 2020;30(11):1622–1636. <https://doi.org/10.1177/0959683620941071>

Bailey G. N., Davidson I. Site Exploitation Territories and Topography: Two Case Studies from Palaeolithic Spain. *Journal of Archaeological Science*. 1983;10(2):87–115.

Chamberlein A. *Demography in Archaeology*. Cambridge : Cambridge University Press, 2006. 235 p.

de Sousa L. M., Poggio L., Batjes N. H., Heuvelink G. B., Kempen B., Riberio E., & Rossiter D. SoilGrids 2.0: Producing Quality-assessed Soil Information for the Globe. *Soil Discuss*. 2020;1–37. <https://doi.org/10.5194/soil-2020-65>

Drennan Robert D., C. Adam Berrey and Christian E. Peterson. *Regional Settlement Demography in Archaeology*. Elliot Werner Publications, Clinton Corners. 2015. 180 p.

Giesecke T., Bennett K. D., Birks H. J. B., Bjune A. E., Bozilova E., Feurdean A., Finsinger W., Froyd C., Pokorny P., Rosch M., Seppa H., Tonkov S., Valsecchi V., and Wolters S. The Pace of Holocene Vegetation Change — Testing for Synchronous Developments. *Quaternary Science Reviews*. 2011;30(19):2805–2814. <https://doi.org/10.1016/j.quascirev.2011.06.014>

Jarman M. R., Vita-Finzi C., Higgs E. S. Site Catchment Analysis in Archaeology. In: *Man, Settlement and Urbanism. Proceedings of a Meeting of the Research Seminar in Archaeology and Related Subjects Held at the Institute of Archaeology, London University*. London : Duckworth, 1972. Pp. 61–67.

Kadochnikov A. Experience in the Development a Regional Geoport for the Krasnoyarsk Region. *InterCarto. InterGIS*. 2020;26:203–214. <https://doi.org/10.35595/2414-9179-2020-1-26-203-214>

Klein Goldewijk K. A Historical Land Use Data Set for the Holocene; HYDE 3.2. *Geophysical Research Abstracts*. 2016;18:1574.

Klein Goldewijk K., Beusen A., van Drecht G. & de Vos M. The HYDE 3.1 Spatially Explicit Database of Human Induced Land Use Change over the Past 12,000 Years. *Global Ecology and Biogeography*. 2011;20:73–86.

Korobov D. S. Early Medieval Settlements and Land Use in the Kislovodsk Basin (North Caucasus). In: *Multi-, Inter- and Transdisciplinary Research in Landscape Archaeology, LAC2014 Proceedings, Vrije Universiteit Amsterdam*. Amsterdam : University Library Vrije Universiteit Amsterdam, 2014. Pp. 3–14. <https://doi.org/10.5463/lac.2014.2>

Krause R. and Koryakova L. N. Multidisciplinary Investigations of the Bronze Age Settlements in the Southern Trans-Urals (Russia). Bonn : Habelt, 2013. 354 p.

Jerma J. L., Heras V., Mora-Navarro G., Rodas P., Matute F. Geoportal Proposal for the Inventory of Cultural Heritage in Nabón (Ecuador). *ISPRS — International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*. XLIII-B2-2020. 2020:1415–1418. <https://doi.org/10.5194/isprs-archives-XLIII-B2-2020-1415-2020>

Malone C. Stoddart S. The Dissection of a Bronze and Early Iron Age Landscape: Site Territories and Land Use. In: *Territory, Time and State: The Archaeological Development of the Gubbio Basin*. 1994. Pp. 81–93 (Cambridge University Press).

Mhangara P., Lamba, A., Mapurisa W., Mudau N. Towards the Development of Agenda 2063 Geo-Portal to Support Sustainable Development in Africa. *ISPRS International Journal of Geo-Information*. 2019;8(9):399; <https://doi.org/10.3390/ijgi8090399>

Müller J. Eight Million Neolithic Europeans: Social Demography and Social Archaeology on the Scope of Change — from the Near East to Scandinavia. In: Kristiansen, K., Smedja, L., Turek, J. (eds.). *Paradigm Found. Festschrift on Occasion of Evzen Neustupny's 80<sup>th</sup> Birthday*. Oxford : Oxbow Books, 2015. Pp. 200–214.

Müller J. Inheritance, Population and Social Identities. Southeast Europe 5200–4300 BCE. In: M. Gori/M. Ivanova (Hrsg.), *Balkan Dialogues. Negotiating Identity between Prehistory and the Present*. London : Routledge, 2017. Pp. 156–168.

Palmisano A., Bevan A., Shennan S. Comparing Archaeological Proxies for Long-Term Population Patterns: an Example from Central Italy. *Archaeol. Sci.* 2017;87:59–72. <https://doi.org/10.1016/j.jas.2017.10.001>

Renfrew C., and Bahn P. (ed.) *Archaeology: The Key Concepts*. 2005. 233 p.

Ronzino P., Acconcia V., & Falcone A. Towards the Integration of Spatial Data through the Italian Geoportal for Archaeological Resources. 2018 3<sup>rd</sup> Digital Heritage International Congress (DigitalHERITAGE) Held Jointly with 2018 24th International Conference on Virtual Systems & Multimedia (VSMM 2018). 2018. <https://doi.org/10.1109/digitalheritage.2018.8810132>

Rosch M., Kleinmann A., Lechterbeck J., Wick L. Botanical Off-Site and On-Site Data as Indicators of Different Land Use Systems: A Discussion with Examples from Southwest Germany. *Veget Hist Archaeobot.* 2014;23:647–648. <https://doi.org/10.1007/s00334-014-0477-8>

Ryabogina N. E., Afonin A. S., Ivanov S. N., Li H.-C., Kalinin P. A., Udaltsov S. N., Nikolaenko S. A. Holocene Paleoenvironmental Changes Reflected in Peat and Lake Sediment Records of Western Siberia: Geochemical and Plant Macrofossil Proxies. *Quaternary International*. 2019;528:73–87 <https://doi.org/10.1016/j.quaint.2019.04.006>

Schwarz A. S., Oeggl K. Vegetation Change during the Bronze Age Studied in a Multi-Proxy Approach: Use of Wood Linked to Charcoal Analysis. *Veget Hist Archaeobot.* 2013;22:493–507. <https://doi.org/10.1007/s00334-013-0402-6>

Smith M. E., Feinman G. M., Drennan R. D., Earle T., and Morris I. Archaeology as a Social Science. *Proceedings of the National Academy of Sciences*. 2012;109(20):7617–7621.

Spanu V., Lorrain E., Muscas L., Demontis R. Nurnet — Geoportal. *Archeomatica*. 2017;VIII:26–29. <https://doi.org/10.48258/arc.v8i5.1669>

Vita-Finzi C., Higgs E. S. Prehistoric Economy in the Mount Carmel Area of Palestine: Site Catchment Analysis. *Proceedings of the Prehistoric Society*. 1970;36:1–37.

Yamashkin S. A., Radovanović M. M., Yamashkin A. A., Barmin N. N., Zanozin V. V., Petrović M. D. Problems of Designing Geoportals Interfaces. *GeoJournal of Tourism and Geosites*. 2019;24(1):88–101. <https://doi.org/10.30892/gtg.24108-345>

### СПИСОК ИСТОЧНИКОВ

Безбородова Л. Г., Пархимович С. Ю. Археологическое наследие И. Я. Словцова // Словцовские чтения: Материалы научно-практической конференции, посвященной 150-летию И. Я. Словцова. Тюмень : Издательско-полиграфическое предприятие «Тюмень», 1995. С. 14–17.

Борисов А. В., Коробов Д. С. Древнее и средневековое земледелие в Кисловодской котловине: итоги почвенно-археологических исследований. М. : Таус, 2013. 272 с.

Зах В. А., Усачева И. В., Зими́на О. Ю., Скочина С. Н., Чикунова И. Ю. Древности Андреевской озерной системы. Т. 1. Археологические памятники. Новосибирск : Наука, 2014. 225 с.

Зими́на О. Ю., Жеребятъева Н. В., Идрисов И. Р., Сизов О. С., Москвина Н. Н., Афонин А. С., Иванов С. Н., Рябогина Н. Е. Картирование палеоландшафтов, оценка биопродуктивности и демографической емкости территории Андреевской озерной системы на рубеже бронзового и раннего железного веков (междуречье Туры и Пышмы, Западная Сибирь) // Вестник археологии, антропологии и этнографии. 2019. №2 (45). С. 69–84. <https://doi.org/10.20874/2071-0437-2019-45-2-069-084>

Зими́на О. Ю., Зах В. А. Нижнее Притоболье на рубеже бронзового и железного веков. Новосибирск : Наука. 2009. 232 с.

Коробов Д. С., Борисов А. В. Новые данные по изучению ресурсных зон древних и средневековых поселений в Кисловодской котловине // Российская археология. 2020. №4. С. 53–69.

Косинцев П. А., Стефанов В. И. Особенности хозяйства населения лесного Зауралья и Приишимской лесостепи в переходное время от бронзового века к железному // Становление и развитие производящего хозяйства на Урале. Свердловск : Изд-во УрО РАН, 1989. С. 105–119.

Макаров Н. А., Зеленцова О. В., Коробов Д. С., Черников А. П., Ворошилов А. Н. Россия как археологическое пространство: первые итоги работы по созданию национальной географо-информационной системы «Археологические памятники России» // Российская археология. 2016. №4. С. 5–15.

Мартынова Е. П., Пивнева Е. А. Современное природопользование таежного населения Нижнего Приобья (Ханты-Мансийский и Октябрьский районы Ханты-Мансийского А.О.) : Исследования по прикладной и неотложной этнологии. М. : Изд-во Института этнологии и антропологии РАН, 1999. 27 с.

Недашковский Л. Ф. Методические аспекты исследования комплексов археологических памятников округа крупнейших золотоордынских городов Нижнего Поволжья // Поволжская археология. 2013. №4 (6). С. 118–129.

Никулина А. В., Зольников И. Д., Кузьмин Я. В., Софеев О. В., Чупина Д. А., Глушкова Н. В., Пчельников Д. В. Методика использования гис-технологий для анализа пространственной локализации поселений на примере эпохи бронзы, Раннего железного века и средневековья в центральной части Барабинской низменности // Вест-

ник Томского государственного университета. 2018. №428. С. 117–125. <https://doi.org/10.17223/15617793/428/16>

Патканов С. К. Соч. в 5 т. Т. 3: Экономический быт государственных крестьян и ино-родцев Тобольского округа Тобольской губернии. Часть вторая. Тюмень : Мандр и К, 2003. 312 с.

Приходько Н. В., Сизов О. С., Ильященко В. А., Зими́на О. Ю. Опыт использования БПЛА (гексакоптер) для построения высокодетальных моделей рельефа в целях археологических исследований // Археология и геоинформатика. М. : Изд-во Института археологии РАН, 2017. С. 41–43.

Сизов О. С., Зими́на О. Ю. Особенности системы жизнеобеспечения и пространственного размещения поселений иткульской культуры в Притоболье (VIII–VI вв. до н.э.) // Вестник археологии, антропологии и этнографии. 2012. №4 (19). С. 155–167.

Сизов О. С., Зими́на О. Ю., Приходько Н. В., Костомаров В. М., Зах В. А., Соромотин А. В. Применение беспилотных аэрофотосъемочных и батиметрических систем для реконструкции динамики уровня воды в Андреевской озерной системе (Тюменская область) // Археология и геоинформатика (Электронный ресурс): на CD-ROM. Вып. 9. М. : ИА РАН, 2019.

Сизов О. С., Идрисов И. Р., Молчанова К. В. Опыт реконструкции исходных ландшафтов с использованием крупномасштабного картирования территории Андреевской озерной системы (междуречье Туры и Пышмы) // Вестник археологии, антропологии и этнографии. 2017. №4 (39). С. 183–190.

Сизов О. С., Приходько Н. В., Зах В. А., Соромотин А. В., Костомаров В. М. Опыт применения беспилотных аэрофотосъемочных и батиметрических систем для реконструкции динамики уровня воды в Андреевской озерной системе (Тюменская область) // Применение беспилотных летательных аппаратов в географических исследованиях. Иркутск : Изд-во ИГ СО РАН, 2018. С. 107–111.

Сизов О. С., Цымбарович П. Р., Зими́на О. Ю., Зах В. А. Веб-геоинформационные технологии в исследовании системы жизнеобеспечения древнего населения на примере Туро-Пышминского междуречья (Тюменская область) // Археология и геоинформатика. Вып. 10. М. : ИА РАН, 2021. DVD-ROM. <https://doi.org/10.25681/IARAS.2021.978-5-94375-342-8.17>

Словцов И. Я. О находках предметов каменного периода близ г. Тюмени в 1883 г. // Зап. ЗСОРГО. Омск, 1885. Кн. 7, вып. 1. 59 с.

Словцов И. Я. Материалы о распределении курганов и городищ в Тобольской губернии // Изв. Импер. Том. ун-та. 1890. Отд. А. Кн. 2. С. 76–97.

Alenius T., Gerasimov D., Sapelko T., Ludikova A., Kuznetsov D., Golyeva A., and Nordqvist K. Human-Environment Interaction during the Holocene along the Shoreline of the Ancient Lake Ladoga: A Case Study Based on Palaeoecological and Archaeological Material from the Karelian Isthmus, Russia. The Holocene. 2020;30(11):1622–1636. <https://doi.org/10.1177/0959683620941071>

Bailey G. N., Davidson I. Site Exploitation Territories and Topography: Two Case Studies from Palaeolithic Spain. *Journal of Archaeological Science*. 1983;10(2):87–115.

Chamberlein A. *Demography in Archaeology*. Cambridge : Cambridge University Press, 2006. 235 p.

de Sousa L.M., Poggio L., Batjes N.H., Heuvelink G.B., Kempen B., Riberio E., & Rossiter D. SoilGrids 2.0: Producing Quality-assessed Soil Information for the Globe. *Soil Discuss.* 2020;1–37. <https://doi.org/10.5194/soil-2020-65>

Drennan Robert D., C. Adam Berrey and Christian E. Peterson. *Regional Settlement Demography in Archaeology*. Elliot Werner Publications, Clinton Corners. 2015. 180 p.

Giesecke T., Bennett K.D., Birks H.J.B., Bjune A.E., Bozilova E., Feurdean A., Finsinger W., Froyd C., Pokorny P., Rosch M., Seppa H., Tonkov S., Valsecchi V., and Wolters S. The Pace of Holocene Vegetation Change — Testing for Synchronous Developments. *Quaternary Science Reviews.* 2011;30(19):2805–2814. <https://doi.org/10.1016/j.quascirev.2011.06.014>

Jarman M.R., Vita-Finzi C., Higgs E.S. Site Catchment Analysis in Archaeology. In: *Man, Settlement and Urbanism. Proceedings of a Meeting of the Research Seminar in Archaeology and Related Subjects Held at the Institute of Archaeology, London University*. London : Duckworth, 1972. Pp. 61–67.

Kadochnikov A. Experience in the Development a Regional Geopotal for the Krasnoyarsk Region. *InterCarto. InterGIS.* 2020;26:203–214. <https://doi.org/10.35595/2414-9179-2020-1-26-203-214>

Klein Goldewijk K. A Historical Land Use Data Set for the Holocene; HYDE 3.2. *Geophysical Research Abstracts.* 2016;18:1574.

Klein Goldewijk K., Beusen A., van DrechtG. & de Vos M. The HYDE 3.1 Spatially Explicit Database of Human Induced Land Use Change over the Past 12,000 Years. *Global Ecology and Biogeography.* 2011;20:73–86.

Korobov D.S. Early Medieval Settlements and Land Use in the Kislovodsk Basin (North Caucasus). In: *Multi-, Inter- and Transdisciplinary Research in Landscape Archaeology, LAC2014 Proceedings, Vrije Universiteit Amsterdam*. Amsterdam : University Library Vrije Universiteit Amsterdam, 2014. Pp. 3–14. <https://doi.org/10.5463/lac.2014.2>

Krause R. and Koryakova L.N. *Multidisciplinary Investigations of the Bronze Age Settlements in the Southern Trans-Urals (Russia)*. Bonn : Habelt, 2013. 354 p.

Lerma J.L., Heras V., Mora-Navarro G., Rodas P., Matute F. Geoportal Proposal for the Inventory of Cultural Heritage in Nabón (Ecuador). *ISPRS — International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences. XLIII-B2-2020.* 2020:1415–1418. <https://doi.org/10.5194/isprs-archives-XLIII-B2-2020-1415-2020>

Malone C. Stoddart S. The Dissection of a Bronze and Early Iron Age Landscape: Site Territories and Land Use. In: *Territory, Time and State: The Archaeological Development of the Gubbio Basin*. 1994. Pp. 81–93 (Cambridge University Press).

Mhangara P., Lamba, A., Mapurisa W., Mudau N. Towards the Development of Agenda 2063 Geo-Portal to Support Sustainable Development in Africa. *ISPRS International Journal of Geo-Information.* 2019;8(9):399; <https://doi.org/10.3390/ijgi8090399>

Müller J. Eight Million Neolithic Europeans: Social Demography and Social Archaeology on the Scope of Change — from the Near East to Scandinavia. In: Kristiansen, K., Smedja, L., Turek, J. (eds.). *Paradigm Found. Festschrift on Occasion of Evzen Neustupny's 80<sup>th</sup> Birthday*. Oxford : Oxbow Books, 2015. Pp. 200–214.

Müller J. Inheritance, Population and Social Identities. Southeast Europe 5200–4300 BCE. In: M. Gori/M. Ivanova (Hrsg.), *Balkan Dialogues. Negotiating Identity between Prehistory and the Present*. London : Routledge, 2017. Pp. 156–168.

Palmisano A., Bevan A., Shennan S. Comparing Archaeological Proxies for Long-Term Population Patterns: an Example from Central Italy. *Archaeol. Sci.* 2017;87:59–72. <https://doi.org/10.1016/j.jas.2017.10.001>

Renfrew C., and Bahn P. (ed.) *Archaeology: The Key Concepts*. 2005. 233 p.

Ronzino P., Acconcia V., & Falcone A. Towards the Integration of Spatial Data through the Italian Geoportal for Archaeological Resources. 2018 3<sup>rd</sup> Digital Heritage International Congress (DigitalHERITAGE) Held Jointly with 2018 24th International Conference on Virtual Systems & Multimedia (VSMM 2018). 2018. <https://doi.org/10.1109/digitalheritage.2018.8810132>

Rosch M., Kleinmann A., Lechterbeck J., Wick L. Botanical Off-Site and On-Site Data as Indicators of Different Land Use Systems: A Discussion with Examples from Southwest Germany. *Veget Hist Archaeobot.* 2014;23:647–648. <https://doi.org/10.1007/s00334-014-0477-8>

Ryabogina N. E., Afonin A. S., Ivanov S. N., Li H.-C., Kalinin P. A., Udaltsov S. N., Nikolaenko S. A. Holocene Paleoenvironmental Changes Reflected in Peat and Lake Sediment Records of Western Siberia: Geochemical and Plant Macrofossil Proxies. *Quaternary International.* 2019;528:73–87 <https://doi.org/10.1016/j.quaint.2019.04.006>

Schwarz A. S., Oeggl K. Vegetation Change during the Bronze Age Studied in a Multi-Proxy Approach: Use of Wood Linked to Charcoal Analysis. *Veget Hist Archaeobot.* 2013;22:493–507. <https://doi.org/10.1007/s00334-013-0402-6>

Smith M. E., Feinman G. M., Drennan R. D., Earle T., and Morris I. Archaeology as a Social Science. *Proceedings of the National Academy of Sciences.* 2012;109(20):7617–7621.

Spanu V., Lorrai E., Muscas L., Demontis R. Nurnet — Geoportal. *Archeomatica.* 2017;VIII:26–29. <https://doi.org/10.48258/arc.v8i5.1669>

Vita-Finzi C., Higgs E. S. Prehistoric Economy in the Mount Carmel Area of Palestine: Site Catchment Analysis. *Proceedings of the Prehistoric Society.* 1970;36:1–37.

Yamashkin S. A., Radovanović M. M., Yamashkin A. A., Barmin N. N., Zanozin V. V., Petrović M. D. Problems of Designing Geoportal Interfaces. *GeoJournal of Tourism and Geosites.* 2019;24(1):88–101. <https://doi.org/10.30892/gtg.24108-345>

---

#### CONTRIBUTION OF THE AUTHORS/ ВКЛАД АВТОРОВ

---

O. Yu. Zimina: collection of material, processing of material, writing sections of the article (Introduction; Area of Study; Results and Discussion), scientific text editing.

Зими́на О. Ю.: сбор материала, обработка материала, написание разделов статьи (Introduction; Area of Study; Results and Discussion), научное редактирование текста.

O. S. Sizov: idea, collection of material, processing of material, writing sections of the article (Results and Discussion; Thematic layers of the Archaeological Geoportal, Basic Geographical Layers of the Archaeological Geoportal; Conclusions), scientific text editing.

Сизов О. С.: идея, сбор материала, обработка материала, написание разделов статьи (Results and Discussion; Thematic layers of the Archaeological Geoportal, Basic Geographical Layers of the Archaeological Geoportal; Conclusions), научное редактирование текста.

P. R. Tsymbarovich: collection of material, processing of material, writing sections of the article (The Archaeological Geoportal Architecture).

Цымбарович П. Р.: сбор материала, обработка материала, написание разделов статьи (The Archaeological Geoportal Architecture).

There is no conflict of interest / Конфликт интересов отсутствует.

---

#### INFORMATION ABOUT THE AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ

---

**Oksana Yuryevna Zimina**, Candidate of Historical Sciences, Senior Researcher, Tyumen Scientific Centre SB RAS, Tyumen, Russia.

**Зими́на Оксана Юрьевна**, кандидат исторических наук, старший научный сотрудник, Тюменский научный центр СО РАН, Тюмень, Россия.

**Oleg Sergeevich Sizov**, PhD, Senior Researcher, Oil and Gas Research Institute of RAS, Moscow, Russia.

**Сизов Олег Сергеевич**, кандидат географических наук, старший научный сотрудник, Институт проблем нефти и газа РАН, Москва, Россия.

**Petr Romanovich Tsymbarovich**, Senior Researcher, V.V. Dokuchaev Soil Science Institute, Moscow, Russia.

**Цымбарович Петр Романович**, старший научный сотрудник, Почвенный институт им. В.В. Докучаева, Москва, Россия.

*The article was submitted 27.06.2022;*

*approved after reviewing 16.08.2022;*

*accepted for publication 31.08.2022.*

*Статья поступила в редакцию 27.06.2022;*

*одобрена после рецензирования 16.08.2022;*

*принята к публикации 31.08.2022.*



Research Article / Научная статья

УДК 902«637»:636.03(470.55/.58)

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-07](https://doi.org/10.14258/tpai(2022)34(3).-07)

## ETHNOZOOLOGY FOR ARCHAEOLOGY: RESULTS OF THE STUDY OF THE MODERN LIVESTOCK BREEDING SYSTEM IN THE STEPPE ZONE OF THE SOUTHERN URALS

**Alexey Yu. Rassadnikov**

*Institute of History and Archaeology, Ekaterinburg, Russia;  
ralu87@mail.ru, <https://orcid.org/0000-0002-3772-303x>*

**Abstract.** The work is devoted to a detailed study of modern livestock breeding in the south of the Chelyabinsk region. The article describes in detail the system of grazing and keeping livestock in the summer and winter periods in the villages of the Southern Urals. The main purpose of the work is to create an information basis for future archaeological and archaeozoological studies of the sites of pastoralists of the Bronze Age and more correct interpretations in the reconstruction of ancient pastoralism. The main research tools were interviewing shepherds and personal observations of grazing and keeping livestock at different times of the year. The main form of grazing and keeping livestock at present is the pasture-stall system, which is quite variable depending on various factors. The warm period of the year is characterized by grazing in the vicinity of villages and stall keeping in the cold season. The study shows the wide possibilities and resistance of small areas of the steppe river valleys to grazing. The results of the study of modern pastoralism can be used in archaeological research in various studies that are associated with a settled model of pastoralism.

**Key words:** cattle, caprines, sheep, horse, pastoralism, archaeozoology, Bronze Age

**Acknowledgements:** I express my gratitude to E. V. Kupriyanova and the Arkaim Reserve for assistance in studying modern animal husbandry in the area of their work (Stepninsky and Kizilsky districts of the Chelyabinsk region). Special thanks are given to Yuri Zuikov for sending photos of winter and spring grazing in the vicinity of Arkaim, as well as to Polina and Maxim Ankushev for the photos of summer grazing in the Kizilsky and Verkhneural'sky districts of the Chelyabinsk region. I also express my gratitude to the reviewers, whose recommendations made it possible to make the work better.

**For citation:** Rassadnikov A. Yu. Ethnozoology for Archaeology: Results of the Study of the Modern Livestock Breeding System in the Steppe Zone of the Southern Urals. *Teoriya i praktika arheologicheskikh issledovaniy = Theory and Practice of Archaeological Research*. 2022;34(3):112–130. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-07](https://doi.org/10.14258/tpai(2022)34(3).-07)

## ЭТНОЗООЛОГИЯ ДЛЯ АРХЕОЛОГИИ: РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЯ СОВРЕМЕННОЙ СИСТЕМЫ ЖИВОТНОВОДСТВА В СТЕПНОЙ ЗОНЕ ЮЖНОГО УРАЛА

**Алексей Юрьевич Рассадников**

*Институт истории и археологии, Екатеринбург, Россия;  
ralu87@mail.ru, <https://orcid.org/0000-0002-3772-303x>*

**Резюме.** Работа посвящена изучению современного животноводства на юге Челябинской области. Статья подробно описывает систему выпаса и содержания домашнего скота в летний

и зимний периоды в деревнях Южного Урала. Основной целью работы является создание информационно-основы для будущих археологических и археозоологических исследований памятников скотоводов бронзового века и более корректных интерпретаций при реконструкции древнего скотоводства. Основными инструментами исследования являлись интервьюирование пастухов и личное наблюдение за выпасом и содержанием скота в разное время года. Основной формой выпаса и содержания скота в настоящее время является пастбищно-стойловая система, которая довольно вариативна в зависимости от различных факторов. Теплый период года характеризуется выпасом скота в окрестностях деревень и стойловым содержанием в холодное время года. Исследование показывает широкие возможности и устойчивость небольших участков степных речных долин к выпасу скота. Результаты изучения современного скотоводства могут быть использованы в археологических исследованиях, которые связаны с оседлой моделью скотоводства.

**Ключевые слова:** крупный рогатый скот, мелкий рогатый скот, овцы, лошадь, скотоводство, археозоология, бронзовый век

**Благодарности:** выражаю признательность Е. В. Куприяновой и заповеднику Аркаим за содействие в изучении современного животноводства в районе их работ (Степнинский и Кизильский районы Челябинской области). Отдельная благодарность Юрию Зуйкову за присланные фото зимнего и весеннего выпаса скота в окрестностях Аркаима, а также Полине и Максиму Анкушевым за фото летнего выпаса скота в Кизильском и Верхнеуральском районах Челябинской области. Также выражаю признательность рецензентам, чьи рекомендации позволили сделать работу лучше.

---

**Для цитирования:** Рассадников А. Ю. Этнозоология для археологии: результаты исследования современной системы животноводства в степной зоне Южного Урала // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 112–130. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-07](https://doi.org/10.14258/tpai(2022)34(3).-07)

---

## Introduction

The river valleys of the steppe zone of the Southern Urals (Fig. 1) are quite extensive and valuable datasets on issues that are primarily related to the study of the environment, vegetation, and animal husbandry. It is not a secret that in the steppe zone it is the river valleys that concentrate the areas used for settlements, agriculture and animal husbandry. This is typical both for the early periods of history and for our days. The uniqueness of the river valleys of the southern steppe zone lies in the fact that here, as in the Bronze Age, livestock breeding remains the main type of economy. Paleobotanical studies demonstrate that the environmental conditions of the territory under consideration for most of the Bronze Age and today are approximately the same (Stobbe, 2013, p. 323). This fact suggests that a thorough study of modern processes and aspects can lead to the data that can later be extrapolated to archaeological studies of the Bronze Age. One of the successful manifestations of this approach was the discovery of the phenomenon of osteophagia in livestock and the study of pathologies of the bones of modern cattle in the valley of the Karagaily-Ayat River. This made it possible to study the phenomenon of osteophagia as a type of modification changes in bones and subsequently to regularly identify bones with traces of exposure to ungulates in the Bronze Age settlements (Rassadnikov, 2017). The study of the pathologies of the bones of modern cattle and caprines made it possible to identify relatively reliable osteological markers of the physical exploitation of bulls and typical age-related changes

in sheep and goats. These data can be applied in archaeozoological studies of the Bronze Age and other periods (Rassadnikov, 2021; 2022). The study of modern animal husbandry is a continuation of the implementation of this approach in the archaeology of the Bronze Age. The study of modern animal husbandry practices and the use of the obtained data for reconstructions is not new in archaeology. There are already examples in the Bronze Age archaeology of observing the modern pastoral system at the excavation site and extrapolating these data to archaeological reconstructions (Anthony et al., 2005, p. 403; Anthony et al., 2016). In general, the practice of studying modern pastoral practices or their individual components is quite common (e.g. Lugli, 2021; Ng et al., 2022). The valley of the Karagaily-Ayat River (Fig. 2) of the Kartalinsky district of the Chelyabinsk region (Russia) is the main area where modern cattle breeding has been studied for several years. This microdistrict is a unique testing ground for this kind of research. Here, in close proximity to each other (10 km from each other), there are three fortified settlements of the Sintashta culture and accompanying burial complexes. In addition to the fortified settlements, several unfortified settlements and related kurgan groups of the Late Bronze Age are concentrated there (Krause, Koryakova, 2013; Koryakova, Krause, 2022). The concentration of sites of pastoralists from different periods of the Bronze Age is also typical for other river valleys of the steppe zone of the Southern Urals. The basis of the life support system of the Bronze Age collectives was the breeding of livestock (Kosintsev, 2000; Rassadnikov, 2019; 2020, 2021). The results of paleobotanical studies, a number of indirect indicators and preliminary results of isotope studies with a high degree of probability suggest that cattle breeding in the Bronze Age was sedentary and a radius of about 4–5 km from the village was used for grazing (Rassadnikov, 2019; 2020, 2021; Stobbe et al., 2016). The likely practice of sedentary pastoralism and the rearing of the same types of livestock in the Bronze Age greatly enhances the importance of a thorough study of modern pastoralism in the river valleys of the Southern Urals. In our opinion, the implementation of such an approach in the context of the Karagaily-Ayat river valley is a unique opportunity to obtain accurate data for future archaeological and archaeozoological studies of the Bronze Age in the steppe zone of northern Eurasia. To increase the level of correctness of the study, in addition to the valley of the Karagaily-Ayat River, the data on modern animal husbandry from microdistricts of four other river valleys of the steppe zone of the Southern Urals were involved, which coincide with the location of a number of settlements of the Sintashta culture (Fig. 1). The main purpose of the work is a thorough description of the modern pastoral system in the same area and approximately the same environmental conditions in which numerous settlements of pastoralists of the Bronze Age were located. Another goal of the work is to show, using the example of a specific river valley, how individual sections of the valley are exploited under different conditions and at different seasons. In this case, an important task is to study the possibility of long-term grazing in one area and what consequences this may lead to (for example, the likelihood of overgrazing). The general principle of work is to combine the data of shepherds and personal observations. In our opinion, it is the shepherds who have the most complete and correct knowledge about all aspects of keeping and grazing livestock.

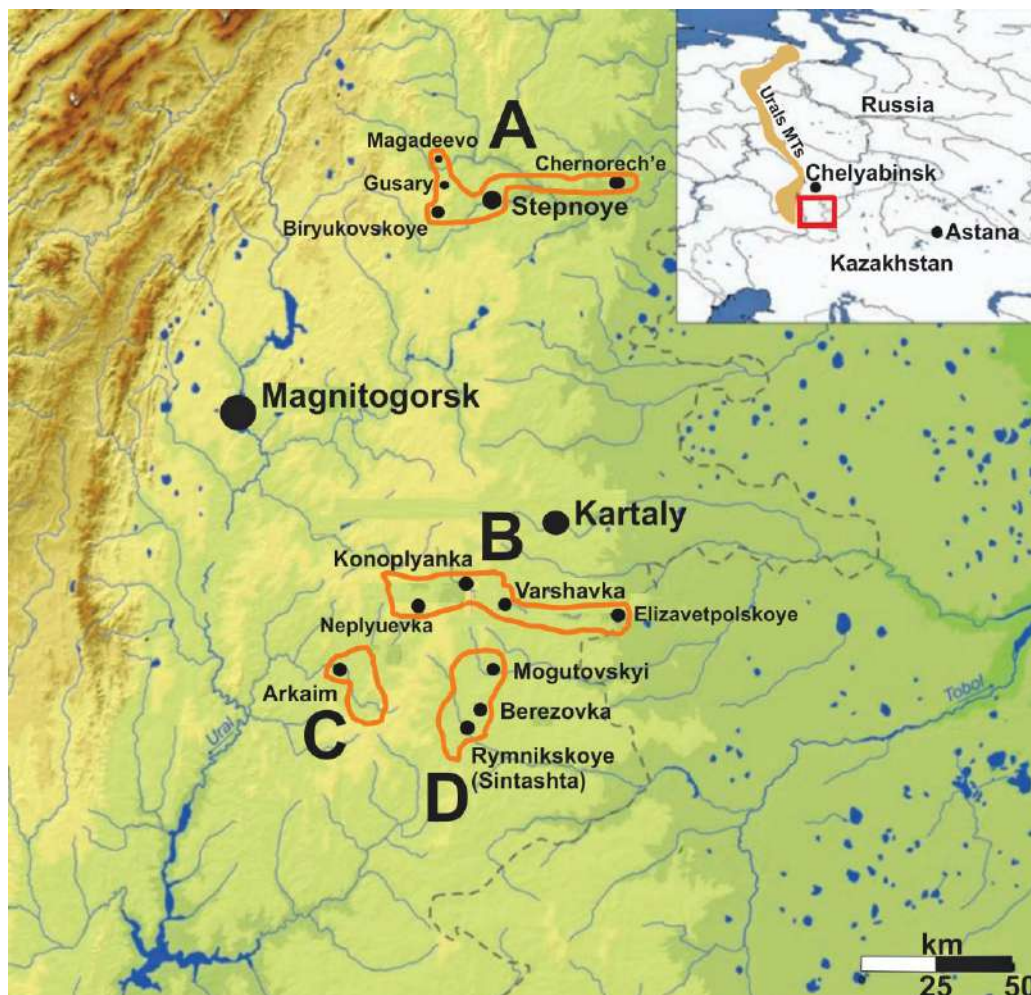


Fig. 1. Map of the steppe zone of the Southern Urals and the location of the microdistricts where the study of the modern livestock breeding system was carried out: A – research area in the valley of the Uy River near the village of Stepnoe (Uisky and Stepninsky districts of the Chelyabinsk region); B – the main research area in the valley of the Karagaily-Ayat River (Kartalinsky district of the Chelyabinsk region); C – research area in the valley of the Karaganka River and Arkaim (Kizilsky district of the Chelyabinsk region); D – research area in the valleys of the Sintashta and Kamysty-Ayat rivers (Bredinsky district of the Chelyabinsk region). Map by Stobbe et al. (2022)

Рис. 1. Карта степной зоны Южного Урала и расположение микрорайонов, где проводилось изучение современной системы скотоводства: А – зона исследований в долине реки Уй в районе села Степное (Уйский и Степнинский районы Челябинской области); В – основная зона исследований в долине реки Карагайлы-Аят (Карталинский район Челябинской области); С – зона исследований в долине реки Караганка и Аркаима (Кизильский район Челябинской области); D – зона исследований в долинах рек Синташта и Камысты-Аят (Брединский район Челябинской области). Карта по (Stobbe et al., 2022)

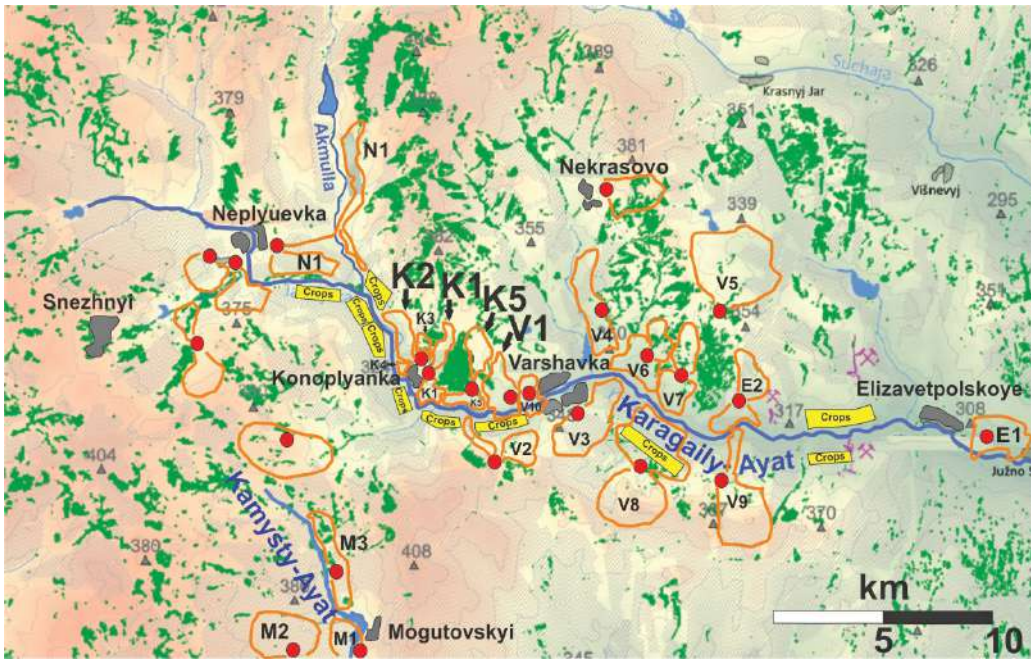


Fig. 2. Microdistrict B from Figure 1 – main research area in the valley of the Karagaily-Ayat River. Designations: yellow rectangles – designation of farmer’s crops in the river valley; red circles are active livestock enclosures; orange contours – approximate daily itinerary and area of the river valley, which is used by the herd of each enclosure; K1, M1, N1, V1 and others – the names of the herds that were observed. Map by Knoll (2014)

Рис. 2. Зона В из рисунка 1 – долина реки Карагайлы-Аят. Обозначения: желтые прямоугольники – обозначение фермерских посевов в долине реки; красные кружки – действующие загоны для скота; оранжевые контуры – примерный участок долины реки, который используется стадом каждого загона; K1, M1, N1, V1 и другие – названия стад, за которыми велось наблюдение. Карта по (Knoll, 2014)

### Geography and Environment

Observations of summer and winter grazing were carried out in the steppe zone of the Southern Urals, which approximately coincides with the territory of distribution of fortified settlements of the Sintashta culture and the south of the Chelyabinsk region (Fig. 1). The northernmost microdistrict of the study is the valley of the Uy River in the area of the settlement of Stepnoye – from the village of Biryukovskoye (Uysky district) to the village of Chernorechye (Stepninsky district). The main and longest observations were carried out in the valley of the Karagaily-Ayat River from the village of Akmulla to the village of Grazhdanskoye, Kartalinsky District, Chelyabinsk Region (Fig. 2). Part of the observations were carried out in the valley of the rivers Kamysty-Ayat (village of Mogutovsky, Bredinskiy district), Sintashta (village of Rymnikskoye, Bredinskiy district) and Karaganka (village of Arkaim/Aleksandrovskoye, Kizilsky district).

The territory of the South Urals lies to the East of the Ural Mountains — between 50- and 54-degrees North latitude and between 59- and 62-degrees East longitude. The terrain is slightly hilly and divided by many river valleys (Fig. S3–34, Dataset#1. Further, all references to illustrations and video that begin with S can be found in the two datasets attached to the article. Links to them are located before the bibliography. In the case of Dataset#1, the illustration number always matches the page number). The climate of the South Urals is continental with an average annual temperature of 3.7°C, from –18°C in January to +20.6°C in July, and significant daily and yearly temperature variations. The average annual rainfall in the Bredinsky District is 300 to 400 mm [Stobbe, 2013; Stobbe et al., 2016] and the snow cover is 10 to 20 cm (Fig. S311–328, Dataset#1). The territory under study belongs to the steppe zone with herbaceous feather-grass and fescue steppe or feather-grass steppe (Stobbe, 2013). This area is also called false steppe: pine and birch forests comprise approximately 10% of the territory (Stobbe, 2013) (Fig. S17–18, Dataset#1). The valley of the Karagaily-Ayat River and other river valleys are characterized by rich meadows and also arable and grazing land (Stobbe 2013; Ruhl, Herbig, Stobbe, 2015; Stobbe et al., 2016) (Fig. S132, 146–147, Dataset#1). One of the most important points in the context of this work is that the environment of the Karagaily-Ayat River valley and the composition of its vegetation in the Bronze Age were comparable to those of the current environment, and the degree of afforestation did not exceed the current values (Stobbe, Kalis, 2012; Ruhl, Herbig, Stobbe, 2015).

### **Methodology**

The main method of this work is personal observation of grazing and keeping of livestock in certain areas of the steppe zone of the Southern Urals in summer and winter. In a number of cases, it was possible to trace the almost complete daily cycle of the movement of the herd from leaving the pen to returning to it. This made it possible to find out the approximate distance that the herd overcomes and to reveal the preferences of animals in choosing places for grazing and resting. For the convenience of research, some herds have been given names that include belonging to the village and the serial number of the herd (For example, herd K1 is one of five herds that belong to the village of Konoplyanka). The grazing system of all herds around the villages of Konoplyanka and Varshavka, as well as the pens belonging to these villages, has been studied in the most complete way (Fig. 2). The second method of this work is interviewing shepherds. Mostly adult and elderly male shepherds, who have extensive experience in working with livestock, were chosen for the conversation. Depending on various factors, both a special questionnaire and a casual conversation were used to obtain certain information. The main emphasis during the conversations was on finding out the possibilities of long-term grazing in a limited area of the river valley and finding out the abilities of each type of livestock for winter grazing. The paper does not use a method for calculating biomass volumes, since in the context of this work it is important to show not the model capabilities of a separate steppe area (Stobbe et al., 2016), but the actual practice of exploiting sections of steppe river valleys at different times of the year and under different conditions, during prolonged drought).

### **Results**

#### ***Summer grazing and livestock management***

Nowadays, the inhabitants of the villages of the steppe zone of the Southern Urals practice one basic model of keeping and grazing livestock. In the warm season, this form of live-

stock breeding is represented by grazing individual herds in the immediate vicinity of villages or summer pens in the vicinity of villages (Fig. 2–3). In winter, stall keeping of livestock is practiced (Fig. 4) with periodic grazing of certain species of ungulates (Fig. 5). The warm period usually lasts from mid-April to early November. But in each case, the dates may be shifted depending on weather conditions or stocks of hay. If little hay is harvested, then cattle can be released to graze in conditions of incomplete snowmelt or generally practice winter grazing in the case of private herds of several cows (Fig. S329–336, Dataset#1). Summer grazing around the villages is represented by three varieties. The first and main variety is represented by private herds of individual villagers or combined herds, which consist of animals of individual villagers (Fig. S35–131, Dataset#1). For summer grazing, a paddock is created either in the village itself or on its outskirts. Every day a herd with a shepherd grazes 2–3 km around the village and near the river. In the evening, the herd returns either to a common pen (e.g., video S14, Dataset#1), or residents take their cows, sheep or horses to their yards (e.g., herd K2 — Fig. 2 and Fig. S227–229, Dataset#1). In several villages there are large livestock farms and breeding plants. If in winter the entire livestock (several thousand heads) is kept in large hangars, then starting from spring, the entire livestock is divided into several herds of 300–500 animals and, with the help of summer pens, is evenly distributed along the river valley. As a rule, part of the river valley is assigned only to the summer paddocks of such farms (Fig. 2 — herds V2–V9; Fig. S132–163; video S19, Dataset#1). Herds of farmers and villagers use other parts of the valley to graze (herds K1, K2, K5 and V1, Fig. 2). The winter hangars themselves continue to function as a summer paddock and a small part of the herd remains there, which grazes around the farm during the day, and returns to the paddock at the hangar in the evening (Fig. S139–143, Dataset#1). The system of summer paddocks is that each herd has its own shepherd who chooses a site for grazing every day and makes sure that the herd does not damage the crops. As a rule, shepherds try to change grazing areas daily to allow vegetation to regenerate and provide livestock with better nutrition. The farthest paddocks are located no further than 10 km from the farm. Pens can be located both on hills and at the edge of the forest. In both cases, the distance to the river is 1–3 km. The location on the tops of the hills is caused by the need for easy viewing of the area by the shepherds and the prevention of stagnant water during heavy rains. The location of the paddocks at the edge of the forest is primarily due to protection from the winds. Pens can be located both a few kilometers from each other, and in close proximity to each other. In the latter case, the shepherd of the herd of one paddock tries not to use the area that is assigned to the herd of the neighboring paddock. Most cattle pens are 15–20 meters long and wide and can hold up to 500 head. Sheep and goat pens are about 10 meters (sometimes a little more) and can accommodate a herd of up to 400–500 heads. Corrals for cattle and horses do not differ in area and are often used in turn for either cattle or horses. A more detailed description of the summer paddock system can be found in Dataset#2 (Fig. S57–1333). The third variation of this model is the grazing of small herds of cattle (from 2–3 animals to 10–20 heads) directly in the village or on its outskirts without a shepherd (Fig. S164–198, Dataset#1). In very rare cases, such small flocks may have shepherds. Direct grazing of livestock can be carried out in two forms. The first and main form of grazing is the grazing of individual herds of livestock, which consist of one species of ungulates (Fig. S45–49; 56–63, 73–76, 111–131, Dataset#1). Less common, but equally basic, is

mixed grazing (Fig. 3). With this model, cattle, horses and sheep with goats graze in the same herd (Fig. S35–44; 51–54, 77–100, Dataset#1). When choosing a grazing site for livestock, two main strategies are observed. A number of shepherds try every day to direct the herd to a different area for grazing. This is done to enable a more complete restoration of vegetation in small areas of river valleys. If the village has several herds, then the shepherds try to divide the areas for grazing. However, with such a system, there are situations when 2–3 herds graze in the same area for some time (Fig. S272–274, 338, Dataset#1). Another part of the shepherds grazes their flock every day in the same place with minor variations. This strategy may not change even in severe drought conditions. In the case of the Karagaily-Ayat river valley, in the context of observing how parts of the valley are exploited, an extremely important point is the fact that almost the entire right bank is occupied by farmers' crops (Fig. 2). Throughout the river, which is used for grazing, there are crops on the opposite bank with minor gaps. With the help of these corridors between the fields, livestock can get to the watering place from pastures far from the river. Land for crops is used for grazing only after the farms have harvested. As a rule, this happens in the first half of September. From the end of September to the beginning of November (the appearance of snow), shepherds willingly use the fields for grazing, which makes it possible for the main summer pastures to rest. Hay for winter stall keeping is harvested either in hayfields near villages that are not specifically used for grazing, or in areas that are located along the far perimeter of pastures (3–5 km from the village, in rare cases further). In the case of the village of Konoplyanka, such a hayfield is a steppe area far from the river and which is located between forests. Hay harvesting starts around mid-July.

The sex and age structure of each herd, as a rule, has its own characteristics. If we talk about private small herds of cattle, which number from a few to 10–15 animals and which often graze near the village or directly in it without a shepherd (in rare cases with a shepherd), then they can consist of adult cows, young bulls and calves. Every evening these animals return to the yard, and the owners milk the cows (for example, Fig. 178–186, Dataset#1). Young bulls are bred for subsequent slaughter or sale. If the owners keep sheep and goats according to the same system, then in the evening some owners can also milk the goats. If we consider mixed private herds, which are sorted out every evening by the owners in the yards (the best example is the k2 herd), then they are also extremely heterogeneous in their sex and age structure. The herd contains adults and old animals, young animals and often just born animals. When the villagers sort out their animals (Fig. 227–229, Dataset#1), then the cows, as a rule, are milked. If we consider private herds (the owner is either one farmer or an enterprise: herds k1, v1–v9, e2), which consist of one species of ungulates, then the main purpose of such herds is reproduction for the uninterrupted sale of livestock for meat and conservation of breeding stock. Cows of such herds are not milked but are used only for feeding calves. The sex and age composition of such herds is highly heterogeneous. The herd consists of adult cows kept for reproduction, calves, young animals (1.5–2.5 years) and a small proportion of old animals (mainly bulls for reproduction). In rare cases, a herd may consist entirely of cows and their calves. But in most cases, the age and sex composition of the herd is quite heterogeneous. Horses are usually bred for sale and meat (k5 and v5 herds). For this reason, adult and old females and males, as well as young animals with newly born animals, are simultaneously in the herd. Locals do not practice milking horses.





Fig. 3. An example of a mixed grazing pattern where horses, cattle and caprines are grazing together. The photo was taken in the floodplain of the Uy River in the vicinity of the village of Stepnoe in July (Stepninsky district of the Chelyabinsk region)

Рис. 3. Пример смешанной модели выпаса, при которой лошади, крупный и мелкий рогатый скот выпасаются вместе. Фото сделано в пойме реки Уй в окрестностях села Степное в июле (Степнинский район Челябинской области)

### ***Summer daytime grazing cycle on the example of individual herds***

**Herd K1.** A sheep flock with a small share of goats numbering about 500 heads is kept in a hangar in winter, and in a traditional summer paddock on the outskirts of the village of Konoplyanka during the warm season (Fig. S331–349; 354–438, Dataset#2). Every day in the morning the herd moves away from the river for a distance of 2–3 km and in the afternoon returns to the river to drink and rest (Fig. 2; Fig. S199–218; video S1–4, Dataset#1). The time and duration of the rest by the river depends on the weather. It is not uncommon for a herd to rest in a paddock in the middle of the day. As a rule, the herd follows approximately the same route every day, using areas that are not used for grazing by other herds. By 8–9 p.m. the herd usually returns to the paddock.

**Herd K2.** Mixed private herd of cattle and caprines with a total number of about 100 heads. Every morning the villagers give their cows, bulls and sheep to the shepherd, who uses the same section of the river valley for grazing with slight variations. The herd goes to the far

point of the route along the river and usually also returns along the river to the village, where the inhabitants sort their cattle (Fig. 2; Fig. S219–231; video S5–6, Dataset#1). The greatest distance from the corral is 3.5 km. Several times a day, the herd stops by the river for rest and watering. This section of the valley, as in the case of herd K1, is used only by this herd.

**Herd K3.** Private herd of sheep and cows, totaling about 20 animals (Fig. 2; Fig. S232–243; video S9–10, Dataset#1). The herd daily grazes in the immediate vicinity of the village of Konoplyanka and does not intersect with the rest of the herds. For grazing, areas are used no further than 1 km and areas near the edge of the forest or clearing between forests (Fig. S233–236, Dataset#1).

**Herd K4.** A private flock of sheep with about 30–40 animals. The daily grazing cycle approximately coincides with the K3 herd. The difference lies in the fact that the shepherd of this herd uses forest glades less and moves a little further from the village, using open spaces (Fig. 2; Fig. S244–246; video S11, Dataset#1).

**Herd K5.** A private herd of about 100 horses is kept year-round in a paddock at the edge of the forest (Fig. S454–479, Dataset#2). The daily grazing area overlaps with the areas used by K1 and V1 herds. A herd of horses is released every day for watering and for grazing uses both the floodplain of the Karagaily-Ayat River and the areas of the steppe between forests remote from the river (Fig. 2; Fig. S247–263; video S12–13, Dataset#1).

**Herd V1.** Combined herd of cattle numbering about 100 heads. The herd consists of private cattle from individual households in the village of Varshavka. For the summer period, the villagers rent their cattle to a common herd, which has a corral located 1.5 km from the western outskirts of the village (Fig. S480–496, Dataset#2). Before the start of the stall keeping, the owners take their animals and keep them in their yard. All daylight hours the herd grazes in the immediate vicinity of the corral. Sometimes the opposite bank of the river and parts of the steppe remote from it can be used. Often the shepherd tries to use areas along the forest (Fig. 2; Fig. S264–274, Dataset#1).

At certain times of the day, herds K1, K5 and V1 intersect and use the same part of the river valley for grazing or resting. The same situation regularly occurs in other parts of the river valley (Fig. S272–274, Dataset#1).

#### ***Winter grazing and livestock keeping***

The main form of winter keeping of livestock is the stall model. It starts from the beginning of November or the beginning of December. During this period, the probability of wet snow is high. Herd owners are trying to protect their livestock from conditions where animal hair can get wet from sleet or snow at near zero temperatures, which will lead to hypothermia of livestock (as a rule, this applies more to sheep and goats). For this reason, sheep and goats are driven into the winter stall before such weather conditions. In conditions of little snow cover and not frosty weather, cattle and sheep can continue grazing until mid-December, and in some cases all winter (Fig. S329–332, Dataset#1). Cattle of large livestock complexes and individual households are kept in stalls with a small yard, on which you can move around and in which hay is poured (Fig. 4; Fig. S275–298; video S7–8, Dataset#1). If we consider each type of livestock separately, then horses can spend the whole winter on pastures near the village. They don't need a shepherd or a pen to spend the night (Fig. 5; Fig. S302–310; video S15–18, Dataset#1). The only support from a person may be to periodically feed the young during frosty periods or in the spring, when an

ice crust can form. Even though cattle and caprines can be grazed as well as horses, according to herders, they still need light shelter at night. Often the walls of such pens are insulated with the skins of cattle, and the floor with hay (Fig. S291–294; 300–301, Dataset#1). The main limiting factor for winter grazing of cattle is the availability of water. As long as the animals have the opportunity to drink water from the river, they will be able to graze without problems in the cold season. Cattle are most dependent on the availability of water, and eating snow can hardly meet all their water needs. It should also be noted that, according to the shepherds, there is no problem with cattle and sheep grazing in winter as well as horses, but the long-term practice of winter stall keeping of livestock weaned animals from such wintering conditions. The main message of the shepherds is that, if necessary, sheep and cattle can feed on their own, but they will need additional feeding. Winter housing is stopped either when the first patches of snow appear in late March or early April, or when the first grass begins to appear in late April (Fig. S332–336, Dataset#1). The decision to start grazing is made independently by each individual herd owner and often directly depends on hay stocks. On average, one cow may require 3 tons of hay or 15 tons of hay for 8–10 cows (depending on how the cattle are fed).



Fig. 4. An example of winter stall keeping of cattle and caprines.  
The photo was taken after a snowstorm in 2021 in early March in the village of Neplyuevka  
(Kartalinsky district of the Chelyabinsk region)

Рис. 4. Пример зимнего стойлового содержания крупного и мелкого рогатого скота.  
Фото сделано после снежного бурана 2021 г. в начале марта в деревне Неплюевка  
(Карталинский район Челябинской области)



Fig. 5. An example of winter grazing of horses.

The photo was taken after a snowstorm in 2021 in early March in the vicinity of the village of Neplyuevka (Kartalinsky district of the Chelyabinsk region)

Рис. 5. Пример зимнего выпаса лошадей (тебеневка).

Фото сделано после снежного бурана 2021 г. в начале марта в окрестностях деревни Неплюевка (Карталинский район Челябинской области)

### ***Osteophagia of cattle and caprines***

During the study of summer livestock pens and thanks to interviews with shepherds, it was possible to identify the phenomenon of osteophagia and lithophagy among cattle and caprines. The phenomenon of osteophagia is the eating by cattle and sheep of inedible objects, in particular bones. According to the shepherds and based on the finds of objects in the pens, cattle gnaw on wooden objects, plastic and metal objects (Fig. S2638–2682, Dataset#2). During the study of modern pens, an extensive collection of bones and objects with traces of gnawing and from the stomach of cattle and caprines was obtained (Fig. S1334–2637, Dataset#2). This collection of modified bones is critical to knowing the diagnostic criteria by which to detect whether bone has been affected by ungulates or size class of livestock, and to distinguish between these types of modifications from herding dog bone effects. Data on bone modification changes in cattle, sheep, goats and dogs are available in Dataset#2 (Fig. S1334–2637; S2731–2990). In addition to eating inedible objects in the valley of the Karagaily-Ayat River, a phenomenon of lithophagy related to osteophagia was recorded. A private herd of cows and bulls

quite actively licked the open ground (Fig. S63–66, Dataset#1). In order to reduce the deficiency of minerals, some paddocks can be seen containers with salt (Fig. S369, Dataset#1). The eating of bones, garbage, the wooden fence of the pens, and the licking of the earth is caused by the inability of the herbivorous diet of ungulates to meet all the body's needs for minerals (Cáceres et al., 2013, p. 3115). This is a typical and congenital feature of all ungulates, which is not a disorder, but a marker of mineral deficiency.

Horses are not seen eating bones and other items like cattle and sheep. But at the same time, the phenomenon of active gnawing of the wooden fence of the pens was recorded (cribbing). Fence chewing is inherently different from osteophagia. If, in the case of eating bones, we are talking about an attempt to compensate for the deficiency of minerals, then in the case of gnawing the fence, we are talking about a behavioral trait of horses (Houpt, 2012). In some cases, horses almost completely gnaw through the fence (Fig. S2683–2707; video S1–5, Dataset#2).

### ***Major livestock diseases***

In addition to various infectious diseases, each type of livestock has both inherent diseases and problems, as well as pathologies that are common among all three types of livestock. Common to all three types of livestock is a relatively high prevalence of manifestations of osteochondrosis, which is expressed in depressions and defects in the articular surface of the bones. Dental pathologies are common, but already only in cattle and caprines. They are caused by eating bones and other inedible objects, which leads to premature wear of the teeth, their ante-mortem loss and inflammatory processes (Rassadnikov, 2021; 2022). Cattle are characterized by lameness and thelaziosis (eye damage by nematode parasites). Thelaziosis leads to partial or complete loss of vision. Lameness is also a serious problem in horses. The main causes of lameness are accidental bruises, trauma, twisting of the legs, icing of paddocks in early spring, intraspecific collisions. Cows are also characterized by degenerative lesions of the hip joint, which lead to a sharp decrease in mobility and subsequent weight loss (Rassadnikov, 2021). The main problem in sheep and goats is foot rot (inflammation of the soft tissues of the lower legs. It is this problem that is one of the main factors in the periodic cleaning of cow pens from manure and the frequent change of sheep pens. On the old sheep pens, several old pens can be seen (Fig. S239–249, dataset #2). One of the important points in the context of the characteristics of animal husbandry and livestock health is the frequent death of adult animals and especially young animals. When examining modern pens, a fairly large number of dead calves, foals, and often adult animals were found (Fig. S582, 602–603, 765, 777, 782, 983, 1091, Dataset#2). The main causes of death of calves are infectious and pulmonary diseases. In rare cases, calves can die due to a crush in the enclosure.

### ***Other aspects of modern livestock breeding***

According to the shepherds, in addition to the end of the stall period, the most difficult time for livestock is the hot months of summer, and the most favorable are the end of April and May, the beginning of autumn, as well as not hot periods of summer. The entire daily cycle of some herds consists in the fact that the herd walks all day in conditional zigzags from the riverbank to the forests. On hot days, the herd can spend the whole day in the floodplain (Fig. S144–147, 150–151, Dataset#1). Also, during such periods, the herd walks all day a few kilometers from the water, and the direction can be set by the cattle themselves. On a not hot day, one cow may need about 30 liters of water. On hot days, a cow can stay by the river all

day and drink regularly. No type of livestock chews wormwood. As a rule, horses and cattle pull long grass, and sheep and goats pull short grass and various branches. This allows you to seamlessly graze all types of livestock in one herd. One of the most important remarks or observations of shepherds is that a small area of the river valley (for example, the area that is used by herds K1, K5, V1, V2, Fig. 2) can easily and for many years withstand the grazing of three herds of 150–200 heads. This number of herds is the most optimal in terms of the load on the vegetation in the grazing area.

### Discussion

The study demonstrates that the modern system of livestock breeding, and grazing is fairly common for almost all villages in the steppe zone of the Southern Urals. This system consists of keeping livestock in winter stalls and grazing around villages during the warm season. In rare cases, grazing in winter is allowed. This livestock way of life is quite stable and has been recorded since the 19<sup>th</sup> century for the territory under consideration (Khalikov, 2016). From the point of view of archaeological terminology, this system is a vivid reflection of the sedentary model of pastoralism. Both separate grazing and a mixed model are practiced, in which all types of livestock (cattle, sheep and horses) graze simultaneously in one herd. Grazing different species of ungulates in one herd does not lead to any problems in the form of eating certain grass by one species of ungulates, which is eaten by another species of ungulates. One of the main objectives of the work was to find out the possibilities of small areas (about 2–3 km from the paddock and 1–2 km from the river) of the river valley for grazing and to determine how such a small area for grazing satisfies the needs of livestock. In fact, far from the entire area of the immediate vicinity of a village or paddock in a river valley is available for grazing. In the case of the valley of the Karagaily-Ayat River, the main load in terms of grazing lies on the left bank from the village of Konoplyanka to the village of Varshavka and a little to the east (Fig. 2 — herds k2, k1, k5, v1, v2, v3, v4, v6, v7, v8, v9, e2). Almost the entire right bank is occupied by crops (Fig. 2). There are small gaps and patches between fields, but the crops are located in the most productive areas for grazing. Observations have shown that even under conditions of such intensive grazing, individual herds do not use the entire area available for grazing when the opposite bank of the river is occupied by crops. In fact, each large herd of one village uses, at best, a third of the radius of 2–3 km of one river bank. Even though figure 2 shows the almost complete absence of vacant lots, the reality is somewhat different. Border zones or areas between zones for grazing neighboring herds remain relatively free from grazing use. Areas next to forests and forest clearings or areas of the steppe between pine forests are extremely poorly used. One of the interesting and important discoveries was that even a long and severe drought has practically no effect on the choice of a grazing site. Even in the absence of green grass (Fig. S340–357, Dataset#1) herds continue to graze in almost the same places as under normal conditions. The only difference is that, for example, shepherds of large sheep and cattle herds try to use for grazing glades at the edge of the forest or clearings between pines, which are never used under normal conditions. Severe and prolonged drought directly affects the winter period of stall keeping. It is during this period that hay is used, which, during a drought, can be harvested significantly less. Another interesting and important observation is that even under conditions of extremely intensive grazing of large and heavy Hereford cattle for many years, overgrazing and complete degradation

of vegetation have not been recorded in the same place. According to the shepherds, the river valley of the Karagaily-Ayat River near the village of Varshavka is “tired” and requires a short rest. In this regard, the most interesting sections of the river valley, which for many years have been used for grazing large herds of Herefords (400–500 heads). Even there, there is no complete degradation of vegetation (Fig. S353–357, Dataset#1). But it should be borne in mind that in winter these areas are not used, as the Herefords switch to a stall mode of keeping. The most objective in terms of overgrazing are the parts of the valley that are used for grazing horses (Fig. 2, herds v5, v9, k5). It is in the case of horses that we have the opportunity to observe year-round grazing in one section of the river valley. In the warm season, these areas are periodically used by herds of sheep and cattle. The approximate total number of livestock grazing in the valley of the Karagaily-Ayat River from the village of Neplyuevka to the village of Elizavetpolskoe is about 4.5 thousand heads of all types of cattle (excluding 1.5–2 thousand cows and bulls, which are kept year-round in the stall of the Varshavskoe breeding farm). If we assume that in the case of the valley of the Karagaily-Ayat River, both banks will be available for grazing, and not one as it is now due to crops and there will not be too large herds of cattle (400–500 heads), then the statement about the problem-free ability of a small area river valley to year-round grazing of several herds of 150–200 heads can be done without any reservations. If both banks of the river are available for grazing, the problem of incomplete restoration of vegetation in areas with intensive grazing is completely removed. Another option for reconstruction may be the option of increasing the number of livestock by 1.5–2 times without the danger of pasture degradation while maintaining the pasture-stall grazing model.

### Conclusion

The study of modern animal husbandry in the steppe zone of the Southern Urals demonstrates that the practiced pasture-stall system is the most optimal system for the territory under consideration. This model of livestock keeping and grazing is quite variable in its implementation in practice and can quickly change depending on various factors. Small areas of river valleys (no further than 3 km from the village along one bank of the river) in the steppe zone of the Southern Urals are extremely resistant to intensive grazing and are able to withstand the load of predominantly grazing in the summer for decades without the danger of overgrazing. In rare cases, small areas of river valleys are used for year-round grazing and this does not lead to pasture degradation.

### Supplementary data:

[Dataset#1] — <http://doi.org/10.17632/5g2jh76mr5.1> — main data of this article: images of summer and winter grazing and keeping of livestock in the Southern Urals;

[Dataset#2] <http://doi.org/10.17632/4g5z2sn2ng.1> — description of the modern system of summer pens in the Southern Urals and bone surface modifications (livestock osteophagia and dog chewing).

### REFERENCES

Kosintsev P. A. Bone Remains of Animals from the Fortified Settlement of Arkaim. In: Archaeological Source and Modeling of Ancient Technologies. Proceedings of the Museum-Reserve Arkaim. Chelyabinsk : Institut istorii i arheologii UrO RAN, 2000. Pp. 17–44. (*In Russ.*)

Lugli F. The Use of Space in the Winter Camps of Steppe Pastoralists — an Ethnoarchaeological Point of View. *Vestnik Tomskogo gosudarstvennogo universiteta. Istoriya = Bulletin of Tomsk State University. History*. 2021;69:92–96. DOI: 10.17223/19988613/69/13. (In Russ.)

Rassadnikov A. Yu. Osteophagia of Domestic Ungulates in the Bronze Age Settlements of the Southern Trans-Urals (based on archaeozoological and ethnozoological materials). *Vestnik arkheologii, antropologii i etnografii = Bulletin of Archaeology, Anthropology and Ethnography*. 2017;2(37):163–168. DOI: 10.20874/2071-0437-2017-37-2-163-168. (In Russ.)

Rassadnikov A. Yu. Archaeozoological Studies at Konoplyanka, the Southern Trans-Urals. *Arheologiya, etnografiya i antropologiya Evrazii = Archaeology, Ethnography, and Anthropology of Eurasia*. 2019;47(2):33–39. <https://doi.org/10.17746/1563-0110.2019.47.2.033-039>. (In Russ.)

Rassadnikov A. Yu. The Sedentary Pastoralism at the Turn of the 3<sup>rd</sup>–2<sup>nd</sup> Millennium BC in the Southern Trans-Urals Based on Archaeozoological Materials of the Kamennyi Ambar Settlement. *Izvestiya Laboratorii drevnih tehnologij = Reports of the Laboratory of Ancient Technologies*. 2020;16(3):46–64. <https://doi.org/10.21285/2415-8739-2020-3-46-64>. (In Russ.)

Rassadnikov A. Yu. Results of Archaeo- and Ethnozoological Research on the Settlement of the Late Bronze Age Chernorechë-2. *Teoriya i praktika arheologicheskikh issledovanij = Theory and Practice of Archaeological Research*. 2021;33(1):85–105. DOI: 10.14258/tpai(2021)33(1).-06. (In Russ.)

Khalikov N. A. The Traditional Economy of the Tatar-Cossacks of the Southern Urals (second half of the 19<sup>th</sup> — early 20<sup>th</sup> centuries). *Srednevekovye tyurko-tatarskie gosudarstva = Medieval Turko-Tatar states*. 2016;8:264–271. (In Russ.)

Anthony D. W., Brown D., Brown E., Goodman A., Kokhlov A., Kosintsev P., Kuznetsov P., Mochalov O., Murphy E., Peterson D., Pike-Tay A., Popova L., Rosen A., Russell N., Weisskopf A. The Samara Valley Project. *Eurasia Antiqua. Zeitschrift fur Archaologie Eurasiens*. 2005;11:395–417.

Anthony D. W., Brown D., Kuznetsov P., Mochalov O. Bronze Age Herding Camps: Survey and Excavations in Peschanyi Dol. In: *A Bronze Age Landscape in the Russian Steppes: The Samara Valley Project*. Monumenta Archaeologica. Los Angeles : Cotsen Institute of Archaeology Press, 2016. No. 37. Pp. 421–441.

Cáceres I., Esteban-Nadal M., Bennàsar M., Dolores Marín Monfort M., Dolores Pesquero M., Fernández-Jalvo Y. Osteophagia and Dental Wear in Herbivores: Actualistic Data and Archaeological Evidence. *Journal of Archaeological Science*. 2013;40:3105–3116. <http://dx.doi.org/10.1016/j.jas.2013.04.006>

Houpt K. A. Motivation for Cribbing by Horses. *Animal Welfare*. 2012;21:1–7.

Knoll D. Siedlungs- und landschaftsarchäologische Untersuchungen zu den befestigten Siedlungen der Bronzezeit im Trans-Ural. In: *Zwischen Tradition und Innovation: Studien zur Bronzezeit im Trans-Ural (Russische Föderation)*. Bonn : Verlag Dr. Rudolf Habelt GmbH, 2014. Pp. 139–198.

Koryakova L. N., Krause R. The Bronze Age in the Karagaily-Ayat Region (Trans-Urals, Russia) Culture, Environment and Economy. *Frankfurt Archaeological Studies 43*. Bonn : Verlag Dr. Rudolf Habelt GmbH, 2022. 560 p.

Krause R., Koryakova L. N. Multidisciplinary Investigations of the Bronze Age Settlements in the Southern Trans-Urals (Russia). Bonn : Verlag Dr. Rudolf Habelt GmbH, 2013. 352 p.



Ng C., Wei W., Yu C., Zheng J. Herding pattern among Bronze Age steppe communities: An ethnographic approach to mapping pasture in the Southeastern Ural Mountains, Russia. *Front. Ecol. Evol.* 2022. 10:984725. doi: 10.3389/fevo.2022.984725

Rassadnikov A. Bone Pathologies of Modern Non-draft Cattle (*Bos Taurus*) in the Context of Grazing Systems and Environmental Influences in the South Urals, Russia. *International Journal of Paleopathology.* 2021;32:87–102. <https://doi.org/10.1016/j.ijpp.2020.11.003>.

Rassadnikov A. Bone Pathologies of Modern Caprines (*Ovis aries* & *Capra hircus*) in the Context of the Pasture-stall System of the Steppe Zone of the South Urals. *International Journal of Paleopathology.* 2022;38:18–31. <https://doi.org/10.1016/j.ijpp.2022.05.003>

Ruhl L., Herbig C., Stobbe A. Archaeobotanical Analysis of Plant Use at Kamennyi Ambar a Bronze Age Fortified Settlement of the Sintashta Culture in the Southern Trans-Urals Steppe, Russia. *Vegetation History and Archaeobotany.* 2015;24(3):413–426. DOI:10/1007/S00334-014-0506-7.

Stobbe A. Long-term Perspective on Holocene Environmental Changes in the Steppe of the Trans-Urals (Russia): Implications for Understanding the Human Activities in the Bronze Age Indicated by Palaeoecological Studies. In: *Multidisciplinary Investigations of the Bronze Age Settlements in the Southern Trans-Urals (Russia)*. Bonn : Verlag Dr. Rudolf Habelt GmbH, 2013. Pp. 305–326.

Stobbe A., Gumnior M., Ruhl L., Schneider H. Bronze Age Human-Landscape Interactions in the Southern Transural Steppe, Russia — Evidence from High-Resolution Palaeobotanical Studies. *The Holocene.* 2016;26(10):1692–1710. DOI: 10.1177/0959683616641740.

Stobbe A., Kalis A. J. Archaeobotanical Investigations in the Trans-Urals (Siberia): The Vegetation History. In: *Landscape Archaeology: Proceedings of the International Conference Held in Berlin, 6<sup>th</sup>–8<sup>th</sup> June 2012*. Berlin : Exzellenzcluster 264 Topoi, 2012. Pp. 297–303.

Stobbe A., Schneider H., Voigt R., Rühl L., Gumnior M. Reconstruction of the Holocene Vegetation and Landscape Development of the Karagaily-Ayat and Ural Valleys in the Southern Trans-Urals (Russia) Based on the Analysis of Pollen, Sediments, Plant Macro-Remains and Diatoms. In: *The Bronze Age in the Karagaily-Ayat Region (Trans-Urals, Russia) Culture, Environment and Economy*. Frankfurt Archaeological Studies 43. Bonn : Verlag Dr. Rudolf Habelt GmbH, 2021. Pp. 269–298.

## СПИСОК ИСТОЧНИКОВ

Косинцев П. А. Костные остатки животных из укрепленного поселения Аркаим // *Археологический источник и моделирование древних технологий*. Труды музея-заповедника Аркаим. Челябинск : Институт истории и археологии УрО РАН, 2000. С. 17–44.

Луйли Ф. Использование пространства на зимних стойбищах степных скотоводов — этноархеологическая точка зрения // *Вестник Томского государственного университета*. История. 2021. №69. С. 92–96. DOI: 10.17223/19988613/69/13.

Рассадников А. Ю. Остеофагия домашних копытных на поселениях бронзового века Южного Зауралья (по археозоологическим и этнозоологическим материалам) // *Вестник археологии, антропологии и этнографии*. 2017. №2 (37). С. 163–168. DOI: 10.20874/2071-0437-2017-37-2-163-168.

Рассадников А. Ю. Результаты археозоологических исследований на поселении бронзового века Коноплянка в Южном Зауралье // *Археология, этнография и антропология Евразии*. 2019. №47 (2). С. 33–39. <https://doi.org/10.17746/1563-0110.2019.47.2.033-039>.

Рассадников А. Ю. Оседлое скотоводство на рубеже III–II тыс. до н. э. в Южном Зауралье по археозоологическим материалам поселения Каменный Амбар // *Известия лаборатории древних технологий*. 2020. №16 (3). С. 46–64. DOI: <https://doi.org/10.21285/2415-8739-2020-3-46-64>.

Рассадников А. Ю. Результаты архео- и этнозоологических исследований на поселении позднего бронзового века Черноречье-2 // *Теория и практика археологических исследований*. 2021. №33 (1). С. 85–105. DOI: [10.14258/tpai\(2021\)33\(1\).-06](https://doi.org/10.14258/tpai(2021)33(1).-06).

Халиков Н. А. Традиционное хозяйство татар-казаков Южного Урала (вторая половина XIX — начало XX вв.) // *Средневековые тюрко-татарские государства*. 2016. №8. С. 264–271.

Anthony D. W., Brown D., Brown E., Goodman A., Kokhlov A., Kosintsev P., Kuznetsov P., Mochalov O., Murphy E., Peterson D., Pike-Tay A., Popova L., Rosen A., Russell N., Weisskopf A. The Samara Valley Project // *Eurasia Antiqua. Zeitschrift für Archäologie Eurasiens*. 2005. No. 11. Pp. 395–417.

Anthony D. W., Brown D., Brown E., Goodman A., Kokhlov A., Kosintsev P., Kuznetsov P., Mochalov O., Murphy E., Peterson D., Pike-Tay A., Popova L., Rosen A., Russell N., Weisskopf A. The Samara Valley Project. *Eurasia Antiqua. Zeitschrift für Archäologie Eurasiens*. 2005;11:395–417.

Anthony D. W., Brown D., Kuznetsov P., Mochalov O. Bronze Age Herding Camps: Survey and Excavations in Peschanyi Dol. In: *A Bronze Age Landscape in the Russian Steppes: The Samara Valley Project. Monumenta Archaeologica*. Los Angeles : Cotsen Institute of Archaeology Press, 2016. No. 37. Pp. 421–441.

Cáceres I., Esteban-Nadal M., Bennàsar M., Dolores Marín Monfort M., Dolores Pesquero M., Fernández-Jalvo Y. Osteophagia and Dental Wear in Herbivores: Actualistic Data and Archaeological Evidence. *Journal of Archaeological Science*. 2013;40:3105–3116. <http://dx.doi.org/10.1016/j.jas.2013.04.006>

Haupt K. A. Motivation for Cribbing by Horses. *Animal Welfare*. 2012;21:1–7.

Knoll D. Siedlungs- und landschaftsarchäologische Untersuchungen zu den befestigten Siedlungen der Bronzezeit im Trans-Ural. In: *Zwischen Tradition und Innovation: Studien zur Bronzezeit im Trans-Ural (Russische Föderation)*. Bonn : Verlag Dr. Rudolf Habelt GmbH, 2014. Pp. 139–198.

Koryakova L. N., Krause R. The Bronze Age in the Karagaily-Ayat Region (Trans-Urals, Russia) Culture, Environment and Economy. *Frankfurt Archaeological Studies 43*. Bonn : Verlag Dr. Rudolf Habelt GmbH, 2022. 560 p.

Krause R., Koryakova L. N. *Multidisciplinary Investigations of the Bronze Age Settlements in the Southern Trans-Urals (Russia)*. Bonn : Verlag Dr. Rudolf Habelt GmbH, 2013. 352 p.

Ng C., Wei W., Yu C., Zheng J. Herding pattern among Bronze Age steppe communities: An ethnographic approach to mapping pasture in the Southeastern Ural Mountains, Russia. *Front. Ecol. Evol.* 2022. 10:984725. doi: [10.3389/fevo.2022.984725](https://doi.org/10.3389/fevo.2022.984725)

Rassadnikov A. Bone Pathologies of Modern Non-draft Cattle (*Bos Taurus*) in the Context of Grazing Systems and Environmental Influences in the South Urals, Russia. *International Journal of Paleopathology*. 2021;32:87–102. <https://doi.org/10.1016/j.ijpp.2020.11.003>.

Rassadnikov A. Bone Pathologies of Modern Caprines (*Ovis aries* & *Capra hircus*) in the Context of the Pasture-stall System of the Steppe Zone of the South Urals. *International Journal of Paleopathology*. 2022;38:18–31. <https://doi.org/10.1016/j.ijpp.2022.05.003>

Ruhl L., Herbig C., Stobbe A. Archaeobotanical Analysis of Plant Use at Kamennyi Ambar a Bronze Age Fortified Settlement of the Sintashta Culture in the Southern Trans-Urals Steppe, Russia. *Vegetation History and Archaeobotany*. 2015;24(3):413–426. DOI:10/1007/S00334-014-0506-7.

Stobbe A. Long-term Perspective on Holocene Environmental Changes in the Steppe of the Trans-Urals (Russia): Implications for Understanding the Human Activities in the Bronze Age Indicated by Palaeoecological Studies. In: *Multidisciplinary Investigations of the Bronze Age Settlements in the Southern Trans-Urals (Russia)*. Bonn : Verlag Dr. Rudolf Habelt GmbH, 2013. Pp. 305–326.

Stobbe A., Gumnior M., Ruhl L., Schneider H. Bronze Age Human-Landscape Interactions in the Southern Transural Steppe, Russia — Evidence from High-Resolution Palaeobotanical Studies. *The Holocene*. 2016;26(10):1692–1710. DOI: 10.1177/0959683616641740.

Stobbe A., Kalis A. J. Archaeobotanical Investigations in the Trans-Urals (Siberia): The Vegetation History. In: *Landscape Archaeology: Proceedings of the International Conference Held in Berlin, 6<sup>th</sup>–8<sup>th</sup> June 2012*. Berlin : Exzellenzcluster 264 Topoi, 2012. Pp. 297–303.

Stobbe A., Schneider H., Voigt R., Rühl L., Gumnior M. Reconstruction of the Holocene Vegetation and Landscape Development of the Karagaily-Ayat and Ural Valleys in the Southern Trans-Urals (Russia) Based on the Analysis of Pollen, Sediments, Plant Macro-Remains and Diatoms. In: *The Bronze Age in the Karagaily-Ayat Region (Trans-Urals, Russia) Culture, Environment and Economy*. Frankfurt Archaeological Studies 43. Bonn : Verlag Dr. Rudolf Habelt GmbH, 2021. Pp. 269–298.

---

#### INFORMATION ABOUT THE AUTHOR / ИНФОРМАЦИЯ ОБ АВТОРЕ

---

**Alexey Yurievich Rassadnikov**, Candidate of Historical Sciences, Researcher of the Institute of History and Archaeology, Ural Branch of the RAS, Ekaterinburg, Russia.

**Рассадников Алексей Юрьевич**, кандидат исторических наук, научный сотрудник, Институт истории и археологии УрО РАН, Екатеринбург, Россия.

*The article was submitted 10.05.2022;*

*approved after reviewing 11.08.2022;*

*accepted for publication 16.08.2022.*

*Статья поступила в редакцию 10.05.2022;*

*одобрена после рецензирования 11.08.2022;*

*принята к публикации 16.08.2022.*

Research Article / Научная статья

УДК 902.2:903'1

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-08](https://doi.org/10.14258/tpai(2022)34(3).-08)

## REVIEW OF PRELIMINARY RESULTS OF ARCHAEOLOGICAL RESEARCH IN THE AREA OF MOUNT AIYRTAS IN 2022, CENTRAL KAZAKHSTAN

**Arman Z. Beisenov**

*"Begazy-Tasmola" Research Center of History and Archaeology, Almaty, Kazakhstan;  
azbeisenov@mail.ru, <https://orcid.org/0000-0003-2524-264X>*

**Abstract.** The mountainous area of Aiyrtas is located in the Karkaraly district of the Karaganda region. There, in previous years, the first sites of the early Iron Age were discovered and explored. Among them, eight mounds from three burial grounds were excavated, and settlements of the early Iron Age, Kazakh winterings were also found. In the summer of 2022, under the guidance of the author, a strip 2.6 km long was identified on the upper slope of the mountain, where 8 settlements of the early Iron Age are compactly located. Excavations of the Aiyrtas-3 settlement were carried out. On an area of 432 m<sup>2</sup>, remains of stone foundations of dwellings and outbuildings were discovered, which, judging by the finds of stone tools and ceramics, belong to two historical eras: the Late Bronze Age and the Saka period. At the same time, questions of the chronology of the upper level of buildings (structures 1–3) will be corrected in the course of obtaining the results of radiocarbon analyses. A few iron objects are associated with the top layer of the site. In the course of research, old Kazakh winterings were discovered, among which, as the author believes, there are earlier ones than those studied in previous years.

**Key words:** Central Kazakhstan, Mount Aiyrtas, Early Iron Age, Tasmola culture, settlements, old Kazakh winter quarters

**Acknowledgments:** the study was carried out with the financial support of the Ministry of Education and Science of the Republic of Kazakhstan within the framework of the grant AP08857177 "Research of the Economy and House-Building Traditions of the Population of the Early Iron Age in Central Kazakhstan". The author expresses thanks the project participants Islam Akhiyarov, Nurlan Dzhumanazarov and Darhan Shashenov for their help in preparing this article.

---

**For citation:** Beisenov A. Z. Review of Preliminary Results of Archaeological Research in the Area of Mount Aiyrtas in 2022, Central Kazakhstan. *Teoriya i praktika arheologicheskikh issledovanij = Theory and Practice of Archaeological Research*. 2022;34(3):131–146. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-08](https://doi.org/10.14258/tpai(2022)34(3).-08)

---

## ОБЗОР ПРЕДВАРИТЕЛЬНЫХ РЕЗУЛЬТАТОВ АРХЕОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ В РАЙОНЕ ГОРЫ АЙЫРТАС В 2022 Г., ЦЕНТРАЛЬНЫЙ КАЗАХСТАН

**Арман Зияденович Бейсенов**

Научно-исследовательский центр истории и археологии «Бегазы-Тасмола»,

Алматы, Казахстан;

azbeisenov@mail.ru, <https://orcid.org/0000-0003-2524-264X>

**Резюме.** Горная местность Айыртас находится в Каркаралинском районе Карагандинской области. Здесь в предыдущие годы были открыты и исследованы первые памятники раннего железного века. В том числе были раскопаны восемь курганов из трех могильников, а также найдены поселения раннего железного века, казахские зимовки. Летом 2022 г. под руководством автора на верхнем склоне горы была выявлена полоса длиной 2,6 км, где компактно расположены восемь поселений раннего железного века. Проведены раскопки поселения Айыртас-3. На площади 432 кв. м открыты остатки каменных оснований жилищ и хозяйственных построек, относящихся, судя по находкам каменных орудий и керамики, к двум историческим эпохам: эпохе поздней бронзы и сакского периода. Вместе с тем вопросы хронологии верхнего уровня сооружений (сооружения 1–3) будут корректироваться в ходе получения результатов радиоуглеродных анализов. С верхним слоем памятника связаны немногочисленные железные предметы. В ходе исследований обнаружены старые казахские зимовки, среди которых, как полагает автор, имеются более ранние, чем те, которые исследовались в предыдущие годы.

**Ключевые слова:** Центральный Казахстан, гора Айыртас, ранний железный век, тасмолинская культура, поселения, старые казахские зимовки

**Благодарности:** исследование выполнено при финансовой поддержке Министерства образования и науки Республики Казахстан в рамках гранта AP08857177 «Исследование хозяйства и традиций домостроительства населения раннего железного века Центрального Казахстана». Автор благодарит участников проекта Ислама Ахиярова, Нурлана Джуманазарова и Дархана Шашенова за помощь в подготовке настоящей статьи.

---

**Для цитирования:** Бейсенов А. З. Обзор предварительных результатов археологических исследований в районе горы Айыртас в 2022 г., Центральный Казахстан // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 131–146. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-08](https://doi.org/10.14258/tpai(2022)34(3).-08)

---

### **I**ntroduction

Mount Aiyrtas, in the area of which archaeological research was carried out, is located on the territory of the Karkaraly district of the Karaganda region of the Republic of Kazakhstan. It is located at a distance of 80 km in the east-southeast direction from the city of Karkaraly.

“Aiyr” in the Kazakh language means something forked, for example, a pitchfork. For the rocky landscape of the Kazakh upland, abounding in various uplifts in the relief, this expression often indicates a hill, which has a small saddle in the middle. If we take into account that “tas” in the Kazakh language is a stone, then we can understand the following meaning of the word Aiyrtas — “Forked stone”, that is, a mountain that has a saddle at the top when viewed from the side. Even at the first glance at this area, it turned out that the name coincides with the peculiarity of this mountain.

The peak with a saddle is located in the northwestern part of the mountain range. Here is the modern cattle breeding farm Aiyrtas, at a short distance from which to the southeast there are two more — Japar and Yestek. It is with this part of the entire mountain range that the main sites of the ancient era are associated.

Our scientific expeditions to Aiyrtas already have their history. In 2014, and 2019 here 8 burial mounds of the early Iron Age were investigated as a part of three burial grounds — Aiyrtas-1, Aiyrtas-2, and Yestek. The main part of the excavated sites belongs to the Tasmola culture of the early Iron Age of Central Kazakhstan. Some burials that did not contain dating materials, except fragments of iron products, may also belong to later periods. Also, in an article devoted to these materials, it was specifically indicated that it was necessary to search for settlements of the early Iron Age at that place (Beisenov, Shashenov, 2020).

Two skulls from two kurgans from the burial grounds of Aiyrtas-1 and Yestek, belonging to the Tasmola culture, were studied by anthropologists and published (Beisenov et al., 2015).

In 2021, the next trip took place, during which small settlements of the early Iron Age were discovered near the Aiyrtas farm, located in gorges, among stone peaks and rocks. Another result of this exploration expedition was the discovery of old Kazakh winter quarters.

In the summer of 2022, research on the sites of Mount Aiyrtas was continued. The archaeological expedition worked in two groups. The main group was engaged in excavations of the settlement of the early Iron Age Aiyrtas-3, the second group carried out reconnaissance to search for and document the sites in the area of Mount Aiyrtas. The archaeological season on Mount Aiyrtas took more than one month. During this time, one settlement was excavated, new burial grounds and single mounds of the early Iron Age and the Middle Ages were found, as well as old Kazakh winters. During these searches, the distant outskirts of the Aiyrtas mountain range were also examined. Special work is required to process and comprehend all this data. This report presents brief results of the studies.

### **Materials and Discussions**

The Aiyrtas mountain area stretches from northwest to southeast, about 10 km long. The highest points have an absolute height of more than 1000 m. The elevation is characterized, especially in high areas, by rather steep slopes, and densely indented beams. Numerous bedrock outcrops are well recorded. The carbonaceous rocks that make up the mountains are overlain by eluvial-deluvial deposits. Chestnut soils are covered with forb steppe vegetation, where sagebrush-fescue communities predominate. There are many thickets of steppe acacia (karagan) here.

Large plains are located on the northern, northeastern, and eastern sides of the mountain. From the west and south, the relief is hillier. The whole area is bordered from the west, north, and east by the channels and dried-up branches of two steppe rivers. This is the Tundik River, quite well-known in the landscape of the eastern part of the Kazakh uplands, flowing to the west of Mount Aiyrtas in a northeasterly direction. The second river Aigyrzhal flows from the southeast and flows into the river Tundik, its right tributary. About the Tundik River, the district under consideration is included in the area of its upper reaches.

Before our expeditions, archaeological research was not carried out in the area of Mount Aiyrtas. The works of 2022 turned out to be the most ambitious when our first excavations were carried out at the settlement and many distant corners of Aiyrtas were examined.

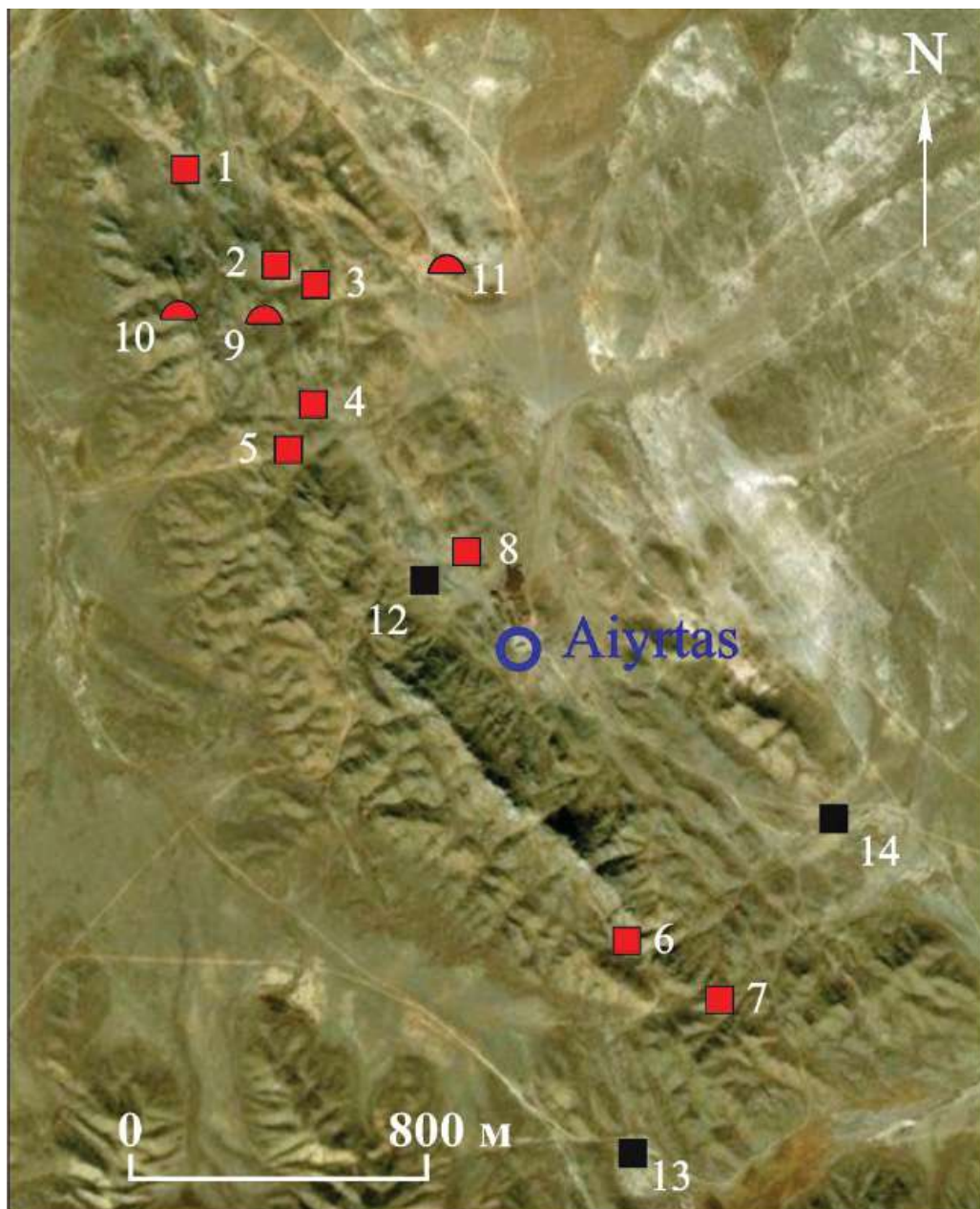


Fig. 1. Main research area: 1–8 – settlements of the early Iron Age Aiyrtas-1 – Aiyrtas-8; 9, 10 – kurgan Aiyrtas-1 and Aiyrtas-2; 11 – Early Iron Age burial ground Aiyrtas-4; 12–14 – old Kazakh winters Aiyrtas-1, Aiyrtas-2, and Aiyrtas-3

Рис. 1. Район основных исследований: 1–8 – поселения раннего железного века Айыртас-1 – Айыртас-8; 9, 10 – курганы Айыртас 1 и Айыртас-2; 11 – могильник раннего железного века Айыртас-4; 12–14 – старые казахские зимовки Айыртас-1, Айыртас-2 и Айыртас-3



Fig. 2. Aiyrtas-4 burial ground

Рис. 2. Могильник Айыртас-4

When presenting an overview of the main results, the main research areas should be indicated. This is the vicinity of the modern Aiyrtas farm, where one compact group of settlements of the early Iron Age is located. The prepared map included precisely the monuments of this small area (Fig. 1).

Here, along a 2.6 km long strip, eight settlements, two mounds, and one burial ground of the early Iron Age were recorded. Three old Kazakh winters are marked separately on the map. In addition, the areas of four settlements, Aiyrtas-2, Aiyrtas-4, Aiyrtas-5, and Aiyrtas-6, are almost completely occupied by old Kazakh winterings. On the territory of another settlement, Aiyrtas-8 (Fig. 1.-8), there are small Kazakh graves. A survey of this area showed that these graves are associated with the wintering of Aiyrtas-1 (Fig. 1.-12), which is located not far from the settlement. Thus, out of seven old Kazakh winter quarters, four are located on the territory of ancient settlements, and three are isolated. All settlements and old winters are located high, at around 900–950 m.



Several other sites are located outside the indicated range (Fig. 1).

Near the modern Asylbek farm, on the bank of a small spring, one settlement of the Bronze Age was found. Not far from the Yestek farm there is one settlement of the early Iron Age, the territory of which is also occupied by the ruins of an old Kazakh wintering. This site is located 3.5 km from the settlement of Aiyrtas-7 to the southeast.

In the valley, located on the northern and northeastern sides of the mountain and where a wide panorama opens from the peaks of Aiyrtas, there are funerary sites. These are burial grounds and single kurgans. Most of them are undoubtedly associated with the Early Iron Age, there are also burial mounds from the Middle Ages.

The Aiyrtas-4 burial ground (Fig. 2) is the closest to the Early Iron Age settlements. From the settlement of Aiyrtas-3, where the excavations were carried out, to this burial ground is 360 m.

To the southeast of the Aiyrtas farm, numerous old Kazakh winters were found in gorges and small narrow valleys. Upon closer inspection, sites of ancient settlements can be found near them or under them.

In 2022, excavations were carried out at the Aiyrtas-3 settlement. This site is located on the northeastern high slope of the mountain (Fig. 3), in a natural niche resembling a foundation pit, which is closed on the northern and eastern sides by two more ridges. Even during the first inspection of the settlement, it was clear that its area has two sectors. In the southern part, three buildings were compactly located (Fig. 3), in the northern part there were heavily destroyed and weakly expressed other structures. Therefore, two excavations were made on the site. The total excavation area is 432 m<sup>2</sup>.



Fig. 3. Settlement Aiyrtas-3. Excavations I and II

Рис. 3. Поселение Айыртас-3. Раскопы I и II



Fig. 4. Excavation I. A – view during the first cleaning of structures and surfaces. B – view after dismantling the wall of structure 2 and final cleaning: 1, 2, 3 – the foundations of the walls of structures 1–3; 4 – the base of the wall of the structure of the lower horizon; 5 – stones from the walls of structures of the lower horizon; 6 – the edge of the housing pit of the lower horizon

Рис. 4. Раскоп I. А – вид в ходе первой зачистки сооружений и поверхности. Б – вид после разборки стены сооружения 2 и окончательной зачистки: 1, 2, 3 – основания стен сооружений 1–3; 4 – основание стены сооружения нижнего горизонта; 5 – камни от стен сооружений нижнего горизонта; 6 – край жилищного котлована нижнего горизонта

In the area of excavation I, which uncovered the main, southern, part of the settlement, there are three structures (Fig. 4.-A, B), the foundations of which are made of stone. The base

of structure 1, located on the western edge of this sector, is better preserved. Its shape is close to an elongated oval. Dimensions — 8×5.4 m. To the east of it is structure 2, which has a rectangular shape, dimensions — 6×4.8 m. Structure 3 is located to the south of them. It has survived much worse. It was probably a round or oval room with two internal sectors. The southern and northern walls of the structure were completely dismantled in subsequent eras, and by the time of the excavations, fragments of three walls had been preserved from the entire structure. If the first two buildings look like residential buildings, then the southern building was intended for household purposes — they could keep livestock and store accessories here. This is confirmed by the small number of finds in this sector.

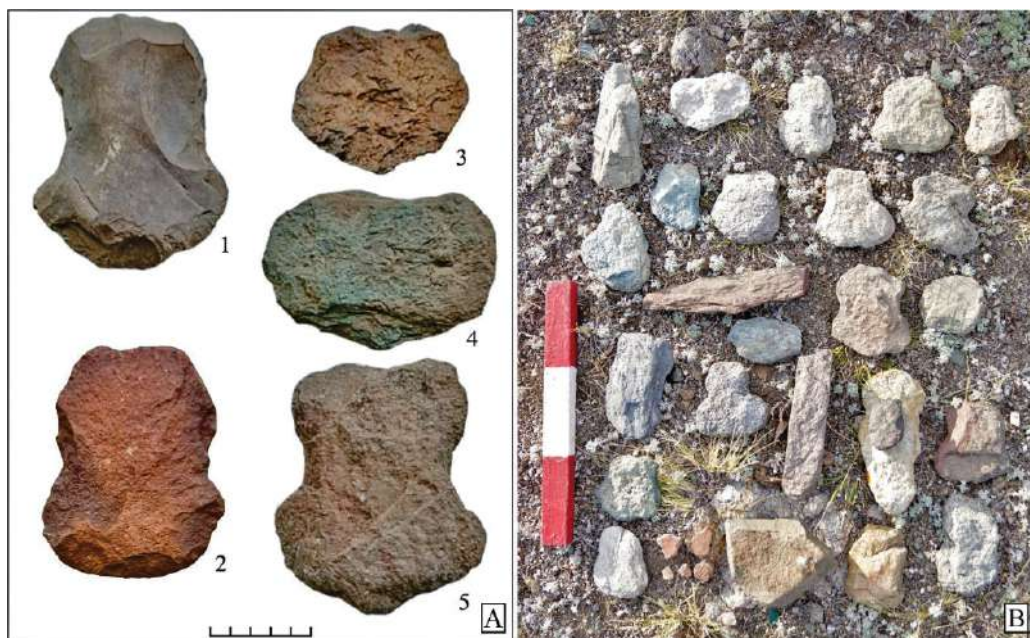


Fig. 5. Stone tools from the settlements of Aiyrtaş-3 (A) and Aiyrtaş-8 (B). A: 1, 2, 5 — hoes; 3, 4 — scrapers. B: Tools collected on the surface

Рис. 5. Каменные орудия из поселений Айыртаş-3 (А) и Айыртаş-8 (Б). А: 1, 2, 5 — мотыги, 3, 4 — скребла. Б: орудия, собранные на поверхности

Of particular interest in this excavation is its northeastern part. Here, under the walls of structure 2, as well as to the east and northeast of it, the lower horizon of construction was opened. Under the walls of building 2 there is one strip of stones, which has an arcuate shape. This remains of the ancient wall were discovered after the upper structure 2 was dismantled (Fig. 4.-B) to clear the lower horizon. To the east of this wall are numerous stones, which are also connected with the lower horizon. In addition to this fact, the edge of the housing pit was cleared right at the northern edge of the excavation. The depth of the pit is 30 cm. Such housing pits are typical for the house-building of the Bronze Age. Findings in this sector of ceramics with traditional ornaments for the Late Bronze Age of Central Kazakhstan reinforce this idea.

In the area of excavation II, which is located to the north of the first, only one horizon of buildings was found. On the eastern edge of the excavation, an oval-rounded room measuring m in size was better preserved. In the western part of the excavation, the remains of two heavily destroyed buildings were unearthed. Here, there are no remains of the premises of the lower horizon.

132 stone tools and blanks were found in the area of the entire excavation. The main part is made up of hoe-shaped tools (Fig. 5.-A: 1, 2, 5) of large and small sizes, 72 pieces in total. The nature of the stone tools found at the excavation firmly allows us to judge the layer of the Early Iron Age. The fact is that at the site a large number of stone tools have been found in the settlements of this era (Beisenov et al., 2018). Good results were obtained in the course of trace analysis of these items. More than 350 tools from the Abylai settlement have now been studied by traceological methods, and functions have been determined for 341 of them. According to I.V. Gorashchuk, a trace expert, stone tools were used in such industries as excavation, processing of livestock products, processing of plant products, and wood processing. A lot of them are hoes that were used in earthworks. They were probably used in agriculture. Some of these results have been published (Beisenov, Gorashchuk, Duysenbay, 2021). During the early Iron Age of Central Kazakhstan, the traceological analysis of stone tools is carried out for the first time. However, the main types and forms of these tools are already well known. This gives grounds to analyze such artifacts with a great deal of confidence already during the first inspection of the settlement, as soon as it is found, as well as during excavations.

In June 2022, the author discovered the settlement of Aiyrtas-8 (Fig. 1.-8), located near Aiyrtas-3. As it often happens, the ruins of ancient structures are poorly preserved due to the use of stones for the construction of nearby old Kazakh winter quarters. At the first and brief inspection of the surface, three hoes were found, all with clear forms. The evening soon came and the search was stopped. As a result of a search the next day, 24 more tools were found on the surface of this settlement, as well as 5 small fragments of ceramics (Fig. 5.-B). All artifacts lay on an area of 110 m<sup>2</sup>. Half of these 26 implements are hoes. Thus, when getting acquainted with the settlements of the Early Iron Age of Central Kazakhstan, often stone tools, including hoes, are the first finds that indicate the chronology of the site.

All found 351 fragments of ceramics are divided into two groups. Most of them (329 fragments) are fragments of dishes, which have very few ornamented specimens. A few ornamented fragments (Fig. 6.-A: 1-3) indicate materials from excavations of other settlements of the Early Iron Age in Central Kazakhstan. As regards the ornament, the ceramics of the settlements of the early Iron Age in Central Kazakhstan are mainly characterized by small and rarely placed “pearls” and pits (Beisenov, Shulga, Loman, 2017). This pottery, by the simplicity of its ornament, is well distinguished from the dishes of the synchronous sites of the Mountain and Steppe Altai in the Russian Federation (Abdulganeev, Vladimirov, 1997; Shulga, 2015; Stepanova, Frolov, 2017).

Now there are results of studying ceramics from the Saka burial sites of the time of Central Kazakhstan. Studies show that pottery from settlements and kurgans is close to each other (Beisenov, Loman, Shashenov, 2021).

22 fragments with a characteristic pattern for the Bronze Age clearly differ from this monotonous pottery (Fig. 6.-A: 4-6). Based on a comparison with the materials of the studied

sites, this pottery can be associated with the culture of the Late Bronze Age of Central Kazakhstan (Varfolomeev, Loman, Yevdokimov, 2017). Among them, there is one fragment of roll ceramics (Fig. 5.-A: 4). The roll, located below the rim, is smooth, and triangular in cross-section. Such ridges are typical for Dongal ceramics of the period of Central Kazakhstan (Loman, 1987). But based on one fragment of ceramics, it is impossible to judge the presence of a Dongal layer on this site. The bulk of the Bronze Age pottery was found in the northeastern sector of the excavation. The ceramics of both groups are mixed, but it is noticeable that fragments of the early period lie lower.

In general, stone tools and ceramics, being the main finds from the excavation, reliably indicate the presence of two main horizons — the Late Bronze Age and the Saka period. Another fact is interesting, which strengthens the position of the layer of the Saka time. We are talking about two solitary kurgans about 10 m in diameter, which are located to the west of the line of settlements, at a short distance from them (Fig. 1.-9, 10). The kurgans are made of fragments of stone and are located on the mountain. Such stone kurgans were discovered by the author near such settlements of the Saka period as Sarybuirat, Keregetas-2, Kyzylsuir, Abylai. All of them are located at a close distance from the settlement, in high places. Excavations of one kurgan near the settlement of Sarybuyrat showed a funeral rite, typical for the Saka time. The author considers such burial mounds as burials of people who lived in the nearest settlement. Their location on the mountain is associated with the winter nature of the settlements. In winter, from the action of winds, there is no snow on the peaks and slopes of the hills, and with the onset of early spring, such areas warm up earlier than the lower slopes and plains covered with snow. Therefore, such tops and terraces were convenient for the burial of residents from the settlement. The graves in such kurgans have a shallow depth. The mound over the burial was made up of fragments of stone, which are many on such hills.

Of the bronze artifacts at excavation I, two objects were found in the form of a punch and an awl (Fig. 6.-B: 3, 4). Both objects may be associated with the Late Bronze Age, although there is a possibility that they belong to the Early Iron Age as well

One more small group of finds should be mentioned. These are three iron artifacts found in the area of excavation I. Two of them (Fig. 6.-B: 1, 2) are fragments in the form of flat plates. Perhaps these are fragments of iron utensils with a wall 4 mm thick. The third artifact looks like an arrowhead with a flat feather (Fig. 6.-B: 5). Its total length is 10 cm. The length of the feather is 5 cm. All three items are associated with a later period. Two fragments of iron plates were found on the territory of structure 1, at a depth of 10 and 30 cm. An arrowhead lay on the territory of structure 3, at a depth of 10 cm. All three artifacts do not provide solid grounds for archaeological dating. Probably, these finds were left by the medieval population. It is now impossible to unequivocally judge the presence of a layer of this time at the Aiyrtas-3 settlement.

Our attention is drawn to the high location of buildings 1, 2, and 3, the walls of which are not deepened into the ground. Structure 1, the best preserved among all sectors of the settlement, has five pits from the pillars inside, which propped up the roof. In one pit, the remains of a wooden post have been preserved (Fig. 7). The walls of structure 2 are built on top of the remains of the ruins of an older structure. The question of the chronological relationship between the upper horizon, represented by structures 1–3, and the lower building level will be significantly corrected after receiving the results of radiocarbon analysis.

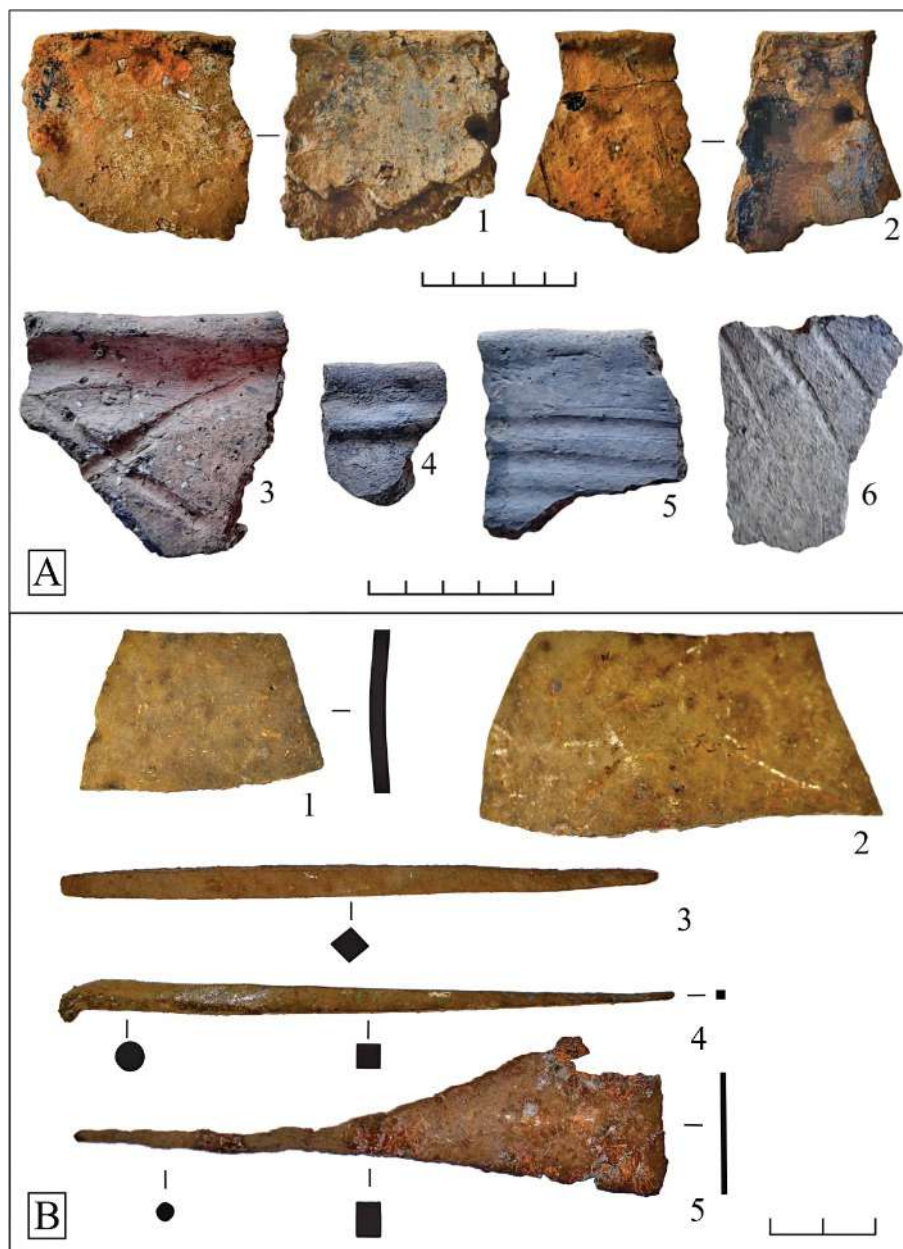


Fig. 6. Ceramics (A) and metal objects (B) from the Aiyrtas-3 settlement. A: 1–3 – ceramics of the early Iron Age; 4–6 – ceramics of the Bronze Age. B: 1, 2 – iron fragments in the form of flat plates; 3, 4 – bronze punch and awl, 5 – iron object in the form of an arrowhead

Рис. 6. Керамика (А) и металлические предметы (Б) из поселения Айыртас-3. А: 1–3 – керамика раннего железного века; 4–6 – керамика эпохи бронзы. Б: 1, 2 – железные фрагменты в виде плоских пластин; 3, 4 – бронзовые пробойник и шило; 5 – железный предмет в форме наконечника стрелы



Fig. 7. Settlement Aiyrtas-3. A – Remains of a wooden post on the floor of structure 1. B – Housing pit of the Late Bronze Age

Рис. 7. Поселение Айыртас-3. А – остаток деревянного столба на полу сооружения 1. Б – жилищный котлован эпохи поздней бронзы

The situation with the dwelling pit in the northeastern corner of excavation I seems clearer. This pit and the sector closest to it can be associated with the cultural layer of the Late Bronze Age. It is unequivocal that the excavation revealed only a small edge of the housing horizon of this era. The consequence of this is a small number of ceramic fragments. As can be seen, the horizon of the Late Bronze Age is directed further to the north and east. An urgent task for the near future is to expand the excavation in this sector.

In Central Kazakhstan, the old Kazakh winterings were discovered and studied by the author before. In 2022, new winterings were found on Aiyrtas. But an important result in this direction lies in another observation.

The fact is that on the slopes and gorges of Mount Aiyrtas two types of winterings were found. Winterings with houses and barnyards with straight walls are known to the author in past studies. This are the winterings of the Karashoky type (Beisenov, Akhiyarov, Dzhusmanazarov, 2020), Kyzylshilik (Beisenov, Shashenov, Duysenbay, 2020) and others. Such winterings are dated by the author to the period of the last third of the 19<sup>th</sup> century and the beginning of the 20<sup>th</sup> century. These winter quarters are usually located separately (Fig. 2.-12-14), in the form of small groups of houses where related families lived.

The old winterings, which are located on the area of the settlements of Aiyrtas-2, Aiyrtas-4, Aiyrtas-5 and Aiyrtas-6, have a completely different look. They are characterized by structures of round and oval shape, which are small in size. They completely or to a large extent cover the territory of the ancient settlement. Perhaps the structures of the ancient horizon in such cases can be destroyed. This type of Kazakh wintering must be dated to an earlier period than the indicated first group. In July 2022, a small excavation was laid at one of these sites, at Aiyrtas-6. Earthworks were brought to a depth of 30 cm and opened one sector of the round house. Work is planned to be continued in the near future, possibly in the fall of 2022. In the summer of 2021, early Iron Age stone tools were found on the surface of this site.

Modern studies of old Kazakh wintering areas are not limited to the relevance (Azhigali, Turganbaeva, 2021; Beisenov, 2021a; Shagirbaev, Ganiyeva, Sakenov, 2022) of this direction. In the conditions of the modern development of science, the complex and multicomponent nature of archaeology is rapidly growing, which helps to solve a very wide range of problems, from excavations of a single monument to extensive regional work, including cartographic and landscape studies (Butzer, 1982; Bradley, 2000; Jacobson-Tepfer, Meacham, 2010; Soenov, Konstantinov, Soyenov, 2011; Rogozhinsky, 2011; Bourgeois et al., 2014; Chang, 2018).

### Conclusion

Most of the Saka settlements of Central Kazakhstan, where excavations were carried out, are single-layered, except for those located on their areas or near their Kazakh winters. Only at the settlement of Shidertinskoe-2 under the Saka horizon was a layer of the Bronze Age discovered. Therefore, Aiyrtas-3 is currently the second case where we find an older layer under the buildings of the early Iron Age. The expected data of radiocarbon analysis, and then the continuation of excavations at Aiyrtas-3, will make it possible to more clearly present the picture of the relationship between the upper and lower horizons. Now we can assume that the settlement was inhabited twice: in the second half of the 2<sup>nd</sup> millennium BC and during the 8<sup>th</sup>–5<sup>th</sup> centuries BC.

The main part of the mounds of the early Iron Age located in the valley in front of Mount Aiyrtas are burial places for ordinary people. However, it is known that there are also large burial mounds here. At a distance of 14 km to the east of Mount Aiyrtas is Mount Borili (in Kazakh, «wolf's place»). In a wide valley in front of this mountain there is an elite burial ground of the Tasmola culture. The core of this burial ground, discovered by A.Z. Beisenov in 2007, are kurgans 3–4 m high. Searches have shown that there are no settlements around Mount Borili, which is associated with the less convenient natural qualities of this small hill. The valley, where the elite burial ground stands, passes into the Aiyrtas valley in the west, forming one whole with it.

The work with the early Iron Age sites of Central Kazakhstan showed that elite burial grounds or large single mounds were built separately, separately from the burial places of the ordinary population. It is possible that the Borili burial ground is associated with the settlements of Mount Aiyrtas.

The topography of the Saka and Kazakh settlements coincide and this has been noticed for a long time. This feature suggests that the natural and climatic conditions on the territory of the Kazakh upland for a long time were approximately similar. The question does not end there. Much more important is the question that forms of adaptation of steppe pastoralists to the natural conditions of their place of residence were found in ancient times.

Now we can say that the area chosen by us for research had important favorable conditions for the ancient and late pastoralists. These conditions consisted of three main factors: 1) the presence of a mountain necessary for the winter habitation of people and livestock (Beisenov, 2021b), 2) the close location of two steppe rivers, which, judging by the wide banks and floodplains, were more abundant in the early periods, 3) the presence of a convenient wide valley for the organization of pastures.

### REFERENCES

Abdulganeyev M. T., Vladimirov V.N. Typology of Altai Settlements in the 6<sup>th</sup>–2<sup>nd</sup> Centuries BC. Barnaul : Izd-vo Alt. un-ta, 1997. 148 p. (*In Russ.*).



Azhigali S. Ye., Turganbayeva L. R. Kainar Cult-Housing Complex of the Second Half of the 18<sup>th</sup> — Early 20<sup>th</sup> Centuries in Northern Ustyurt as a Historical, Cultural and Architectural Monument. *Arheologiya, etnografiya i antropologiya Evrazii = Archaeology, Ethnography and Anthropology of Eurasia*. 2021;49(4):109–119 (*In Russ.*).

Beisenov A. Z. Issues of the Study and Preservation of Kazakh Winterings. In: Preservation and Study of the Cultural Heritage of the Altai Territory. Barnaul : Izd-vo Alt. un-ta, 2021a. Issue. XXVII. Pp. 7–16 (*In Russ.*)

Beisenov A. Z., Akhiyarov I. K., Dzhumanazarov N. SH. Karashoky, an Old Wintering Place in the Aksary Valley in Central Kazakhstan. In: Field Research in the Upper Ob, Irtysh and Altai (archaeology, ethnography, oral history and museology. 2019. Barnaul : AltGPU, 2020. Issue. 15. Pp. 6–25 (*In Russ.*).

Beisenov A. Z., Gimranov D. O., Akhiyarov I. K., Duysenbay D. B. Settlement of the Saka Time Abylai in Central Kazakhstan. *Teoriya i praktika arheologicheskikh issledovanij = Theory and practice of archaeological research*. 2018;2:150–171 (*In Russ.*)

Beisenov A. Z., Gorashchuk I. V., Duysenbay D. B. Trasological Study of Stone Tools of the Settlement of the Saka Time of Abylai, Central Kazakhstan. *Povolzhskaya arheologiya = The Volga Region Archaeology*. 2021;3:177–194 (*In Russ.*).

Beisenov A. Z., Ismagulova A. O., Kitov E. P., Kitova A. O. The Population of Central Kazakhstan in the 1<sup>st</sup> Millennium BC. Almaty : Institut arheologii, 2015. 188 p. (*In Russ.*).

Beisenov A. Z., Loman V. G., Shashenov D. T. Ceramics from the New Kurgans of the Tasmola Culture. *Nizhnevolzhskij arheologicheskij vestnik = The Lower Volga Archaeological Bulletin*. 2022;21(1):6–20. DOI: <https://doi.org/10.15688/nav.jvolsu.2022.1.1> (*In Russ.*)

Beisenov A. Z., Shashenov D. T. Tasmola Burial Mounds in the Aiyrtaş Valley in Central Kazakhstan. *Nizhnevolzhskij arheologicheskij vestnik = The Lower Volga Archaeological Bulletin*. 2020;19(1):268–284. DOI: <https://doi.org/10.15688/nav.jvolsu.2020.1.15>. (*In Russ.*)

Beisenov A. Z., Shashenov D. T., Duysenbay D. B. Kyzylshilik, Wintering of Khasen Akaev's Family. In: Preservation and Study of the Cultural Heritage of the Altai Territory. Barnaul : Izd-vo Alt. un-ta, 2020. Issue. XXV. Pp. 240–251 (*In Russ.*).

Beisenov A. Z., Shulga P. I., Loman V. G. Settlements of the Saka Era. Almaty : NICIA “Begazy-Tasmola”, 2017. 208 p. (*In Russ.*).

Burzhua Zh., Cheremisin D. V., Plets G., Dvornikov E. P., Ebele' A. V., Stikhel'baut V., Van Khoof L., Geyli V. Archaeological Landscape of the Dzhazator Valley (Altai): Monuments and Petroglyphs of the Neolithic — Ethnographic Time. *Arheologiya, etnografiya i antropologiya Evrazii = Archeology, Ethnography and Anthropology of Eurasia*. 2014;4:106–119 (*In Russ.*).

Varfolomeyev V., Loman V., Yevdokimov V. Kent is a Bronze Age City in the Center of the Kazakh Steppes. Astana : Kazahskij nauchno-issledovatel'skij institut kul'tury, 2017. 338 p. (*In Kazakh, Russian, English*).

Loman V. G. Dongal Type of Ceramics. Issues of Periodization of Archaeological Sites of Central and Northern Kazakhstan. Karaganda : KarGU, 1987. Pp. 115–129 (*In Russ.*).

Rogozhinskiy A. E. Petroglyphs of the Archaeological Landscape of Tamgaly. Almaty : KazNII kul'turnogo naslediya, 2011. 342 p. (*in Russian, English*).

Soyenov V. I., Konstantinov N. A., Soyenov D. V. Features of Topography and Chronology of Altai Settlements of. In: Terra Skithica. Novosibirsk : Izd-vo In-ta arheologii i etnografii SO RAN, 2011. Pp. 252–260 (*In Russ.*).

Stepanova N. F., Frolov Ya. V. Ceramics from the Settlements of the Early Iron Age in the Forest-Steppe Altai. *Teoriya i praktika arheologicheskikh issledovaniy = Theory and Practice of Archaeological Research*. 2017;1:71–85 (*In Russ.*).

Shagirbayev M., Ganieva A., Sakenov S. The Economy of the Kazakhs of the Nura-Ishim Interfluvium in the 19<sup>th</sup> — Early 20<sup>th</sup> Centuries (according to osteological materials of wintering Bozok II). *Arheologiya Kazakhstana = Archaeology of Kazakhstan*. 2022;1(15):146–163. DOI : 10.52967/akz2022.1.15.146.163. (*in Kazakh*).

Shul'ga P. I. Cattle Breeders of Gorny Altai in the Scythian Time (based on materials from settlements). Novosibirsk : NGU, 2015. 336 p (*In Russ.*).

Bradley R. *An Archaeology of Natural Places*. L. : Routledge, 2000. 177 p.

Butzer K. *Archaeology as Human Ecology. Method and Theory for a Contextual Approach*. Cambridge : Cambridge University Press, 1982. 364 p.

Chang C. *Rethinking Prehistoric Central Asia: Shepherds, Farmers, and Nomads*. 2018. Abingdon & New York : Routledge. 160 p.

Beisenov A. Z. New Data in the Research of the Saka Time Settlements in Central Kazakhstan. *Teoriya i praktika arheologicheskikh issledovaniy = Theory and Practice of Archaeological Research*. 2021b;33(3):181–202. DOI: 10.14258/tpai(2021)33(3).-11

Jacobson-Tepfer E., Meacham J. *Archaeology and Landscape in the Mongolian Altai: An Atlas*. California : ESRI Press, 2010. 209 p.

## СПИСОК ИСТОЧНИКОВ

Абдулганеев М. Т., Владимиров В. Н. Типология поселений Алтая 6–2 вв. до н.э. Барнаул : Изд-во Алт. ун-та, 1997. 148 с.

Ажигали С. Е., Турганбаева Л. Р. Культурно-жилищный комплекс Кайнар второй половины XVIII — начала XX в. на Северном Устюрте как историко-культурный и архитектурный памятник // *Археология, этнография и антропология Евразии*. 2021. Т. 49, №4. С. 109–119.

Бейсенов А. З. Вопросы изучения и сохранения казахских зимовок // *Сохранение и изучение культурного наследия Алтайского края*. Барнаул : Изд-во Алт. ун-та, 2021а. Вып. XXVII. С. 7–16.

Бейсенов А. З., Ахияров И. К., Джуманазаров Н. Ш. Карашоки, старая зимовка в долине Аксары в Центральном Казахстане // *Полевые исследования в Верхнем Приобье, Прииртышье и на Алтае (археология, этнография, устная история и музееведение)*. 2019 г. Барнаул : АлтГПУ, 2020. Вып. 15. С. 6–25.

Бейсенов А. З., Гимранов Д. О., Ахияров И. К., Дуйсенбай Д. Б. Поселение сакского времени Абылай в Центральном Казахстане // *Теория и практика археологических исследований*. 2018. №2. С. 150–171.

Бейсенов А. З., Горашук И. В., Дуйсенбай Д. Б. Трасологическое исследование каменных орудий поселения сакского времени Абылай, Центральный Казахстан // *Поволжская археология*. 2021. №3. С. 177–194.

Бейсенов А. З., Исмагулова А. О., Китов Е. П., Китова А. О. Население Центрального Казахстана в 1 тыс. до н.э. Алматы : Институт археологии, 2015. 188 с.

Бейсенов А. З., Ломан В. Г., Шашенов Д. Т. Керамика из новых курганов тасмолинской культуры // Нижневолжский археологический вестник. 2022. Т. 21, №1. С. 6–20. DOI: <https://doi.org/10.15688/nav.jvolsu.2022.1.1>

Бейсенов А. З., Шашенов Д. Т. Тасмолинские курганы в долине Айыртас в Центральном Казахстане // Нижневолжский археологический вестник. 2020. Т. 19, №1. С. 268–284. DOI: <https://doi.org/10.15688/nav.jvolsu.2020.1.15>

Бейсенов А. З., Шашенов Д. Т., Дуйсенбай Д. Б. Кызылшилик, зимовка семьи Хасена Акаева // Сохранение и изучение культурного наследия Алтайского края. Барнаул : Изд-во Алт. ун-та, 2020. Вып. XXV. С. 240–251.

Бейсенов А. З., Шульга П. И., Ломан В. Г. Поселения сакской эпохи. Алматы : НИЦИА «Бегазы-Тасмола», 2017. 208 с.

Буржуа Ж., Черемисин Д. В., Плетс Г., Дворников Э. П., Эбелев А. В., Стихельбаут В., Ван Хооф Л., Гейли В. Археологический ландшафт долины Джазатора (Алтай): Памятники и петроглифы эпохи неолита — этнографического времени // Археология, этнография и антропология Евразии. 2014. №4. С. 106–119.

Варфоломеев В., Ломан В., Евдокимов В. Кент — город бронзового века в центре казахских степей. Астана : Казахский научно-исследовательский институт культуры, 2017. 338 с. (на казахском, русском, английском языках).

Ломан В. Г. Донгальский тип керамики. Вопросы периодизации археологических памятников Центрального и Северного Казахстан. Караганда : КарГУ, 1987. С. 115–129.

Рогожинский А. Е. Петроглифы археологического ландшафта Тамгалы. Алматы : КазНИИ культурного наследия, 2011. 342 с. (на русском, английском языках).

Соенов В. И., Константинов Н. А., Соенов Д. В. Особенности топографии и хронология городищ Алтая // Terra Skithica. Новосибирск : Изд-во Ин-та археологии и этнографии СО РАН, 2011. С. 252–260.

Степанова Н. Ф., Фролов Я. В. Керамика с поселений раннего железного века Лесостепного Алтая // Теория и практика археологических исследований. 2017. №1. С. 71–85.

Шагирбаев М., Ганиева А., Сакенов С. Хозяйство казахов нура-ишимского междуречья XIX — начала XX в. (по остеологическим материалам зимовки Бозок II) // Археология Казахстана. 2022. №1 (15) С. 146–163. DOI: [10.52967/akz2022.1.15.146.163](https://doi.org/10.52967/akz2022.1.15.146.163) (на каз. яз.).

Шульга П. И. Скотоводы Горного Алтая в скифское время (по материалам поселений). Новосибирск : НГУ, 2015. 336 с.

Bradley R. An Archaeology of Natural Places. L. : Routledge, 2000. 177 p.

Butzer K. Archaeology as Human Ecology. Method and Theory for a Contextual Approach. Cambridge : Cambridge University Press, 1982. 364 p.

Chang C. Rethinking Prehistoric Central Asia: Shepherds, Farmers, and Nomads. 2018. Abingdon & New York : Routledge. 160 p.

Beisenov A. Z. New Data in the Research of the Saka Time Settlements in Central Kazakhstan. Theory and Practice of Archaeological Research. 2021b;33(3):181–202. DOI: [10.14258/tpai\(2021\)33\(3\).-11](https://doi.org/10.14258/tpai(2021)33(3).-11)

---

Jacobson-Tepfer E., Meacham J. Archaeology and Landscape in the Mongolian Altai: An Atlas. California : ESRI Press, 2010. 209 p.

---

**INFORMATION ABOUT THE AUTHOR / ИНФОРМАЦИЯ ОБ АВТОРЕ**

---

**Arman Z. Beisenov**, Candidate of Historical Sciences, Director of “Begazy Tasmola” Research Center of History and Archaeology, Almaty, Kazakstan.

**Бейсенов Арман Зияденович**, кандидат исторических наук, директор Научно-исследовательского центра истории и археологии «Бегазы-Тасмола», Алматы, Казахстан.

*The article was submitted 22.07.2022;*

*approved after reviewing 23.08.2022;*

*accepted for publication 31.08.2022.*

*Статья поступила в редакцию 22.07.2022;*

*одобрена после рецензирования 23.08.2022;*

*принята к публикации 31.08.2022.*

Research Article / Научная статья

УДК 902+569.96(575.3)

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-09](https://doi.org/10.14258/tpai(2022)34(3).-09)

## SEVERAL RESULTS OF BIOARCHAEOLOGICAL AND ETHNOECOLOGICAL INVESTIGATIONS IN TAJIKISTAN

**Nadezhda A. Dubova<sup>1\*</sup>, Tatiana G. Filimonova<sup>2</sup>, Robert M. Sataev<sup>1</sup>,  
Lilia V. Sataeva<sup>3</sup>, Vladimir V. Kufferin<sup>1</sup>, Anatoliy N. Yamskov<sup>1</sup>**

<sup>1</sup>N.N. Miklukho-Maklay Institute of Ethnology and Anthropology  
of Russian Academy of Sciences, Moscow, Russia;

[dubova\\_n@mail.ru](mailto:dubova_n@mail.ru), <https://orcid.org/0000-0002-4340-1037>

[rob-sataev@mail.ru](mailto:rob-sataev@mail.ru), <https://orcid.org/0000-0001-9980-3345>

[vladimirkufferin@mail.ru](mailto:vladimirkufferin@mail.ru), <https://orcid.org/0000-0002-7171-8998>

[yamskov@iea.ras.ru](mailto:yamskov@iea.ras.ru), <https://orcid.org/0000-0001-9995-5883>

<sup>2</sup>A. Donish Institute of History, Archaeology and Ethnography of National Academy  
of Sciences of Tajikistan, Dushanbe, Tajikistan;

[tatjanafilimonova@mail.ru](mailto:tatjanafilimonova@mail.ru), <https://orcid.org/0000-0002-7126-8325>

<sup>3</sup>Bashkir State Agrarian University, Ufa, Russia;

[ivsataeva@mail.ru](mailto:ivsataeva@mail.ru), <https://orcid.org/0000-0001-5108-0889>

\*Corresponding author

**Abstract.** The article describes several topics of joint Russian-Tajik research conducted since 2013 in the Khatlon velayat of the Republic of Tajikistan within the framework of the Memorandum of Cooperation between the N. N. Miklukho-Maklay Institute of Ethnology and Anthropology of Russian Academy of Sciences and the A. Donish Institute of History, Archaeology and Ethnography of the National Academy of Sciences of Tajikistan. The text includes several interconnected blocks: archaeological excavations, ethnoecological study of the subsistence systems of the modern and medieval populations, and collection and analysis of human remains. The article gives brief information about the archaeological excavations of the Shakhidon burial ground of the 7<sup>th</sup>–8<sup>th</sup> centuries (Baljuvan jamoat), anthropological characteristics of the population buried in it and information about the economy of the population of the dekh Shaidon, where the site is located, as well as materials on other regions of the Republic.

**Key words:** Middle Asia, paleoecology, Medieval history, early nomads, funeral (burial) rituals, modern and Medieval subsistence system, human, animal and plant remains

**Acknowledgments:** the research was carried out within the framework of the State assignment of the N.N. Miklukho-Maklay Institute of Ethnology and Anthropology of Russian Academy of Sciences.

**For citation:** Dubova N. A., Filimonova T. G., Sataev R. M., Sataeva L. V., Kufferin V. V., Yamskov A. N. Several Results of Bioarchaeological and Ethnoecological Investigations in Tajikistan. *Teoriya i praktika arheologicheskikh issledovanij = Theory and Practice of Archaeological Research*. 2022;34(3):148–163. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-09](https://doi.org/10.14258/tpai(2022)34(3).-09)

## НЕКОТОРЫЕ РЕЗУЛЬТАТЫ БИОАРХЕОЛОГИЧЕСКИХ И ЭТНОЭКОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ В ТАДЖИКИСТАНЕ

Надежда Анатольевна Дубова<sup>1\*</sup>, Татьяна Германовна Филимонова<sup>2</sup>,  
Роберт Мидхатович Сатаев<sup>1</sup>, Лилия Векиловна Сатаева<sup>3</sup>,  
Владимир Владимирович Куфтерин<sup>1</sup>, Анатолий Николаевич Ямсков<sup>1</sup>

<sup>1</sup>Институт этнологии и антропологии им. Н.Н. Миклухо-Маклая  
Российской академии наук, Москва, Россия;  
dubova\_n@mail.ru, <https://orcid.org/0000-0002-4340-1037>  
rob-sataev@mail.ru, <https://orcid.org/0000-0001-9980-3345>  
vladimirkufterin@mail.ru, <https://orcid.org/0000-0002-7171-8998>  
yamskov@iea.ras.ru, <https://orcid.org/0000-0001-9995-5883>

<sup>2</sup>Институт истории, археологии и этнографии им. А. Дониша  
Национальной академии наук Таджикистана, Душанбе, Таджикистан;  
tatjanafilimonova@mail.ru, <https://orcid.org/0000-0002-7126-8325>

<sup>3</sup>Башкирский государственный аграрный университет, Уфа, Россия;  
lvsataeva@mail.ru, <https://orcid.org/0000-0001-5108-0889>

\*Автор, ответственный за переписку

**Резюме.** В статье описывается несколько направлений совместных российско-таджикских исследований, проводимых начиная с 2013 г. в Хатлонском вилояте Республики Таджикистан в рамках Меморандума о сотрудничестве между Институтом этнологии и антропологии им. Н. Н. Миклухо-Маклая РАН и Институтом истории, археологии и этнографии им. А. Дониша Национальной академии наук Таджикистана. Текст включает несколько взаимосвязанных блоков: археологические раскопки, этноэкологическое изучение систем жизнеобеспечения современного и средневекового населения и сбор и анализ палеоантропологических данных. Приведена краткая информация о раскопках могильника VII–VIII вв. Шахидон (Балджуванский джамоат), антропологическая характеристика населения, захороненного в нем, и сведения о хозяйстве населения деха Шайдон, где памятник расположен, а также сравнительные материалы по другим районам республики.

**Ключевые слова:** Средняя Азия, палеоэкология, средневековая история, ранние кочевники, погребальные ритуалы, современная и средневековая система жизнеобеспечения, костные останки человека, животных и растений

**Благодарности:** выполнено в рамках государственного задания Института этнологии и антропологии им. Н. Н. Миклухо-Маклая РАН.

**Для цитирования:** Дубова Н. А., Филимонова Т. Г., Сатаев Р. М., Сатаева Л. В., Куфтерин В. В., Ямсков А. Н. Некоторые результаты биоархеологических и этноэкологических исследований в Таджикистане // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 148–163. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-09](https://doi.org/10.14258/tpai(2022)34(3).-09)

### Introduction

Since 2013 Russian-Tajik team, comprised of specialists in different fields of science from the Institute of Ethnology and Anthropology of the Russian Academy of Sciences and from the Institute of History, Archaeology and Ethnography of the National Academy of Sciences of Tajikistan, is conducting comprehensive research in the river Surkhob valley in Southern Tajikistan (Dubova et al., 2019, 2020). The main purpose of the work is to study

the life support systems of ancient and medieval societies in comparison with the modern one, characteristic of the population of this region. Therefore, archaeological excavations, undertaken together with zooarchaeological and archaeobotanic studies, were supplemented by ethnoecological study. The work includes a significant replenishment of the currently available bioarchaeological data on the distribution of stress markers as well as pathological conditions and parameters of the dental system. To identify the features of age-related processes, special attention has been paid to the study of the skeletal remains of individuals of different biological ages (from early childhood to maturity).

### **Investigations of the Shakhidon Graveyard**

The Shakhidon cemetery was one of the basic objects on this way. It was discovered by the Baljuvan archaeological expedition under the leadership of Tatyana G. Filimonova, in 2012 in the process of compiling an archaeological map of this region. The research was conducted in the village (“dekh” in Tajik language) Shaidon of the Sarikhosor jamoat (Baljuvon district) in Khatlon region of Tajikistan (38°31'45"N 69°50'10"E) on the loess remnant formed as a result of the erosion of alluvial sediments in the valley of the Surkhob River (Fig. 1; Filimonova, Akhmetdzyanov, 2016; Filimonova, 2019; Filimonova et al., 2019). In 2011 local residents found a human burial with a horse in it. The man lied on his back, next to him was an iron sword and a horse in a harness and under a saddle (psalia, bits, stirrups, etc. have been preserved). Some of the finds, including the sword, are now in the exposition of the local museum (Fig. 2). Excavations of the cemetery began in 2013.

The dating of the first discovered burials was based on a characteristic coin, which is an imitation of Peroz (the ruler of Sasanian Iran) item and dates according to the numismatist D. Dovutov back to the Kushano-Sasanian period (459–484 cc). The coin was found while clearing fragments of the neck vertebrae and base of the skull of a man buried in grave No. 2. It was put into the mouth of the deceased (three such cases in this graveyard) accordingly with the tradition left as a legacy by the Greeks of supplying the deceased with coins for Charon (Fig. 3). Based on this coin and the funeral rituals, that differ from those of the local agricultural population, the author of the excavations suggested that the cemetery belonged to nomadic tribes, probably Ephthalites (Filimonova, Akhmetdzyanov, 2016, p. 262). The analysis of grave goods carried out by Viktor S. Solovyov, allows to attribute them to the 6<sup>th</sup>–7<sup>th</sup> centuries (Solovyov, 2018). According to the conclusion of the professors of Altai State University, Alexey Tishkin, Vadim V. Gorbunov and Nikolay N. Seregin (it is planned to carry out special studies) made during a visual inspection of the available material in 2018, the burial ground may belong to a somewhat later time — the 7<sup>th</sup>–8<sup>th</sup> centuries (Tishkin et al., 2019).

During 2013–2015 twenty-nine burials most of which were destroyed or looted were unearthed there. Different types of tomb constructions are noted: single-chamber catacombs (10 graves), shaft tombs (13), pits (2), two-chamber catacomb-pits (2). In two cases, the type of graves could not be determined. Intact and destroyed stone lay outs which were probably arranged on the surface after the burial pit was filled in were found at different depths. The positions of the skeletons are no less diverse: only in 10 cases the buried were laid on their backs with bent legs, knees turned upwards, and with their feet resting on the bottom of the grave pit. Others were buried in various poses, included three on the left side in crouched position. In one burial two people were buried, all others were single.



Fig. 1. General view on the Shakhidon graveyard. 2015

Рис. 1. Общий вид могильника Шахидон. 2015 г.



Fig. 2. The sword, stirrups, bit and other fragments of funeral offerings from the destroyed burial at Shakhidon graveyard in the local museum exposition. 2013

Рис. 2. Меч, стремена, удила и другие фрагменты погребальных приношений из разрушенного погребения могильника Шахидон в экспозиции местного музея. 2013 г.





Fig. 3. Shakhidon graveyard. Tomb N 28.  
The coin between the teeth of the buried woman of 25–40 years old

Рис. 3. Могильник Шахидон. Могила №28.  
Монета в зубах погребенной женщины 25–40 лет

Together with human in 21 graves there were animal remains presented by skeletons and “skins”. The “skin” is the burial of the skin of an animal, taken together with the head and distal parts of the limbs. Horses (11 burials), hybrids of horses and donkeys (5 burials) as well as cattle and small ruminants can be identified. Separated bones of small ruminants were also found. In some cases, they presented funeral food (Fig. 4).

The grave assemblage includes arrowheads and spearheads, swords, knives, stirrups, bronze mirrors, beads, earrings, ceramic vessels, and coins. A microscopic study of soil samples from the filling of several graves showed a high concentration of flint formations of plant origin (phytoliths and cuticular casts) in them, which may indicate that the “skins” placed in these burials were stuffed with grass. The composition of the detected microbiomorphs includes forms characteristic of cereals and dicotyledonous plants that make up meadow communities. Another explanation for this phenomenon may be the use of grass bedding on which the deceased was laid.

The burial ritual differs sharply from the Zoroastrian traditions of the agricultural population of early medieval Bactria-Tokharistan. It unequivocally indicates that the burial

ground belongs to the circle of mobile pastoral cultures. Different variants of burial structures and the positions of the buried show the presence in their composition of groups that differ in cultural traditions. It is important to emphasize the simultaneous existence of characteristic local pottery and a number of traditions left by the Greeks with the “steppe” ones, which are evidences of the contacts that took place between mobile pastoralists and settled farmers.

The excavations of the Shakhidon cemetery will be continued and published in the special monograph.



Fig. 4. The Shakhidon graveyard.

General view of tomb N 30 with a buried woman of 25–35 and a horse

Рис. 4. Могильник Шахидон.

Общий вид могилы №30 с погребенной женщиной 25–35 лет и лошастью

### **Bioarchaeological Study**

During the excavation of 12 burials of the Shahidon burial ground, the remains of 13 individuals of different sex and age (4 male, 6 female, 2 children and 1 fetus) were studied. Preliminary results of the study have been published (Dubova, Kufterin, 2016).

Field processing of the material was carried out taking into account traditional recommendations (Mamonova, Romanova, Kharitonov, 1989), cameral examination — according to a comprehensive anthropological program, which included sex and age identification, traditional morphometry, assessment of the muscular relief of long bones, determination of muscle relief development and of odontological features, scoring of pathological and stress mark-

ers. A separate publication is devoted to the craniological features of the population that left the site (Kufterin, Dubova, 2017).

Small series of female mesocranic skulls (only one male skull was measured by complete enough program) is characterized by large and medium diameters. Artificial deformation is absent. The forehead has middle width; the face is medium of length and moderately profiled in the horizontal plane. The nose is mesorhinnic. Orbits are absolutely and relatively high. Low nasal bones protrusion, moderate horizontal face profile as well as high orbits together with general Caucasoid image of the skull give possibility to suppose the presence of the East Asian anthropological component. But the flattened face skeleton, especially in naso-molar part is not only characteristic of Eastern Asian but with so named "Palaeocaucasoid" Eurasian population also. The amount of data is very small. So, this combination of traits gives grounds for the assumption of mechanical mixing of different components.

Canonical discriminant analysis of female Shakhidon skulls with 31 synchronous series from Middle Asia by 16 craniological traits (head length, breadth and basion-height, minimum frontal and bizigomatic diameters, upper face height, orbit maxillo-frontal breadth and height, nose width and height, simotic width and height, naso-malar, zigo-maxillar angles and angle of nasal bones protrusion) using STATISTICA 12.3 soft shows their greatest similarity with the "Ephtalite" skulls from the Kukaldy site (Alai Range) and two combined series of Turk nomads: from Eastern Kazakhstan, the 7<sup>th</sup>–12<sup>th</sup> centuries (Ginzburg, Trofimova, 1972, p. 241) and Tien Shan the 6<sup>th</sup>–8<sup>th</sup> centuries (Miklashevskaya, 1959).

The moderate degree of postcranial bones relief indicates the absence of extreme physical exertion. Stress markers are rare.

### **The Life Support System of the Modern Population**

Bioarchaeological research was supplemented by the study of *the life support system* of the modern population. Data on the structure and characteristics of traditional forms of exploitation of plant resources and animal husbandry were obtained through observations and a survey. Heads of farms, protected areas, citizens involved in the harvesting and processing of products (wild fruits, medicinal plants, timber, etc.) and shepherds were involved in the survey as "experts". In total, 27 persons were interviewed in Tajikistan and 23 — in Turkmenistan. In addition to interviews, the structure of livestock was also evaluated through visual counts of household flocks on pastures or transhumant routes. Some 100 samples of timber, fruits, and seeds of cultivated and wild plants, used by local populations, were collected during our field research in both regions under the study (ethnobotanical collection). In addition, five wooden samples were taken for xylotomy analysis from the excavations at the Early Medieval burial ground of Shakhidon. We have also interviewed 87 families (more than 50% of the total) in the village Shaidon, where the Shakhidon burial ground was located. The questionnaire included questions about family structure (age and sex composition), specific features of farming, animal breeding, and appropriating forms of economy, aimed at exploiting plant and animal resources. The collected information was tested by the results of direct field observations of the daily activities of this population.

### **The Peculiarities of Ethnoecological Approach**

The ideas of "cultural ecology" and, later, "ecological anthropology" gained wide acceptance abroad much earlier than in the USSR. The corresponding subdiscipline of "ethnic ecol-

ogy” was developed only in the early 1980s in the Soviet Union. The former served as an important or sometimes a leading methodological basis in the studies of the local differentiation and historical evolution of subsistence systems, including those of the pastoralist’s cultures in the arid and semiarid zones (for example, see: *The Ecology of Pastoralism*, 2015). The region of our studies comprises an integral part of those natural zones.

However, there are certain unique features of our approach. For instance, most of the relevant studies of foreign scholars, representing cultural anthropology and relying to some or great extent on ecological-anthropological methods of collecting and analyzing field data, have been devoted to the peoples of East Africa. Much less emphasis was made on related studies of pastoral peoples of other regions in Sub-Saharan Africa or the Middle East and North Africa (see, for example, reviews of this kind of literature: Dyson-Hudson R., Dyson-Hudson N., 1980; Fratkin, 1997; Muhammad et al., 2019). Archaeologists, including those who actively use methods of “cultural ecology” while reconstructing subsistence systems of ancient peoples and civilizations of arid and semiarid zones, mostly work in countries of the Middle East and North Africa (see, for instance, the review: Honeychurch, Makarewicz, 2016). There were also many archaeological studies of this kind in Central and South America. Thus, there are practically no direct analogues of the project, based on the same methodological approach and focused on studies of subsistence systems in the arid and semiarid expanses of Eurasia and Central Asia in particular.

On the other hand, the very term “subsistence system” has been interpreted quite differently in the contemporary foreign English-language social sciences, compared to the scholarly approach within “ethnic ecology”, founded by professor Victor I. Kozlov. The former is almost identical to the notion of “subsistence” in the works of Igor I. Krupnik. It also resembles the actual meaning of the popular term “economic and cultural type”, introduced into the Soviet ethnography by Maxim G. Levin and Nikolay N. Cheboksarov in the 1950’s. But neither the I. Krupnik’s approach to the term “subsistence system” nor its interpretation in the West have gained any support in the Russian-language literature (for details, see: Yamskov, 2009). Thus in methodology, our project differs considerably from the approaches that currently prevail in Western archaeology and cultural anthropology.

Finally and most importantly, in the framework of this project, we started to collect field data that might allow us to achieve an interdisciplinary synthesis of studies in ethnology, archaeology, bioarchaeology and paleoecology. These studies are integrated by the one aim — to analyze subsistence systems in all their historical diversity.

#### **Tajikistan Regions Where Ethnoecological Research was Done**

Field ecological research in Tajikistan was done in the Khatlon province (Qubodiyon, Danghara, Baljuvon, and Dusti/Jilikul districts) and the Fayzobod district of the republican subordination. The territories of these districts encompass various natural zones, from the deserts on the plains to highlands. Large-scale and in-depth interviews, as well as extensive personal observations, were conducted in the village Shaidon of the Sarikhosor jamoat to find out specific features of the use of animals and plants in individual households.

Field materials in the Dusti, or the Jilikul, district were collected to compare the current state of animal husbandry with the situation before the Soviet collectivization of farming and pastoralism (for the details about the latter see: Yamskov, 2021). In this district special at-

tention was paid to evaluating certain present-day problems in animal breeding, including social and environmental factors, limiting its development. In previous years this kind of field data was collected in Turkmenistan, in Garagum and the Bayramaly districts (“etraps” in Turkmen language) of the Mary province (“welayat”) and in villages of the Ahal province, located in the vicinity of Ashgabat. All participants of the project took part in field studies.

Before the Soviet collectivization of agriculture, traditional pastoralism of ethnic Tajiks was a highly developed part of household economy, containing practically every known form of animal husbandry, typical for a settled farming ethnic community residing both in the lowlands and highlands (see, for instance: Yamskov, 2021, pp. 251–258). During the Soviet period, the country experienced rapid growth of rural population and, correspondingly, human impact on agricultural lands, including various types of pastures. This negative environmental impact was especially serious in the areas of winter and intermediate spring-autumn pastures, where animals should be pastured for some 70% of the time due to natural conditions in Tajikistan. The highland summer pastures that cover far greater territories and are thus much better preserved, can be used by domestic animals for only some 30% of the time during a year (Abdunazarov, 2006). The collapse of the USSR and the subsequent bloody Civil war of 1992–1997 in Tajikistan led to great economic devastations and a sharp decline in total livestock numbers, but then the number of domestic animals rather quickly reached previous levels and continued to rise further, unfortunately causing deterioration of pastures and growing deficit of lands, suitable for keeping animals.

In his recent review of the main current problems of extensive pastoralism in post-Soviet Central Asia, the famous anthropologist and historian, Anatoliy Khazanov, stressed that in Tajikistan the major limitation for further development of animal husbandry is a lack of pasture lands and a poor state of the existing pastures, 85% of which have been overgrazed and degraded (Khazanov, 2017, pp. 60–61). The UN experts put the growth of total numbers of livestock in Tajikistan from 2005 through 2014 at 64% up to 7.4 million animals. The stock is comprised of 43,6% of sheep, 25% of goats, 30,5% of cattle (with milking cows comprising some 15% of the total livestock). The major problem is overgrazing and the resulting degradation of natural pastures so that 89% of the summer pastures and 97% of the winter pastures suffer from medium or heavy soil erosion. The total area of pastures in Tajikistan equals 3,6 million hectares, with summer pastures in the highlands covering 2,02 million hectares. At the same time, another 700 thousand hectares of summer pastures in the most distant parts of the country are not in use anymore, while many portions of the most accessible summer pastures have also been heavily overgrazed (Tadjikistan, 2017, pp. 206–207, 214).

The high importance of pastoralism in the economy of contemporary Tajikistan and its population can be seen even on the hillsides along the roads, linking the lowlands and mountains of this republic. Almost everywhere these hillsides are covered from top to bottom with fresh paths running strictly parallel to each other, almost exactly repeating the horizontal. These paths on the slopes were carved by sheep during the seasonal transhumance of flocks between lowland winter and highland summer pastures.

Economic statistics are no less eloquent. Animal husbandry made up some 30% of the total agricultural production in Tajikistan in 2013 (Karimova, 2015, p. 23). At the same time, individual private households contained 93% of cattle and 83% of sheep and goats in the coun-

try. From 1991 to 2011, the total number of cattle in Tajikistan rose by 69%, yaks — by 55%, sheep and goats — by 37%, horses — by 45%. It was the private households that showed those profound increases, thus more than compensating for great losses of livestock during the Civil war of 1992–1997 and a manifold decline of the number of animals in various large enterprises that were founded on the bases of the disbanded kolkhoz (collective enterprises) and sovkhoz (state-owned enterprise) of the Soviet period. Nevertheless, the fast growth of population in Tajikistan in that period resulted in lowering of *per capita* production of meat and milk in the republic — corresponding figures in 2011 became only 74% and 87%, compared to 1991 (Amirov, 2014, pp. 113–115, 155).

More than 51% of the able-bodied population are currently employed in agriculture, and the latter makes up around 20% — 22% of GNP in Tajikistan. The total amount of agricultural and other productive lands in the republic, which equals some 7,2 million hectares, is made up of pastures, comprising 53% of these areas. The pastures, in turn, are classified as winter (720 thousand hectares), summer (2 million hectares), spring (740 thousand hectares) and all year round (400 thousand hectares). For comparison, cultivated areas make up only 675 thousand hectares, including 470 thousands of hectares of irrigated fields, and the additional more than 115 thousand hectares are under gardens and vineyards (Amirshoev, 2018, p. 22).

#### **Subsistence System of the Shaidon Village**

At the time of our studies, there were 1140 people residing in the Shaidon village (totally in the jamoat — 5800 persons) and 170 households (totally in the jamoat — 850). Natural and climatic conditions strongly influence economic activities in this dekh. It is located at the elevation of 1500 meters above the sea level in the narrow sloping valley surrounded by steep mountain slopes at the place where three rivers meet. The relief inside the settlement and in adjacent territories is very dissected. Some aspects of the climate are close to subtropical. Temperatures in winter are fluctuating from –3 to +3 Centigrade (sometimes reaching as low as –10, according to locals), and in summer — from +23 to +38 (the mean yearly temperature is +14,7). The low slope valley of Sari Khosor provides for a maximum period of the Sun exposure during the year, reaching some 2600–2800 hours. The prevalent soils in the vicinity of this dekh are serozems (grey arid subtropical) and brown mountain soils, generally good for cultivation.

Our data shows that the population's economy is based on farming, transhumant and village-based pastoralism, beekeeping. Plants are cultivated on the household plots in the dekh (garden and orchard, usually about 0,5 hectares), as well as on the plots outside dekh on mountain slopes (usually about 200 hectares). The latter distant plots are used for growing cereals and potatoes, and only about 2/3 of a plot are under cultivation each year while the rest goes fallow and the grass is used to feed domestic animals. Mostly winter varieties of wheat are cultivated (summer varieties have limited distribution) with one crop per year and productivity around 15–20 centners per hectare. Grain is grounded in water mills of the traditional Central Asian design. The water mills are regularly renewed, and the new ones are constructed. As a rule, mills are not placed in the channels of large rivers, but on their banks with canals connected to them and providing running water, or on small streams, in places where there is a necessary water drop to rotate the millstones.

The local population also grows barley, oats, corn, and peas on their plots. The first three crops are used as fodder. Potatoes, cabbages, cucumbers are grown on household plots,

and they can produce up to 2 yields per year. Carrots are practically not cultivated here, because they require far more developed and deep soil layers. The garden can be located both on the household plot and separately on a distant plot. The main horticultural crops are apple, pear, peach, cherry plum, cherry, walnut (an average of 3–4 trees of each species). According to locals, the harvest of fruits and nuts of each type can reach 1 ton. The main part of the harvested fruits is dried, and dried fruits are sold.

Domestic animals of the local population include sheep (53,6%) and goats (18,9%), cows (16,9%), horses (5,3%), donkeys (5,3%). The main part of livestock in summer is kept on distant mountain pastures away from the village, on common and private plots. There can be some 20–40 sheep and goats, around 2–10 cows, 1–3 horses and donkeys in one household. Every cow usually gives some 8–10 liters of milk per day, and the milk is processed into butter, sour cream, buttermilk, kurut (dried yoghurt). Goats are rarely milked, and milk from sheep is not used. Sheep are sheared twice a year, and goats — once a year. They usually have a Gissar fat-tailed breed of sheep. Households also keep poultry — some 15–20 or more chicken and 5–10 turkeys. Apiaries include 50–125 hives. Depending on weather conditions and care, one hive produces 20–40 kg of honey per year. Dogs are used to guard houses and herds. Mostly large forms of the “Alabay” type are kept, but small forms of dogs are also present. Observations show that small dogs hunt mice. The horse and donkey retain the function of the main mode of transport because the dissected relief limits the possibility of using road transport.

Though farming is highly developed here, the gathering also retains a significant role in the economy, since the surroundings of the village are rich in wild fruits. The local population harvests hawthorn, pistachio, walnut, cherry plum, apples and pears, wild rose, barberry (including bark), as well as food and medicinal herbs and roots (cumin, rhubarb, mint, oregano, sage, lemon balm (lemongrass), St. John’s wort, plantain, liquorice, golden root, su-mac-tatum, etc.). In recent years, they began to actively collect sea buckthorn and hand it over to a small plant in Sari Khosor, which processes it into medicinal oil. The collection and production of pickled canned mountain garlic (“piezianzur”) is of no small importance.

Harvesting of hay and firewood is carried out in specially allocated areas. Firewood is the main fuel here, and dung is rarely used (usually manure is used for fertilizer). Hunting is not widespread. In the vicinity of the village, there is a high number of wild boars, which harms crops, orchards, gardens. But the local Muslim population does not use wild boar meat for food, so the killed animals are thrown on the spot. A similar situation develops with porcupines, which significantly damage crops and fruit trees. Informants also report that wolves regularly enter the territory of the village, posing a threat to livestock and poultry. Fishing is not developed.

Presently, there is a growing number of small villages, each containing some 3–6 households, in the interfluves of the Surkhob and Yakhsu rivers. The territory is a plateau, standing above river valleys. Relief is deeply dissected by ravines of ancient water flows, now dried up, and small streams. The northern slopes of the hills are usually covered by thick woods. There are narrow terraces along the streams, suited for cultivation. Thick grasses allow practicing intensive animal husbandry here. So, the amount of farmers’ households is increasing. They are based on small parts of preserved terraces of different elevations above the river in the valley of Surkhob.

## Conclusion

As the result of our study at the Shakhidon graveyard (Baljuvon district) twenty-nine tombs of early nomads of 7–8 cc. were described. In twenty-one of them there were remains of horses and hybrids of horses and donkeys presented by skeletons and “skins”. Different variants of burial structures and the positions of the buried show the presence in their composition of groups that differ in cultural traditions. The contacts that took place between mobile pastoralists and settled farmers must be underlined. This result is supported by the analysis of bioarchaeological data from twelve tombs presented by thirteen individuals. The combination of morphological traits gives grounds for the assumption of mechanical mixing of different components. Canonical discriminant analysis of female Shakhidon skulls with 31 synchronous series from Middle Asia by 16 craniological traits shows their greatest similarity with the “Ephtalite” skulls from the Kukaldy site (Alai Range) and two combined series of Turk nomads: from Eastern Kazakhstan, VII–XII centuries and Tien Shan VI–VIII centuries.

The ethnoecological investigation shows that the modern local population of Southern Tajikistan is successfully utilizing natural-climatic conditions and resources, preserving their traditional ways of life to a considerable extent. The latter is due to the specifics of geographical location and environmental conditions that make innovations in life-supporting systems of little efficiency. It is hard to access studied villages because of the insufficient network of good roads, and knurled tracks along dried riverbeds are mostly used as roads in these areas.

The excavation of the Shakhidon graveyard and study of subsistence system of modern population of Tajikistan in comparison with the surrounding regions will be continued.

## REFERENCES

Abdunazarov Kh. History of Animal Breeding in Tajikistan (1965–2000). Pt 2. Dushanbe: Irfon, 2006. 284 p. (*In Russ.*).

Amirov N. I. The Development of the Beef Animal-Breeding of the Republic of Tajikistan: Dis. ... Doctor of Economic Sciences. Moscow, 2014. 270 p. (*In Russ.*)

Amirshoev F. S. Beef Animal Breeding of Tajikistan: Current State and Prospects for Integration into the EAEU. In: Beef Animal-Breeding — Priorities and Development Prospects. Orenburg: Izd-vo FNC BST RAN, 2018. Pp. 22–24. (*In Russ.*)

Ginzburg V. V., Trofimova T. A. Palaeoanthropology of Middle Asia. Moscow: Nauka, 1972. 271 p. (*In Russ.*).

Dubova N. A., Kufterin V. V. Preliminary Results of the Studies of Anthropological Data from 2012–2013 Years' Excavations in the Baljuvon District. In: Archaeological Works in Tajikistan. Dushanbe: Institut istorii, arheologii i etnografii NANT, 2016. Issue 39. Pp. 67–80. (*In Russ.*)

Dubova N. A., Sataev R. M., Kufterin V. V., Sataeva L. V. First Results of Archaeoecological Research at the Shakhidon Graveyard in 2013–2014. In: Archaeological Works in Tajikistan. Dushanbe: Institut istorii, arheologii i etnografii NANT, 2019. Issue 40. Pp. 272–279. (*In Russ.*).

Dubova N. A., Sataev R. M., Sataeva L. V., Kufterin V. V., Yamskov A. N., Filimonova T. G., Sayfulloev N. N. Bioarchaeological and Ethnoecological Research in Tajikistan in 2015. In: Archaeological Works in Tajikistan. Dushanbe: Institut istorii, arheologii i etnografii NANT, 2020. Issue 41. Pp. 114–133. (*In Russ.*)



Karimova M. T. Changes in Agriculture in Connection with the Accession of Tajikistan to the WTO. In: Actual Issues of Economics and Management. Moscow: Buki-Vedi, 2015. Pp. 22–25. (*In Russ.*)

Kufterin V. V., Dubova N. A. Craniology of “Hephtalites” by the Materials of Shkhidon Graveyard (Southern Tajikistan). *Vestnik antropologii = Herald of Anthropology*. 2017. 2(38). Pp. 20–27 (*In Russ.*)

Mamonova N. N., Romanova G. P., Kharitonov V. M. Primary Processing and Determination of Anthropological Material in the Field. In: Methods of Field Archaeological Research. Leningrad: Nauka, 1989. Pp. 50–83. (*In Russ.*)

Miklashevskaya N. N. Results of Paleoanthropological Investigations in Kirgiziya. In: Transactions of Kirgiz Archaeological-Ethnographical Expedition. Vol. II. Moscow: Izdatel'stvo Akademii nauk SSSR, 1959. Pp. 295–331. (*In Russ.*)

Solovyev V. S. Materials from the Excavations of the Shahidon Burial Ground in Tajikistan. *Filo Ariadne*. 2018. 2(10). Pp. 11–24. (*In Russ.*)

Tishkin A. A., Filimonova T. G., Gorbunov V. V., Seregin N. N. Shokhidon — Collapsing Necropolis of the Early Middle Ages in Tajikistan. In: Preservation and Study of the Cultural Heritage of the Altai Territory. Barnaul: Izd-vo Alt. un-ta, 2019. Issue XXV. C. 304–311.

Filimonova T. G. Baljuvan Arcaheological Expedition: Excavations and Exploration of 2013–2014. In: Archaeological Works in Tajikistan. Dushanbe: Institut istorii, arheologii i etnografii NANT, 2019. Vol. 40. Pp. 252–271. (*In Russ.*)

Filimonova T. G., Akhmetzyanov M. R. Report on the Archaeological Works in the Baljuvan District (2012). In: Archaeological Works in Tajikistan. Dushanbe : Institut istorii, arheologii i etnografii NANT, 2016. Issue 38. Pp. 256–277. (*In Russ.*)

Filimonova T. G., Saifulloev N., Dubova N. A., Sataev R. M., Kufterin V. V., Sataeva L. V. A New Site of the Early Nomads in the South of Tajikistan: the Shakhidon Burial Ground (on the problem of the interactions between mobile animal-breeders and farmers). In: Antiquity of the Eastern Europe, Central Asia and Southern Siberia in the Context of Connections and Interactions in the Eurasian Cultural Space (new data and concepts). Vol. 1. Ancient Central Asia in the Eurasian Cultural Context (new data and concepts). St. Petersburg: Institut istorii material'noj kul'tury, 2019. P. 262–264. DOI: 10.31600/978-5-907053-34-2-262-264 (*In Russ.*)

Khazanov A. M. After Socialism: The Fates of Pastoralism in Central Asia, Mongolia, and Russia. *Vestnik antropologii = Herald of Anthropology*. 2017. 2(38). Pp. 45–85 (*In Russ.*)

Yamskov A. N. Interpretations of the Concept of “Life Support” in Ethnic Ecology and a Possible Approach to the Study of Cultural Adaptation. In: Ethnos and Living Environment. Vol. 1. Collection of Ethnoecological Studies Dedicated to the 85<sup>th</sup> Anniversary of V. I. Kozlov. Moscow: Staryj sad, 2009. Pp. 73–94. (*In Russ.*)

Yamskov A. N. Pastoralism. In: Tajiks. Moscow: Nauka, 2021. Pp. 241–264 (*In Russ.*)

Dyson-Hudson R., Dyson-Hudson N. Nomadic Pastoralism. *Annual Review of Anthropology*. 1980;9:15–61.

The Ecology of Pastoralism / Ed. N. Kardulias. Boulder: University Press of Colorado, 2015. 272 p.

Fratkin E. Pastoralism: Governance and Development Issues. *Annual Review of Anthropology*. 1997;26:235–261.

Honeychurch W., Makarewicz C. The Archaeology of Pastoral Nomadism. *Annual Review of Anthropology*. 2016;45:341–359.

Muhammad K., Mohammad N., Abdullah K., Mehmet S., Ashfaq A. K., Wajid R. Socio-Political and Ecological Stresses on Traditional Pastoral Systems: A Review. *Journal of Geographical Sciences*. 2019;29:1758–1770.

Tajikistan. Environmental Performance Reviews. Third Review. Geneva : The UN Economic Commission for Europe, 2017. 32 p.

### СПИСОК ИСТОЧНИКОВ

Абдуназаров Х. История скотоводства в Таджикистане (1965–2000). Ч. 2. Душанбе : Ирфон, 2006. 284 p.

Амиров Н. И. Развитие мясного скотоводства Республики Таджикистан: дис. ... д-ра экон. наук. М., 2014. 270 с.

Амиршоев Ф. С. Мясное скотоводство в Таджикистане: современное состояние и перспективы интеграции в ЕАЭС // Мясное скотоводство — приоритеты и перспективы развития. Оренбург : Изд-во ФНЦ БСТ РАН, 2018. С. 22–24.

Гинзбург В. В., Трофимова Т. А. Палеоантропология Средней Азии. М. : Наука, 1972. 271 с.

Дубова Н. А., Куфтерин В. В. Предварительные результаты изучения антропологического материала из раскопок 2012–2013 гг. в Бальджуванском район // Археологические работы в Таджикистане. Душанбе : Институт истории, археологии и этнографии АН РТ, 2016. Т. 39. С. 67–80.

Дубова Н. А., Сатаев Р. М., Куфтерин В. В., Сатаева Л. В. Первые результаты археологических исследований могильника Шахидон в 2013–2014 гг. // Археологические работы в Таджикистане. Душанбе : Институт истории, археологии и этнографии АН РТ, 2019. Т. 40. С. 272–279.

Дубова Н. А., Сатаев Р. М., Сатаева Л. В., Куфтерин В. В., Ямсков А. Н., Филимонова Т. Г., Сайфуллоев Н. Н. Биоархеологические и этноэкологические исследования в Таджикистане в 2016 г. // Археологические работы в Таджикистане. Душанбе : Институт истории, археологии и этнографии АН РТ, 2020. Т. 41. С. 114–133.

Каримова М. Т. Изменения в сельском хозяйстве в связи с вступлением Таджикистана в ВТО // Актуальные вопросы экономики и управления. М. : Буки-Веди, 2015. С. 22–25.

Куфтерин В. В., Дубова Н. А. Краниология «эфталитов» по материалам могильника Шахидон (Южный Таджикистан) // Вестник антропологии. 2017. №2(38). С. 20–27.

Мамонова Н. Н., Романова Г. Р., Харитонов В. М. Первичная обработка и определение антропологического материала в полевых условиях // Методика полевых археологических исследований. Л. : Наука, 1989. С. 50–83.

Миклашевская Н. Н. Результаты палеоантропологических исследований в Киргизии // Труды Киргизской археолого-этнографической экспедиции. Т. 2. М. : Издательство Академии наук СССР, 1959. С. 295–331.

Соловьев В. С. Материалы из раскопок могильника Шахидон в Таджикистане // *Filo Ariadne*. 2018. №2(10). С. 11–24.

Тишкин А. А., Филимонова Т. Г., Горбунов В. В., Серегин Н. Н. Шохидон — аварийный могильник раннего средневековья в Таджикистане // Сохранение и изучение культурного наследия Алтайского края. Барнаул: Изд-во Алт. ун-та, 2019. Вып. XXV. С. 304–311.

Филимонова Т. Г. Бальджуванская археологическая экспедиция: раскопки и разведки 2013–2014 годов // Археологические работы в Таджикистане. Душанбе : Институт истории, археологии и этнографии АН РТ, 2019. Т. 40. С. 252–271.

Филимонова Т. Г., Ахметзянов М. Р. Отчет об археологических работах в Бальджуванском районе (2012 г.) // Археологические работы в Таджикистане. Душанбе : Институт истории, археологии и этнографии АН РТ, 2016. Т. 38. С. 256–277.

Филимонова Т. Г., Сайфуллоев Н., Дубова Н. А., Сатаев Р. М., Куфтерин В. В., Сатаева Л. В. Новый памятник ранних кочевников на юге Таджикистана: могильник Шахидон (к проблеме взаимодействия между подвижными скотоводами и земледельцами) // Древности Восточной Европы, Средней Азии и Южной Сибири в контексте связей и взаимодействий в евразийском культурном пространстве (новые данные и концепции). Т. 1. Древняя Средняя Азия в евразийском культурном пространстве (новые данные и концепции). СПб. : Институт истории материальной культуры, 2019. С. 262–264. DOI: 10.31600/978-5-907053-34-2-262-264.

Хазанов А. М. После социализма: Судьбы скотоводства в Центральной Азии, Монголии и России // Вестник антропологии. 2017. №2(38). С. 45–85.

Ямсков А. Н. Трактовки понятия «жизнеобеспечение» в этнической экологии и возможный подход к изучению культурной адаптации // Этнос и среда обитания. Т. 1. Сборник этноэкологических исследований к 85-летию В. И. Козлова. М. : Старый сад, 2009. С. 73–94.

Ямсков А. Н. Скотоводство // Таджики. М. : Наука, 2021. С. 241–264.

Dyson-Hudson R., Dyson-Hudson N. Nomadic Pastoralism. *Annual Review of Anthropology*. 1980;9:15–61.

The Ecology of Pastoralism / Ed. N. Kardulias. Boulder : University Press of Colorado, 2015. 272 p.

Fratkin E. Pastoralism: Governance and Development Issues. *Annual Review of Anthropology*. 1997;26:235–261.

Honeychurch W., Makarewicz C. The Archaeology of Pastoral Nomadism. *Annual Review of Anthropology*. 2016;45:341–359.

Muhammad K., Mohammad N., Abdullah K., Mehmet S., Ashfaq A. K., Wajid R. Socio-Political and Ecological Stresses on Traditional Pastoral Systems: A Review. *Journal of Geographical Sciences*. 2019;29:1758–1770.

Tajikistan. Environmental Performance Reviews. Third Review. Geneva : The UN Economic Commission for Europe, 2017. 32 p.

There is no conflict of interest / Конфликт интересов отсутствует.

---

#### INFORMATION ABOUT THE AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ

---

**Nadezhda Anatolievna Dubova**, Doctor of Historical Sciences, Main Researcher, Head of the Center of Human Ecology, N. N. Miklukho-Maklai Institute of Ethnology and Anthropology of Russian Academy of Sciences, Moscow, Russia.

**Дубова Надежда Анатольевна**, доктор исторических наук, главный научный сотрудник, руководитель Центра антропоэкологии, Институт этнологии и антропологии им. Н. Н. Миклухо-Маклая Российской академии наук, Москва, Россия.

**Tatiana Germanovna Filimonova**, Candidate of Historical Sciences, Leading Researcher, Department of Archaeology, Institute of History, Archaeology and Ethnography of National Academy of Sciences of Tajikistan, Dushanbe, Tajikistan.

**Филимонова Татьяна Германовна**, кандидат исторических наук, ведущий научный сотрудник, Отдел археологии, Институт истории, археологии и этнографии Национальной академии наук Таджикистана, Душанбе, Таджикистан.

**Robert Midkhatovich Sataev**, Candidate of Biological Sciences, Senior Researcher, Center of Human Ecology, N. N. Miklukho-Maklai Institute of Ethnology and Anthropology of Russian academy of sciences, Ufa, Russia.

**Сатаев Роберт Мидхатович**, кандидат биологических наук, старший научный сотрудник, Центр антропоэкологии, Институт этнологии и антропологии им. Н. Н. Миклухо-Маклая Российской академии наук, Уфа, Россия.

**Lilia Vakilovna Sataeva**, Candidate of Biological Sciences, Associate Professor, Bashkir State Agrarian University, Ufa, Russia.

**Сатаева Лилия Вакиловна**, кандидат биологических наук, доцент Башкирского государственного аграрного университета, Уфа, Россия.

**Vladimir Vladimirovich Kufterin**, Candidate of Biological Sciences, Senior Researcher, Center of Human Ecology, N. N. Miklukho-Maklai Institute of Ethnology and Anthropology of Russian academy of sciences, Moscow, Russia.

**Куфтерин Владимир Владимирович**, кандидат биологических наук, старший научный сотрудник, Центр антропоэкологии, Институт этнологии и антропологии им. Н. Н. Миклухо-Маклая Российской академии наук, Москва, Россия.

**Anatolij Nikolavich Yamskov**, Candidate of Historical Sciences, Leading Researcher, Center of Human Ecology, N. N. Miklukho-Maklai Institute of Ethnology and Anthropology of Russian Academy of Sciences, Moscow, Russia.

**Ямсков Анатолий Николаевич**, кандидат исторических наук, ведущий научный сотрудник, Центр антропоэкологии, Институт этнологии и антропологии им. Н. Н. Миклухо-Маклая Российской академии наук, Москва, Россия.

*The article was submitted 26.06.2022;*

*approved after reviewing 04.08.2022;*

*accepted for publication 16.08.2022.*

*Статья поступила в редакцию 26.06.2022;*

*одобрена после рецензирования 04.08.2022;*

*принята к публикации 16.08.2022.*

Research Article / Научная статья

УДК 738.1: 902(235.226)

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-10](https://doi.org/10.14258/tpai(2022)34(3).-10)

## CHINESE PORCELAIN IN WESTERN MONGOLIA (THE QING DYNASTY)

**Alina Yu. Ozheredova<sup>1\*</sup>, Yuri I. Ozheredov<sup>2</sup>**

<sup>1</sup>Feng Chia University, Taichung, Taiwan;  
[alguniang@gmail.com](mailto:alguniang@gmail.com), <https://orcid.org/0000-0002-6610-8722>

<sup>2</sup>M.K. Ammosov North-Eastern Federal University, Chukotka Branch, Anadyr, Russia;  
[nohoister@gmail.com](mailto:nohoister@gmail.com), <https://orcid.org/0000-0002-4849-0745>

\*Corresponding author

**Abstract.** The paper examines Chinese porcelain collected at the Chinese fortress in the Khovd city, Shar Sum monastery and two archaeological sites in the Barun Khurai Depression in southwest Mongolia. The sites were built for Chinese military administration and Mongolian Buddhist clergy during the Qing period. The study concludes that the decorative motives of the porcelain reflect the tastes of the mentioned categories of Mongolian population and is predominantly related to Tibetan Buddhism elements of the Chinese folk culture. The discovered material also indicates originally “non-Han” components of the Chinese history. The results of the study play an important role in understanding stylistic preferences in Chinese porcelain outside China. It also serves as a reference for a better evaluation of Chinese porcelain export trajectories within Central Asia and in the territories up north.

**Key words:** Chinese porcelain, Mongolia, Qing dynasty, archaeology, Buddhism, decorative art

**For citation:** Ozheredova A. Yu., Ozheredov Yu. I. Chinese Porcelain in Western Mongolia (the Qing Dynasty). *Teoriya i praktika arheologicheskikh issledovanij = Theory and Practice of Archaeological Research*. 2022;34(3):164–175. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-10](https://doi.org/10.14258/tpai(2022)34(3).-10)

## КИТАЙСКИЙ ФАРФОР В МОНГОЛИИ (ДИНАСТИЯ ЦИН)

**Алина Юрьевна Ожередова<sup>1\*</sup>, Юрий Иванович Ожередов<sup>2</sup>**

<sup>1</sup>Университет Фэнцзя, Тайчжун, Тайвань;  
[alguniang@gmail.com](mailto:alguniang@gmail.com), <https://orcid.org/0000-0002-6610-8722>

<sup>2</sup>Северо-Восточный федеральный университет имени М.К. Аммосова,  
Чукотское отделение, Анадырь, Россия;  
[nohoister@gmail.com](mailto:nohoister@gmail.com), <https://orcid.org/0000-0002-4849-0745>

\*Автор, ответственный за переписку

**Резюме.** Исследование представляет обобщающий анализ китайского фарфора, собранного на китайской крепости в г. Ховде, руинах дацана Шар-Сум и двух памятниках на территории Барунхурайской впадины на юго-западе Монголии. Названные объекты служили целям китайской военной администрации и представителям буддийского духовенства Западной Монголии в период Цин. По итогам анализа очевидно, что в декоре фарфоровых изделий преобладают тибето-монгольские элементы китайской народной культуры, а также частности, отражающие «неханьскую» часть истории Китая. Результаты исследования играют важную роль для понимания стилевых предпочтений в фарфоре за пределами Китая, а также для изучения траекторий перемещения китайского фарфора через Центральную Азию далее на север.

**Ключевые слова:** китайский фарфор, Монголия, династия Цин, археология, буддизм, изобразительно искусство

**Для цитирования:** Ожередова А. Ю., Ожередов Ю. И. Китайский фарфор в Монголии (династия Цин) // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 164–175. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-10](https://doi.org/10.14258/tpai(2022)34(3).-10)

## **I**ntroduction

geographical position of Mongolia and China predetermined their long shared history. During more than two millennia of Chinese and Mongolian statehood there were a number of periods when the dominating positions interchanged between the two power centers. The first large scale conflict between the Chinese empire and the steep nomads followed the rise of the Xiongnu empire which existed between 209 BC and 93 AD. The confrontation lasted for three centuries and ended in the collapse of the latter. The Xiongnu hordes retreated to the outer Mongolia and their territories were occupied by the Xianbei, the Rouran, the Tujue, the Uyghurs, the Kyrgyz people and the Mongols who continued the confrontation with China. Weakening Chinese Empire failed to resist the nomads, and in 1260–1280 the Mongols defeated the Chinese army. Beijing throne was conquered by a first non-Han dynasty which subsequently was overthrown by the Ming dynasty in 1386. In 1629 Mongolia submitted to the Manchu who captured the Forbidden city in 1644 and ruled for over 300 years (Kurc, 1929, p. 7).

Political turmoil between Mongolia and China directly influenced the culture of these two empires. This is clearly reflected in historical records, and is also demonstrated by the archaeological finds analyzed in the paper. The authors focus on the Chinese porcelain shards collected from the Qing period sites in Western Mongolia: the ruins of the Chinese fortress in the Khovd City, the Shar Sum datsan outside the city, a fortified construction and a datsan located in the Barun Khurai Depression near Mount Oshka.

The preliminary studies of the sites have been presented in a number of publications (Ozheredov, 2005a, 2005b; 2009a, 2009b; Ozheredov, Ganbold, 2009; Ozheredov et al., 2008; Ozheredova, Ozheredov, 2011a, 2011b, 2011c, 2012, 2015), however some degree of incompleteness and inaccuracies were inevitable at the initial stages of the research. As time went by, more finds and information collected by the authors allowed different approach to evaluating the overall material. It resulted in the present paper aimed at summarizing the information available so far.

### **Historical Background of the Archaeological Sites**

Considerably large addition to the collected material was made over the years with the new fragments from the Khobdo fortress, located at the left bank of the Buyant river within the territories of the modern Khovd city (Fig. 1.-1). The fortress was built three times. Its history began in 1718 at the Khovd river, however the exact location of the first building has not been established (Pozdneev, 1883, p. 307). Two works by Pozdneev mention close but different dates of the construction: 1731 (Pozdneev, 1883, p. 334, 335, 340; Kiselyov, 1957, p. 101) and 1730. The new city, or, to be exact, the fortress was built "...at the Khobdo river with the purpose to station leading garrison there and in order to have supply warehouses for the troops". The war with the Dzungar people was the main reason for building this fort (Pozdneev, 1896, p. 304).

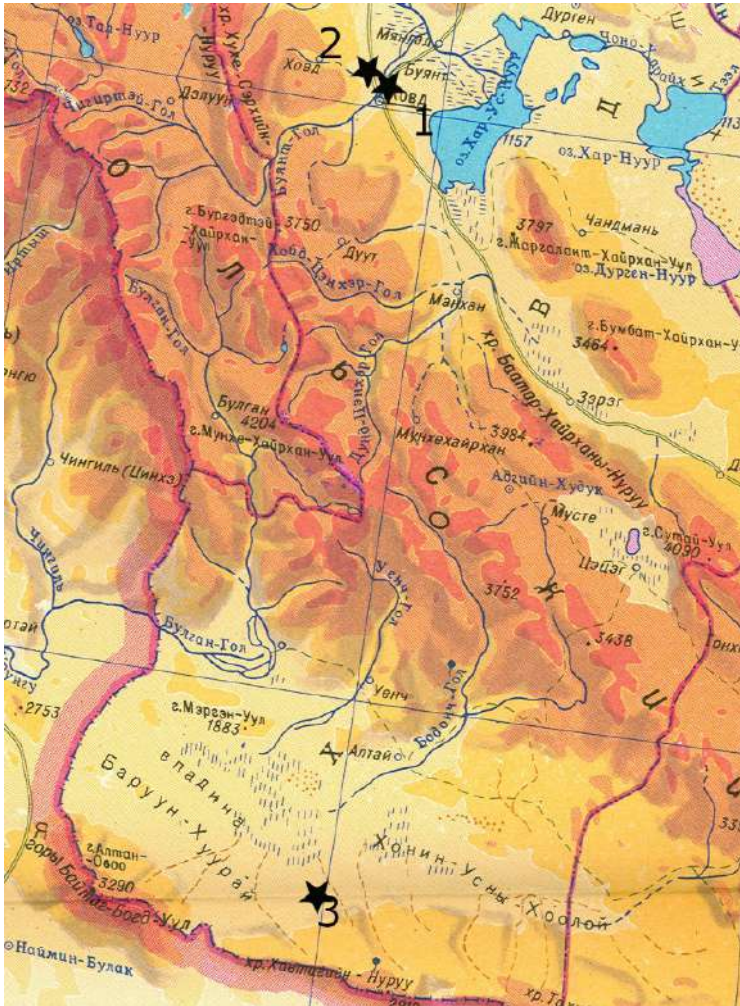


Fig. 1. The map of the archaeological sites in West Mongolia: 1 – Khovdo fortress; 2 – Shar Sumdatsan; 3 – The sites in the Barun Khurai depression

Рис. 1. Карта археологизированных объектов Западной Монголии: 1 – Крепость Кобдо; 2 – дацан Шар-Сум; 3 – памятники в Барунхурайской впадине

Modern Khovd city, where Chinese porcelain shards were collected, was founded in 1762 on the right bank of the Buyant river, about 40 km to the south-west from the previous fortress, which is now called “Old Khovd” among the local people (Pozdneev, 1896, p. 304).

According to the staff-captain Printz, who was seconded to Mongolia in 1864, the city “... was built half a versta away from the water, on the right bank of the Buyant river... A small brook divides the city into two main parts: the northern administrative one and the southern trade district — the northern part of the city ... is constructed as a fortress, surrounded by a stone wall in a shape of a square with sides 130 sazhen long. There are towers in the corners

of the square. Crenellated walls are 1½ sazhen thick and about 2 sazhen high” (Printz, 1869, p. 8). A detailed description of the fortress can be found in Pozdnev’s *Mongolia and Mongols* (1896, p. 303–337).

After the revolution of 1912 the Qing administration departed from the city and the fortress was destroyed. Parts of the ruined adobe walls and old poplars — remnants of the former park — are the only reminder of the original constructions. For a long period of time the city land was ploughed for gardens, cut by irrigation canals and roads. The destruction of the cultural layers led to shifting artifacts between different levels which resulted in accumulation of ceramic shards on the surface.

Similar material was discovered at the ruins of the Buddhist datsan Shar Sum, located about 1 km to the north from the fortress (Fig. 1.-2). Short history of the site, its architectural reconstruction, collected artifacts and their preliminary study have been discussed in a number of works (Ozheredov, 2005a, 2005b; Ozheredov et al., 2008; Ozheredov, Ganbold, 2009; Ozheredova, Ozheredov, 2012), here we would like to focus on the basic information.

The first documented Russian description of Khovd and nearby territories was done by Printz and doesn’t offer much information about the Shar Sum monastery (1869, p.8). More detailed introduction appears in Potanin’s studies where it is mentioned among the buildings constructed by the order of Chinese emperor to provide residency for Mongolian high rank religious administration — gegens (Potanin, 1881, p. 40, 78–79; 1948, p. 63). According to the Mongolian chronicle *Erdeni-yin erike*, the temple was built in 1762 by Olot lama Don-dok, supposedly, as a mobile monastery consisted of *yurts*. Only in 1766 the Chinese emperor ordered to build a stone datsan, which was finished in 1767 (Pozdnev, 1896, p. 327, 334). According to Grum-Grzhimailo, after some time local residents started calling it “Shar Sume” (Grum-Grzhimailo, 1926, p. 251).

The ruins of the sites in the eastern part of the Barun Khurai depression near Oshka mountain represent the remains of fortified constructions with ramparts and a moat. Two of them have a typical fortress architecture. Within the outer fortified elements of the third one we identified some fragments of a stone foundation and, supposedly, the remains of a *kang* type heating construction.

According to the written records this territory traditionally was populated by Oirat Zakhchins, who guarded the frontiers of Manchurian China from hostile Dzungaria (Grum-Grzhimailo, 1926, p. 263–264).

Oral communication with an ethnologist from Hovd State University M. Ganbold revealed that one of the sites used to be a Tibetan style datsan built by the lamas from Shar Sum monastery to facilitate spiritual practices of local Zakhchins. Grum-Grzhimailo also documented a large monastery (200 lamas) on this territory populated by the same ethnic group (Grum-Grzhimailo, 1926, p. 261).

### **Chinese Porcelain Analysis**

The fortress in Khovd and the Shar Sum datsan are in relative proximity from each other. The sites near Oshka Mountain are located considerably far from them (about 300 km to the south-west) (Fig. 1.-3), however, according to the written records, they are related to the Shar Sum monastery. Apart from the verbal sources the indirect connection of all three locations is confirmed by the archaeological data recovered by the authors — the fragments



of Chinese porcelain with similar technological and decorative characteristics. 44 fragments of Chinese porcelain produced between the 17<sup>th</sup> and the beginning of the 20<sup>th</sup> centuries were found on the territory of Shar Sum within the areas where religious ceremonies would take place (*hure*) and at the living quarters of the lamas (*bayshina*). 158 porcelain fragments from the 18<sup>th</sup> — beginning of 20<sup>th</sup> centuries were collected on the territory of the Khovd fortress. 16 fragments of the late 19<sup>th</sup> — the beginning of 20<sup>th</sup> centuries were gathered at the constructions in the Barun Khurai depression. The analysis of large fragments suggested that most of the objects represented utilitarian tableware — cups (bowls) and small plates.

The shards found at the fortress and within the territory of the monastery confirm Potanin's records about Chinese merchants who came from Beijing to Khobdo once a year with special goods, that included porcelain (Potanin, 1881, p. 74). According to the participants of the expedition to Mongolia organized by Tomsk Society of Siberian and Mongolian Studies in 1910, "In some places it is possible to see Chinese faience and porcelain tableware. Many Chinese stores sell cheap faience tableware. But this type of ware is unlikely to be in big demand among nomads...", because "the Mongols eat and drink tea, other beverages and liquid food from wooden bowls *ayaks*, and every Mongol has a bowl like this. The bowls are brought by Chinese and are known for their durability" (Bogolepov, Sobolev, 1911, p. 140–141). Later, Grum-Grzhimailo wrote that tableware sets in Khalkha Mongol families "consist of several wooden bowls, and only on a rare occasion they are replaced by porcelain" (Grum-Grzhimailo, 1926, p. 330).

Considering the fact that there are much more porcelain fragments in the fortress that is not much larger than the monastery, it is possible to suggest that the discovered Chinese artifacts mainly belonged to the ethnic Chinese and a small group of local people (lamas). According to Printz, about a thousand Chinese lived in the fortress and the neighboring trade district *maimacheng* in 1864 (Printz, 1869, p. 8). The population stayed the same even about 50 years later in 1910 (Bogolepov, Sobolev, 1911, p. 22).

Stylistic characteristics of the decoration applied to the Chinese porcelain fragments serve as an important source of information about the preferences in decorative household art common among the residents of Mongolia during the mentioned historical period. The analysis of the material demonstrates a clear dominance of religious and auspicious symbolic motives that were popular in Chinese folk art.

One example is the group of the fragments with a Chinese character *shou* (壽) "longevity". *Shou* already appears among the pictograms on the neolithic ceramics. The association of this symbol with the concept of long life is traced back to the period before the 3<sup>rd</sup> century BC. The so called "longevity culture" that started to form in 8<sup>th</sup> century BC represents one of the basic components of Chinese worldview (Yin Wei, Yin Weiran, 2005, p. 147; Su Keming, 2009, p. 102).

There is a large collection of styles applied to the ideograph *shou* in Chinese tradition. Su mentions 13,822 variants of this character found only in written sources (Su Keming, 2009, p. 103). As applied to ceramics there are 1000 different styles just on a single *zun* vase from Kangxi period (Johan's autumn auction..., 2018, p. 48–51).

The most common motif on the fragments from Shar Sum and Khobdo is stylized sanscrit symbols *Fanwen* (梵紋) combined with a character *shou* (Fig. 2.-1–3). There are more frag-

ments with this decoration at the fortress, and in general it constitutes one fourth of the finds from all of the mentioned sites in Mongolia.

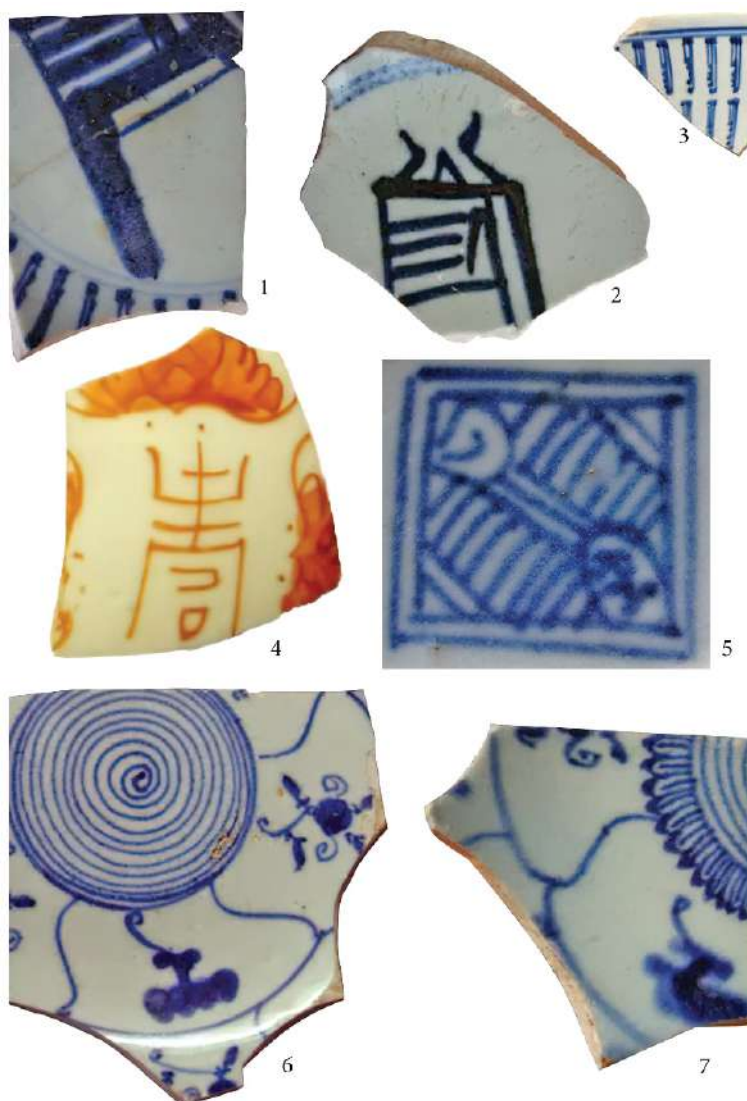


Fig. 2. Chinese porcelain fragments from West Mongolia (the images are provided without scale): 1–2 – Central character shou (?) on the porcelain fragments decorated with Fanwen motif; 3 – Porcelain decorated with Fanwen motif on cavetto; 4 – Porcelain with Wufu shou motif; 5 – Tuji mark; 6–7 – Porcelain decorated with Lingzhi motif

Рис. 2. Фрагменты китайского фарфора из Западной Монголии (иллюстрации даны без масштаба): 1–2 – центральный иероглиф шоу (?) на фарфоре с орнаментом Фаньвэнь; 3 – фарфор с орнаментом Фаньвэнь в зоне каветто; 4 – фарфор с орнаментом Уфу шоу; 5 – марка типа Ту Цзи; 6–7 – фарфор с изображением магического гриба Линчжи

*Fanwen* is very often rendered in cobalt blue on white, with parallel rows of Sanskrit symbols. This ornament can either cover the whole body of an object (a vase or a bowl), or only a part of a piece, for instance a cavetto of a plate on the outside or inside (Fig. 2.-3). Apart from the parallel lines of the Sanskrit symbols some plates also have a large image of a character *Shou* in the center (Fig. 2.-1-2). There are researchers who believe the central character rendered in the similar style as the fragments from Mongolia represent a Sanskrit symbol *Om* (Brown, Sjostrand, 2004, p. 106–107). However, there are examples of the plates with identical *Fanwen* motif on the cavetto and a character *Shou* in Regular script or in round form in the center. Hence highly stylized central symbol on the porcelain found in Mongolia merit further academic research. The authors are more convinced with the second interpretation and suggest that the style of the character *shou* on the objects from Mongolia is close to Mongolian square script also called *Phags-pa* script, or to Chinese Seal script *Zhuanshu*.

*Fanwen* is relatively common motif in Chinese art of the 18<sup>th</sup> — 19<sup>th</sup> centuries, and it is used for utilitarian as well as for ceremonial ware. Some of it was discovered in Chinese burials dated to Qianlong period (Yu Jiadu, 1997, fig. 224).

Despite the differences in interpretation, the cultural and historical context of this motif, in one way or another, is related to Tibetan Buddhism element of Chinese culture. There is an opinion that objects decorated with *fanwen* were specifically produced for export to Tibet (Vestfalen, Krechetova, 1947, p. 28).

Another auspicious ornament that includes *shou* was discovered in Barun Khurai depression (Fig. 2.-4). It consists of the character *shou* surrounded by bats and called *Wufushou*, “five blessings and longevity”. This combination of symbols also belongs to a large group of auspicious ornaments popular in Chinese folk art. Interestingly, the bowls with the similar ornament that were found in Olun Sume are viewed as porcelain produced for export to Mongolia (Vestfalen, Krechetova, 1947, p. 53).

One more group of shards found at the Khobdo fortress and Shar Sum datsan consists of the bottom parts with marks *Tuji* (Fig. 2.-5) also called *Doufu Gan*, “dried tofu”. It belongs to a larger category of marks referred to as *Huayang Kuan* “marks-pictures”. According to 14<sup>th</sup> century Chinese historian Tao Zunyi, the introduction of this type of marks to Chinese decorative art is directly connected to the Manchu and other non-Han ethnoses, so called “the colored eyes”, who held high rank positions in the Yuan government, however, could not write or speak Chinese. As a result, the objects previously marked with Chinese characters to indicate the higher quality and status instead started to be branded with pictures and patterns. Later, during the Ming and Qing periods, this tradition spread onto more coarse mainstream household porcelain (Zhongguo gu taoci..., 1998, p. 345).

Another large group of porcelain fragments has a plant motif based on the image of the magical mushroom *lingzhi* (Fig. 2.-6-7). *Lingzhi* is associated with Daoist immortals who lived on the magic islands in the Eastern Sea. In order to find them one would require this mushroom (Grube, 1912, p. 145). Hence the motif is closely connected to the “longevity cult” popular during Ming and Qing period. Multiple discoveries of this type of porcelain at the trade shipwrecks (Christie’s Amsterdam..., 1995, p. 124; Tek Sing..., 2000, p. 115) suggests that it was produced in large numbers and met the demand outside China.

A large portion of the porcelain collection from Khobdo and Shar Sum is taken up by light green celadon also called *douqing* or “bean green”. Celadon history started in the Shang period when this type of glaze was a result of a natural chemical reaction during the firing process. Only in the end of the Han dynasty Chinese ceramists managed to develop a technology which would allow them to control the color and texture of this glaze. According to some researchers, celadon became popular due to its resemblance to bronze and jade objects (Gompertz, 1968, p. 23–30). Interestingly, the history of the Chinese export ceramics is also closely related to celadon, as the objects covered with this type of glaze were already popular outside China at the early stages of its production.

### Conclusions

A complex analysis of the collected material suggests that the Qing porcelain in Mongolia was mainly used by Chinese military administration and Mongolian Buddhist clergy. The decorative motif applied to the porcelain reflects basic values of Chinese folk culture, however the design elements predominately signal Tibetan Buddhism stylistic framework. The decoration also reflects the preferences originally related to non-Han components of Chinese culture. Hence these two characteristics allows us to suggest that the porcelain exported to Mongolia was intended for local tastes, even though it was used predominantly by Chinese population.

Identifying the porcelain in Mongolia provides a better understanding of how Chinese products corresponded to the needs and decorative preferences of the neighboring territories. It also demonstrates the degree of cultural interchange between different territories.

In addition, the study sheds more light on the trajectory of porcelain trade routes that ran across Central Asia further west and north. The discussed Chinese artifacts serve as a reference for a more complete interpretation of Chinese porcelain fragments recently identified among archaeological material in Siberia.

### REFERENCES

Bogolepov M. I., Sobolev M. N. Essays on the Trade Between Russia and Mongolia. Expedition to Mongolia in 1910. Tomsk : Tipografiya Sibirskogo tov-va pechat. dela, 1911. 500 p. (Proceedings of Tomsk Society of Siberian studies. Vol. I.) (*In Russ.*).

Vestfalen E. H., Krechetova K. N. Chinese Porcelain. Leningrad : Gosudarstvennyj Ermitazh, 1947. 56 p. (*In Russ.*).

Grube W. Spiritual Culture of China. Literature, Religion, Cult. St. Petersburg : Brokgauz-Efron, 1912. 251 p. (*In Russ.*).

Grum-Grzhimailo G. E. Western Mongolia and Uryankhay Krai. Vol. III. Issue 1. Anthropological and Ethnographic Essays of These Countries. Leningrad : Leningradskij Gublil, 1926. 415 p. (*In Russ.*).

Kiselev S. V. Ancient Cities of Mongolia. *Sovetskaya arheologiya = Soviet Archaeology*. 1957;2:91–101. (*In Russ.*).

Kurc B. G. Russian-Chinese Relations in the 16<sup>th</sup>, 17<sup>th</sup> and 18<sup>th</sup> Centuries. Kiev : Gosdarsvennoe izd-vo Ukrainy, 1929. 158 p. (*In Russ.*).

Ozheredov Yu. I. The Beginning of the Research in the Shar Sum Complex in West Mongolia. In: Archaeology of Southern Siberia: Ideas, Methods, Discoveries. Krasnoyarsk : RIO KGPU, 2005a, Pp. 131–133. (*In Russ.*).

Ozheredov Yu. I. On the Complex Expedition of Tomsk State University in 2004 in Western Mongolia. In: Natural Environment, History and Culture of Western Mongolia and Neighbouring Territories. Kyzyl : Izd-vo TuvIKOPR SO RAN, 2005b. Pp. 77–81. (*In Russ.*).

Ozheredov Yu. I. On the History of the Temple Complex Shar Sum in Western Mongolia. *Mir Evrazii = The World of Eurasia*. 2009a;2(5):38-49. (*In Russ.*).

Ozheredov Yu. I. Preliminary Study of the Buddhist Temple Shar Sum in Khovd Aimak in Western Mongolia. In: Problems of Archaeology and History of Northern Asia. Tomsk : Agraf-Press, 2009b. Pp. 178–197. (*In Russ.*).

Ozheredov Yu. I., Ganbold M. The Results of the Preliminary Survey of the Buddhist Temple Shar Sum in the Khovd Aimak in Western Mongolia. *Erdem shinzhilgeeniy bichig (Niygem humuunlegiin uhaan) = Research Paper (Social Humanities)*. 2009;2(14):109–116. (*In Russ.*).

Ozheredov Yu. I., Munkhbayar Ch., Ozheredova A. Yu., Tomko V. S. The Results of the Preliminary Territory Survey in the Shar Sum Temple of the Khovd Aimag in Western Mongolia. In: Ethnocultural History of Eurasia: Modern Research and Reconstruction. Barnaul : Azbuka, 2008. Pp. 255–256. (*In Russ.*).

Ozheredova A. Yu., Ozheredov Yu. I. The Porcelain from the Chinese Fortress Khobdo. In: Ancient Cultures of Mongolia and Baikal Siberia. Issue II. Irkutsk : Izd-vo IrGTU, 2011a. Pp. 540–545. (*In Russ.*).

Ozheredova A. Yu., Ozheredov Yu. I. Barunfurayi yiseki shutsudo chugoku tojiki. In: Bulletin of Kotani-dzyo Museum. Osaka : Scientific Research Society of Chinese Porcelain and Kotani Fortress Museum, 2011b. Pp. 1–12. (*In Jap. and Russ.*).

Ozheredova A. Yu., Ozheredov Yu. I. Hobudo chugoku zosai shutsudo tojiki. In: Bulletin of Kotani-dzyo Museum. Osaka : Scientific Research Society of Chinese Porcelain and Kotani Fortress Museum, 2011c. Pp. 15–34 (*In Jap. and Russ.*).

Ozheredova A. Yu., Ozheredov Yu. I. Chinese Porcelain from the Ruins of the Shar Sum Temple Complex in Western Mongolia. In: Ancient Cultures of Mongolia and Baikal Siberia. Ulanbaatar : Izd-vo Mong. gos. un-ta, 2012. Pp. 409–419. (*In Russ.*).

Pozdneev A. Mongolia Chronicle “Erdeni-yin Erike”. Original Text with Translation and Commentaries, Including the Materials on the Khalkha History from 1636 to 1736. St. Petersburg : Tipografiya Imperatorskoj Akademii nauk, 1883. 413 p. (*In Russ.*).

Pozdneev A. Mongolia and the Mongols. The Results of the Travel to Mongolia in 1892–1893. Vol. I: Traveling Journal and the Itinerary in 1892. St. Petersburg : Tipografiya Imperatorskoj Akademii nauk, 1896. 337 p. (*In Russ.*).

Potanin G. N. Essays on the North-West Mongolia. Issue II: Ethnographic materials. St. Petersburg : Tip. V. Kirshbauma, 1881. 90 p. (*In Russ.*).

Potanin G. N. Travels in Mongolia. Moscow : Ob'edinenie gosudarstvennyh knizhno-zhurnal'nyh izdatel'stv, 1948. 483 p. (*In Russ.*).

Printz A. A Trip to Khobdo. *Tomskie Gubernskie Novosti = Tomsk Guberniya News*. 1869;20:8. (*In Russ.*).

Ozheredova A. Yu., Ozheredov Yu. I. Chinese Clay Shaped Vessels from Barun Khurai Tract. In: Ancient Cultures of Northern China, Mongolia and Baikal Siberia. Vol. II. Hohhot : Kexue chubanshe, 2015. Pp. 629–633.

Yin Wei, Yin Weiran. Zhongguo shou wenhua. Kunming : Yunnan renmin chubanshe, 2005. 212 p. (*In Chin.*).

Su Keming. Shou, Shouli, Shouxin — Zhongguo minjian cishou xisu. Chengdu : Sichuan renmin chubanshe, 2009. 209 p. (*In Chin.*).

Johan's Autumn Action Catalogue. Hong Kong : Zhonghan paimai chubanshe, 2018. 246 p. (*In Chin. and Engl.*).

Yu Jiadu. Jiangxi taoci shi. Kaifeng : Henan daoxue chubanshe, 1997. 524 p. (*In Chin.*).

Zhongguo gu taoci tudian. Beijing : Wenwu chubanshe, 1998. 469 p. (*In Chin.*).

Brown R., Sjostrand S. Maritime Archaeology and Shipwreck Ceramics in Malaysia. Kuala Lumpur : Department of Museums and Antiquities, 2004. 118 p.

Gompertz G. Celadon Wares. London : Faber & Faber, 1968. 216 p.

Tek Sing Treasures. Nagel Auktionen. Stuttgart, Germany : Stuttgarter Kunstauktionshaus Dr. Fritz Nagel, 2000. 396 p.

Christie's Amsterdam: The Diana Cargo. Amsterdam : Christie's Amsterdam, 1995. 154 p.

### СПИСОК ИСТОЧНИКОВ

Боголепов М. И., Соболев М. Н. Очерки русско-монгольской торговли. Экспедиция в Монголию 1910 года. Томск : Типография Сибирского тов-ва печат. дела, 1911. 500 с. (Труды Томского общества изучения Сибири. Т. 1).

Вестфален Э. Х., Кречетова К. Н. Китайский фарфор. Л.: Государственный Эрмитаж, 1947. 56 с.

Грубэ В. Духовная культура Китая. Литература, религия, культ. СПб. : Брокгауз-Ефрон, 1912. 251 с.

Грум-Гржимайло Г. Е. Западная Монголия и Урянхайский край. Т. 3. Вып. 1. Антропологический и этнографический очерк этих стран. Л. : Ленинградский Гублит, 1926. 415 с.

Киселев С. В. Древние города Монголии // Советская археология. 1957. №2. С. 91–101.

Курц Б. Г. Русско-китайские отношения в XVI, XVII и XVIII столетиях. Киев : Гос. изд-во Украины, 1929. 158 с.

Ожередов Ю. И. Начало исследований комплекса Шар-Сум в Западной Монголии // Археология Южной Сибири: идеи, методы, открытия. Красноярск : РИО КГПУ им. В. П. Астафьева, 2005а. С. 131–133.

Ожередов Ю. И. О работе комплексной экспедиции Томского государственного университета в 2004 г. в Западной Монголии // Природные условия, история и культура Западной Монголии и сопредельных регионов. Кызыл : Изд-во ТуВИКОПР СО РАН, 2005б. С. 77–81.

Ожередов Ю. И. К истории храмового комплекса Шар-Сум в Западной Монголии // Мир Евразии. 2009а. №2 (5). С. 38–49.

Ожередов Ю. И. Предварительные исследования буддийского храма Шар-Сум в Ховдском аймаке Западной Монголии // Проблемы археологии и истории Северной Азии. Томск : Аграф-Пресс, 2009б. С. 178–197.

Ожередов Ю. И., Ганболд М. Итоги предварительных исследований территории буддийского храма Шар-Сум в Ховдском аймаке Западной Монголии // Эрдэм шинжилгээний бичиг (Нийгэм хумуунлэгийн ухаан). 2009. №2(14). С. 109–116.

Ожередов Ю. И., Мунхбаяр Ч., Ожередова А. Ю., Томко В. С. Итоги предварительных исследований территории буддийского храма Шар-Сум в Ховдском аймаке Западной Монголии // *Этнокультурная история Евразии: современные исследования и опыт реконструкций*. Барнаул : Азбука, 2008. С. 255–256.

Ожередова А. Ю., Ожередов Ю. И. Фарфор китайской крепости Хобдо // *Древние культуры Монголии и Байкальской Сибири*. Вып. 2. Иркутск : Изд-во ИрГТУ, 2011а. С. 540–545.

Ожередова А. Ю., Ожередов Ю. И. Барунфурай изэки шутсудо тьюгоку тодзики (Китайский фарфор на памятниках Барунхура) // *Котанидзё кёдо хакубуцукан киё* (Бюллетень Музея Котани-дзё). Осака : Тьюгоку котодзи тэсакэнкюкай и Котани-дзё кюдокан (Научно-исследовательское общество китайского фарфора и Музей крепости Котани), 2011b. С. 1–12 (на яп. и русс. яз.).

Ожередова А. Ю., Ожередов Ю. И. Кобудо тьюгоку дзосай сюцудо тодзики (Фарфор китайской крепости Хобдо) // *Котанидзё кёдо хакубуцукан киё* (Бюллетень Музея Котани-дзё). Осака : Тьюгоку котодзи тэсакэнкюкай и Котани-дзё кюдокан (Научно-исследовательское общество китайского фарфора и Музей крепости Котани), 2011с. С. 15–34 (на яп. и русс. яз.).

Ожередова А. Ю., Ожередов Ю. И. Китайский фарфор на развалинах монастырского комплекса «Шар-Сум» в Западной Монголии // *Древние культуры Монголии и Байкальской Сибири*. Уланбаатар : Изд-во Монг. гос. ун-та, 2012. С. 409–419.

Позднеев А. Монгольская летопись «Эрдэнийн эрихэ». Подлинный текст с переводом и пояснениями, заключающими в себе материалы для истории Халхи с 1636 по 1736 г. СПб. : Типография Императорской Академии наук, 1883. 413 с.

Позднеев А. Монголия и монголы. Результаты поездки в Монголию в 1892–1893 гг. Т. 1. Дневник и маршрут 1892 года. СПб. : Типография Императорской Академии наук, 1896. 337 с.

Потанин Г. Н. Очерки Северо-Западной Монголии. Вып. II. Материалы этнографические. СПб. : Тип. В. Киршбаума, 1881. 90 с.

Потанин Г. Н. Путешествия по Монголии. М. : ОГИЗ, 1948. 483 с.

Принтц А. Поездка в Хобдо // *Томские Губернские Новости*. 1869. №20. С. 8.

Ozheredova A. Yu. Ozheredov Yu. I. Chinese clay shaped vessels from Barun Khurai Tract // *Древние культуры Северного Китая, Монголии и Байкальской Сибири*. Т. II. Хух-Хото : Кэсюэ чубаньшэ, 2015. С. 629–633.

Инь Вэй, Инь Фэйжань. Чжунго шуо вэньхуа (Культура долголетия в Китае). Куньмин : Юньнань жэньминь чубаньшэ, 2005. 212 с. (на кит. яз.).

Су Кэмин. Шуо, Шоули, Шоусин — Чжунго миньцзянь цишоу сису (Долголетие, Ритуалы долголетия, божество Шоусин — Народная традиция поклонения долголетию в Китае). Чэнду : Сычуань жэньминь чубаньшэ, 2009. 209 с. (на кит. яз.).

Чжунхань цюли паймай тулу (Каталог осеннего аукциона Чжунхань). Гонконг : Чжунхань паймай чубаньшэ, 2018. 246 с. (на кит. и англ. яз.).

Ю Цзяду, Цзянси таоци ши (История керамики провинции Цзянси). Кайфэн : Хэнань дасюэ чубаньшэ, 1997. 524 с. (на кит. яз.).

Чжунго гутаоци тудянь (Иллюстрированная энциклопедия древней керамики Китая). Пекин : Вэньчубаньшэ, 1998. 469 с. (на кит. яз.).

Brown R., Sjostrand S. Maritime Archaeology and shipwreck ceramics in Malaysia. Kuala Lumpur : Department of Museums and antiquities, 2004. 118 p.

Gompertz G. Celadon wares. London : Faber & Faber, 1968. 216 p.

Tek Sing Treasures. Nagel Auktionen. Stuttgart, Germany : Stuttgarter Kunstauktionshaus Dr. Fritz Nagel, 2000. 396 p.

Christie's Amsterdam: The Diana Cargo. Amsterdam : Christie's Amsterdam, 1995. 154 p.

---

#### CONTRIBUTION OF THE AUTHORS/ ВКЛАД АВТОРОВ

---

A. Yu. Ozheredova: data recovery, processing artefacts, analyzing and interpreting technical, historical and cultural characteristics of the artefacts, writing the relevant part of the paper, editing and translating the text.

Ожередова А. Ю.: сбор материала, обработка материала, анализ и интерпретация технических, исторических и культурных характеристик найденных артефактов, написание соответствующего раздела статьи, редакция и перевод текста статьи.

Yu. I. Ozheredov: organization and executing archaeological expeditions that allowed data recovery; conducting historical and archaeological analysis of the studied sites; writing the relevant part of the paper.

Ожередов Ю. И.: организация и руководство археологических экспедиций, в ходе которых осуществлялся сбор материала, обработка материала, историческое и археологическое исследование памятников, написание соответствующего раздела статьи.

There is no conflict of interest / Конфликт интересов отсутствует.

---

#### INFORMATION ABOUT THE AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ

---

**Alina Yur'evna Ozheredova**, Master's Degree, Department of History and Historical Artefacts, College of Humanities and Social Sciences, Feng Chia University, Taichung, Taiwan.

**Ожередова Алина Юрьевна**, мастер кафедры истории и исторических реликвий Института гуманитарных и социальных наук, Университет Фэнчзя, Тайчжун, Тайвань.

**Yuri Ivanovich Ozheredov**, Candidate of Historical Sciences, Researcher, M. K. Ammosov North-Eastern Federal University, Chukotka Branch, Anadyr, Russia.

**Ожередов Юрий Иванович**, кандидат исторических наук, научный сотрудник Северо-Восточного федерального университета имени М. К. Аммосова, Чукотское отделение, Анадырь, Россия.

*The article was submitted 09.07.2022;*

*approved after reviewing 03.08.2022;*

*accepted for publication 16.08.2022.*

*Статья поступила в редакцию 09.07.2022;*

*одобрена после рецензирования 03.08.2022;*

*принята к публикации 16.08.2022.*



Research Article / Научная статья

УДК 903.5(574.4)

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-11](https://doi.org/10.14258/tpai(2022)34(3).-11)

## PRELIMINARY RESULTS OF THE RESEARCH INTO THE SITES OF THE XIANBEI PERIOD IN THE KAZAKH ALTAI

**Zainolla Samashev<sup>1</sup>, Azat Aitkali<sup>2\*</sup>**

<sup>1</sup>Al-Farabi Kazakh National University, Almaty, Kazakhstan;  
archaeology\_kz@mail.ru, <https://orcid.org/0000-0002-7171-3003>

<sup>2</sup>A.H. Margulan Institute of Archaeology, Nursultan, Kazakhstan;  
A7471986103@gmail.com, <https://orcid.org/0000-0002-2476-3999>

\*Corresponding author

**Abstract.** This article is devoted to the preliminary results of the study of the materials obtained during the excavations on the territory of the Kazakh Altai archaeological complex of the Xianbei period at the Berel burial ground. After the fall of the Hunnic Empire, the nomadic association of Xianbei, known from Chinese written sources, had a huge influence on the appearance of the archaeological cultures of Altai. For the first time in Altai, archaeological material concerning this polyethnic community was obtained in the last quarter of the last century. However, for a long time, archaeologists could not identify the Xianbei site from other numerous excavated archaeological sites. For the purpose of detailed cultural and chronological identification, Chinese materials were used, which made it possible to bring the problem of identifying Xianbei sites to a qualitatively new level. On the territory of the Kazakh Altai, the period of intensive study of the Xianbei circle of sites began in 2015, when a series of new funeral and memorial structures was opened. These studies allowed not only expanding the boundaries of this community and, but also putting forward the thesis about the large-scale penetration of the Xianbei in the 3<sup>rd</sup>–4<sup>th</sup> centuries AD into the territory under consideration.

**Key words:** Kazakhstan, Kazakh Altai, Berel burial ground, Xianbei period, funeral and memorial objects

**Acknowledgements:** the work was carried out with the financial support of the Ministry of Culture and Sports of the Republic of Kazakhstan within the framework of program-targeted financing BR10164221 “The Sites of the Kazakh Altai of the Beginning of the 1<sup>st</sup> Millennium AD: the Origins of the Great Migration of Peoples and the Formation of the Ethno-Cultural Structure of Eurasia”

**For citation:** Samashev Z., Aitkali A. Preliminary Results of the Research into the Sites of the Xianbei Period in the Kazakh Altai. *Teoriya i praktika arheologicheskikh issledovaniy = Theory and Practice of Archaeological Research*. 2022;34(3):176–193. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-11](https://doi.org/10.14258/tpai(2022)34(3).-11)

## ПРЕДВАРИТЕЛЬНЫЕ ИТОГИ ИССЛЕДОВАНИЯ ПАМЯТНИКОВ СЯНЬБИЙСКОГО ВРЕМЕНИ В КАЗАХСКОМ АЛТАЕ

Зайнолла Самашев<sup>1</sup>, Азат Айткали<sup>2\*</sup>

<sup>1</sup>Казахский Национальный университет имени аль-Фараби, Алматы, Казахстан;  
archaeology\_kz@mail.ru, <https://orcid.org/0000-0002-7171-3003>

<sup>2</sup>Институт археологии имени А.Х. Маргулана, Нур-Султан, Казахстан;  
A7471986103@gmail.com, <https://orcid.org/0000-0002-2476-3999>

\*Автор, ответственный за переписку

**Резюме.** Статья посвящена предварительным результатам изучения материалов, полученных в ходе раскопок на территории Казахского Алтая археологического комплекса сяньбийского времени на могильнике Берел. Как известно, после падения Хуннуской империи огромное влияние на облик археологических культур Алтая оказало кочевое объединение Сяньби, известное по китайским письменным источникам. Впервые на Алтае археологический материал относительно этой полиэтнической общности был получен в последней четверти прошлого столетия. Однако долгое время археологи не могли определить памятники, принадлежащие собственно сяньбийским племенам, из числа многих раскопанных археологических объектов. С целью детальной культурно-хронологической идентификации привлекались китайские материалы, позволившие вывести проблему отождествления сяньбийских памятников на качественно новый уровень. На территории Казахского Алтая период интенсивного изучения сяньбийского круга памятников начался с 2015 г., когда была открыта серия новых погребально-поминальных сооружений. Эти исследования позволили не только расширить границы данной общности, но и выдвинуть тезис о масштабном проникновении сяньбийцев в III–IV вв. н.э. на рассматриваемую территорию.

**Ключевые слова:** Казахстан, Казахский Алтай, могильник Берел, сяньбийское время, погребально-поминальные объекты

**Благодарности:** работа выполнена при финансовой поддержке Министерства культуры и спорта Республики Казахстан в рамках программно-целевого финансирования BR10164221 «Памятники Казахского Алтая начала I тыс. н.э.: истоки Великого переселения народов и формирования этнокультурной структуры Евразии».

**Для цитирования:** Самашев З., Айткали А. Предварительные итоги исследования памятников сяньбийского времени в Казахском Алтае // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 176–193. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-11](https://doi.org/10.14258/tpai(2022)34(3).-11)

### Introduction

Presented in article materials belong to one of the most understudied periods in archaeology of Central Asia — Xianbei period. Our research allowed not only finding evidence of the presence of the Xianbei layer in the territory of Kazakhstan, but also helped to expand borders of this community. Archaeological work of recent years shows that this association of nomadic tribes in the first half of the 1<sup>st</sup> millennium AD penetrated into the upper reaches of the Bukhtarma River and settled partially in the southwestern periphery of the Altai.

Practically from the moment of the first scientific research, since 1998, within the barrow space of the elite sites of Berel burial ground we documented Xianbei burial and memorial objects. Initially, they were dated to the Early Turkic periods, but later it turned out that they correlate with the circle of burials of the Xianbei time (Samashev, Kariev, Erbolatov, 2019).

Taking into account the fact that in the domestic scientific developments until now there was no such concept and direction of the search, we for the first time initiated investigations by wide areas at the Berel burial ground. At the same time, there was a need for a more thorough analysis of earlier (pre-2015) research materials, which were attributed to the Early Medieval epoch, for chronological and ethnocultural attribution (Samashev, 2011).

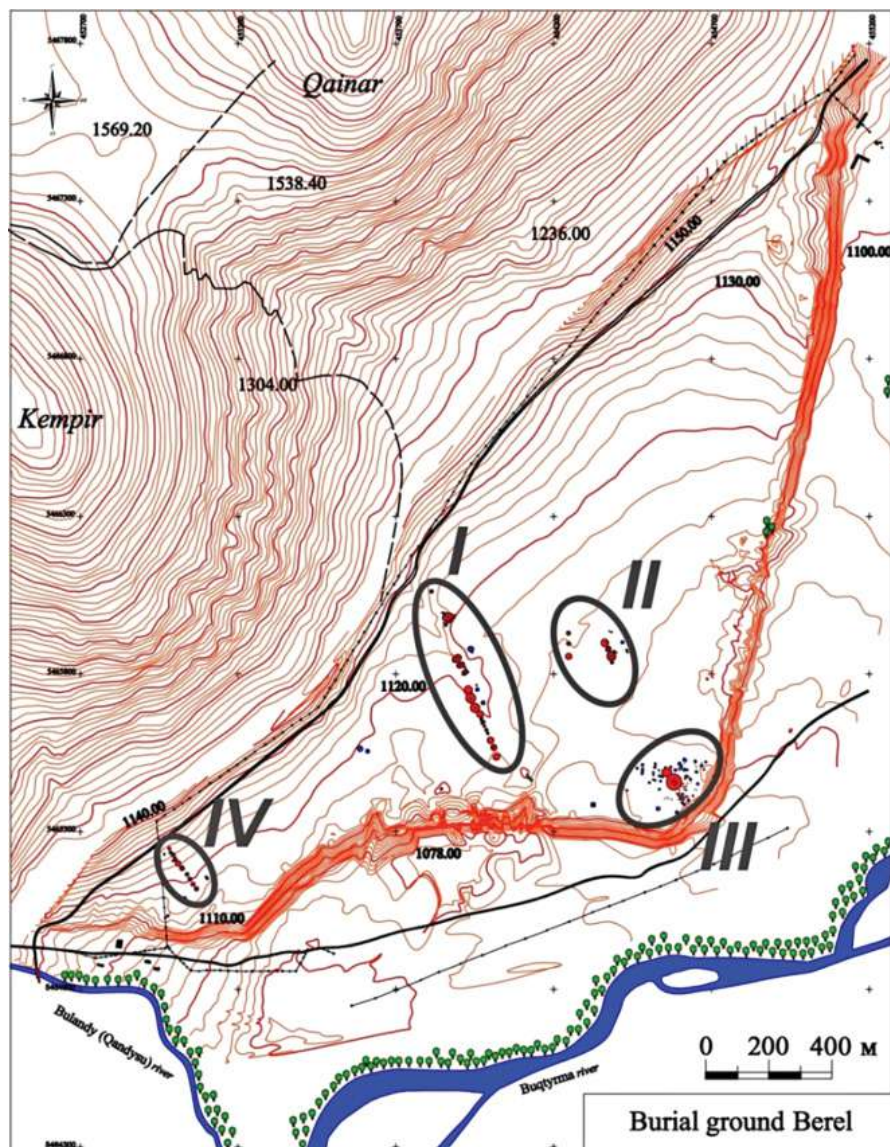


Fig. 1. Berel. Topoplan with the designation of the main groups of funerary and memorial sites

Рис. 1. Берел. Топоплан с обозначением основных групп погребально-поминальных объектов

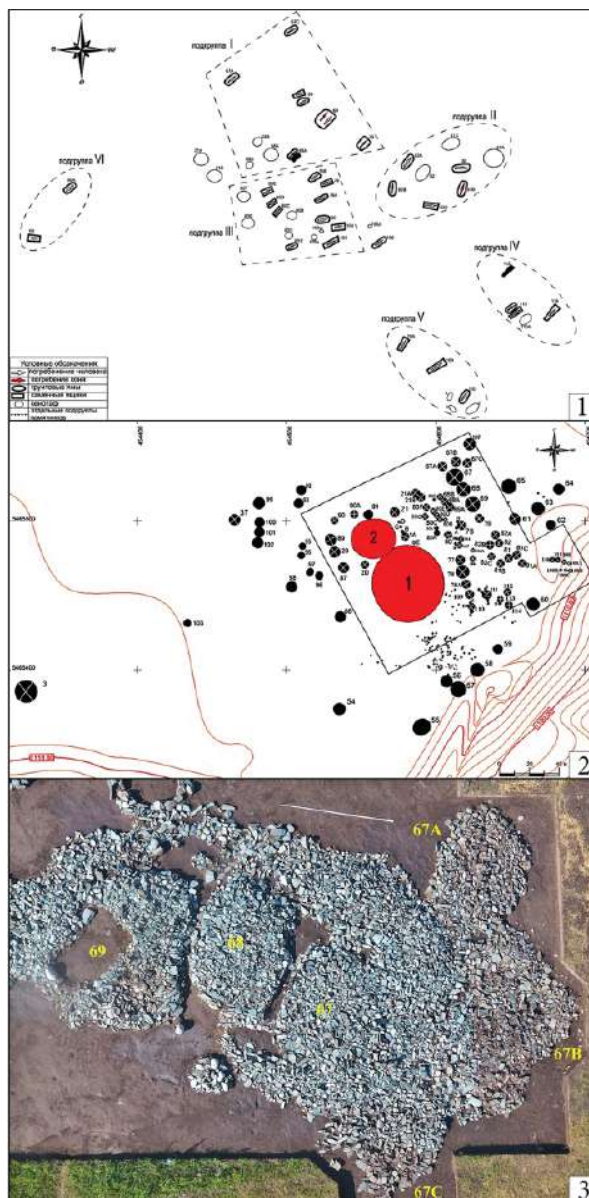


Fig. 2. Berel: 1 – schematic plan with the designation of the main groups of funerary and memorial monuments; 2 – the plan of the third group of monuments, where the bulk of the objects of the Xianbeian period are concentrated; 3 – mounds of funerary and memorial objects of the Xianbeian time

Рис. 2. Берел: 1 – схематический план с обозначением основных групп погребально-поминальных объектов; 2 – план третьей группы памятников, где сконцентрирована основная масса объектов сяньбийского периода; 3 – насыпи погребально-поминальных объектов сяньбийского времени

It is known that a number of burials of that time in Altai, in particular, the Berel cemetery was united by A. A. Gavrilova (1965, p. 54–57) into the Berel grave type and dated it to the 4<sup>th</sup>–5<sup>th</sup> centuries AD. A stable rite of burial with a horse and predominantly latitudinal (eastward) orientation of the buried are distinguishing features of these graves. It should be pointed out that on the basis of finds of three-fingered arrowheads with horny tips-whistles and also of bone girth buckles with a rounded upper part, the Berel complex was close to the Early Turkic time, and the absence of the stirrup in the burials was the ground for its homogenization (Savinov, 1984, p. 29–30). Now the question of ethno-cultural attribution of Berel graves is still open.

As it has already been said, the bulk of the funeral and burial sites of the Xianbei time of Berel, identified to date, is situated around two “king” barrows (№1 and №2) of the Pazyryk time, at the tip of the third terrace above the floodplain of the Bukhtarma river (Fig. 1, 2.-1). According to preliminary calculations, because of archaeological works on the burial ground, a total of 55 objects was uncovered by a continuous excavation. From them 35 burials, 20 ritual excarnations which by characteristic elements of ceremonialism and accompanying inventory, are related to the Xianbei time. It should be noted that due to the limited scope of the publication in the article presented materials only some investigated objects. In general, the obtained archaeological sources provide an opportunity to identify features of similarity and difference of the studied objects to restore certain aspects of the development of material and spiritual culture of the ancient population of the southwestern Altai historical period under study.

#### **Materials and interpretation of the materials**

The tradition of compact placement of funerary objects within separate groups probably reflects their chronological proximity and is characteristic of many Altai burial grounds of Xianbei time (Tishkin, Matrenin, Shmidt, 2018). In general, spatial organization in the form of dense concentration of structures on the territory of the cemetery, arrangement of objects in close rows is a feature which is recorded in synchronous monuments of Mongolia, Transbaikalia, Tessin culture of Khakassia, Kokel and Ulug-Khem culture of Tuva (Fig. 2.-2).

Near-burial objects are represented by ritual layouts, often oval and less often rounded, circular ground structures with ground filling of inner space. Necropolis gravestones are represented by sub-square, sub-circular, oval, rectangular-shaped stone outcrops in one or three layers (Fig. 2.-3). Under the embankments, ground structures of rectangular, sub-square, oval shape are documented (Fig. 3.-1). The latter predominate and are oriented with long axis in east-west direction. In the centre of the above-ground structures, there was usually one oval or rectangular pit, long axis oriented also in latitudinal direction with different deviations.

Burial chambers mainly without additional intra-burial structures, simple shallow ground pits, stone boxes with and without overlapping, imitation stone slab boxes, occasional remnants of wooden wall lining, in one case in a wooden pit (c. 108 A) were documented most often. The presence of a deep under-floor cavity has only been recorded in one case, under the embankment of Site 13A.

Burials of people are made on a rite of single inhumation, only in one of barrows there was a pair burial (k. 68). The buried persons most often lay stretched out on their backs, sometimes with their knees slightly bent on their sides with their legs outstretched, rarely slightly bent. In barrow 76, the corpse was placed on the right side. The heads of the buried per-

sons are usually oriented in the eastern sector with slight deviations, most often to the north. However, in three barrows the buried were oriented in the opposite direction in the western (k. 2D, 90 A) and north-western (k. 90) directions. Probably, the coexistence of several traditions in the orientation of the burials indicates the interaction of several ethno-cultural groups within a single association.



Fig. 3. Berel: 1 – fences of funerary and memorial objects of the Xianbeian time; 2 – burial 113; 3 – burial 108A

Рис. 3. Берел: 1 – ограды погребально-поминальных объектов сяньбийского времени; 2 – ограда 113; 3 – ограда 108А



Fig. 4. Berel. Burial 69. Paired burial of people accompanied by two horses

Рис. 4. Берел. Ограда 69. Парное погребение людей в сопровождении двух лошадей



Fig. 5. Berel. The subject complex of burials of the Xianbeian time: 1, 2, 5, 6, 9 – burial 81; 3, 7 – burial 108A; 4 – burial 21; 8 – burial 109; 10–15 – bone tubes from burials of the Xianbeian time; 16–20 – decorations from the burials of the Xianbeian period (16 – burial 109; 17, 19, 20 – burial 81; 18 – burial 68)

Рис. 5. Берел. Предметный комплекс погребений сяньбийского времени: 1, 2, 5, 6, 9 – ограда 81; 3, 7 – ограда 108А; 4 – ограда 21; 8 – ограда 109; 10–15 – костяные трубочки из погребений сяньбийского времени; 16–20 – украшения из погребений сяньбийского времени (16 – ограда 109; 17, 19, 20 – ограда 81; 18 – ограда 68)



In the six burials (k. 69, 69A, 81 B, 108, 108A, 113) of the necropolis, there was an accompanying burial of a high horse, laid down at the same level, on top, behind the northern wall to the right of the man (Fig. 3.-2, 3). The direction of the head of the riding horses coincided with the orientation of the buried people (Fig. 4). The tradition of inhumation with a horse in Altai has its origins in the Scythian-Saxon time and may be connected with the heritage of the Pazyryk culture. There is no consensus among scholars as to the identity of horse burials. However, most researchers tend to think they were left by the Tele tribes, or by the early Turks themselves.

About 20 cenotaphs have been identified in the necropolis. Separate ritual structures with the horse carcass were found in 5 cases (k. 21, 82B, 79, 76A, 67C). Thus, under fence No. 21 the presence of a deep undermining was established. Among the bones of two horses a fragment of a mirror of Han time made of various metal alloy and ornamented with so-called pointed ribbon, spiral and other motives was found (Fig. 5.-4). The Chinese mirrors give precise chronological reference points but at the same time they are known to have been in use for a very long time. For example the fragment of the mirror in the Hermitage with the same ornamental motifs is dated by the 3<sup>rd</sup> century BC (Lubo-Lesnichenko, 1975, p. 38, fig. 3). In terms of metal composition (copper-tin-lead alloy) and ornamental motifs let us mention a fragment of a Chinese mirror from barrow No. 52 from the Yaloman II site in the Altai Mountains, which is dated to the 2<sup>nd</sup>-1<sup>st</sup> centuries BC (Tishkin, Khavrin, 2006, p. 82–84; Tishkin, Seregin, 2011, p. 44). It is possible that Berel specimen is a late copy of the Hun mirror.

As a whole new sources obtained during field works find direct analogies in materials from the sites in Transbaikalia, Southern Siberia and neighboring Altai territories. Some finds have analogies only in Transbaikalia and may indicate foreign cultural components within the Berel burial ground, not related to the autochthonous population. From this it becomes clear to what extent an anthropological study of the bone remains from the burials is relevant.

**Anthropological series** with descriptions of craniological, osteometric, paleopathological, morphological features, as well as sex and age determinations have been carried out by anthropologists (Kitov and Kitova, 2018, pp. 233–268). The series originating from the burials adjoining the barrows of the Pazyryk culture can be divided into two main groups. Apparently the representatives of the first group are descendants of the Saks of Eastern Kazakhstan. They are characterized by a short and broad, high skull, wide and high face, medium broad, high nasal bones, strongly projecting in profile, and flattening or tending to flattening on horizontal levels. The other group — does not form any unity, and, characterizing the involvement of the South Siberian, Mongolian and Baikal populations in the general eastward migration flow to the Altai territory”.

Along with the anthropological material, in spite of the general similarity of the objects of the material complex, the heterogeneity of the ethnical composition of the burial site is shown by the specificity of the funerary constructions and the burial rites. More specifically, the orientation of the buried, the facts of the interment in a simple earth pit, in a stone box, in a wooden pit, accompanied by a horse, either separately, or next to or above a man.

The Chinese written sources briefly describe the burial rites and beliefs of the Xianbei. They state that the Xianbei like Wuhuan buried in coffins, together with the dead they burnt their personal belongings and their horse. Many similarities between Xianbei and other Cen-

tral Asian nomads can be seen. For example, the Xianbei people sacrificed to the sky various animals bulls, rams and dogs to rivers, earth, some heavenly bodies, and also to dead chiefs in the eastern temple (Dashkovsky and Meikshan, 2014, p. 31–32). The souls of dead relatives, according to their beliefs, were sent to Chishan mountain (Kryukov et al., 1983, p. 62).

It is difficult to judge about *social stratification* of the society of the Xianbei era based on the materials of the Berel burial ground. Analysis of the materials of the studied sites showed that burial rites were a secondary indicator of the social significance of the burials. The main criterion for determining the social status of the buried was the accompanying items, which could be used as a basis for determining the degree of social significance. In its turn, the socially significant object complex consisted of weapons, human equipment, ammunition of a riding horse, tools and household items (Fig. 5.-1–15). Thus, all the studied objects of the Berel necropolis can be divided into three conventional categories: uninventory, with scarce inventory and conditionally rich.

It is known from written sources that in the 2<sup>nd</sup> century AD the Xianbei had noble and less noble families. From the biography of the Xianbei chief Kebinen, it is clear that the origin was of great importance. Sources say that Kebinen came from a lowly, lowly clan. Besides, starting from Tangshihuai, all rulers (dazhen) passed power by inheritance (Kichanov, 2010, p. 70). Among the investigated monuments of Berel, dated to the period of Xianbei dynasty, the sites 81 and 109 are remarkable for the richness of accompanying artifacts, where women are buried, probably belonging to the elite of the society.

Fence 81 is situated 30 m to the north of the large Berel barrow. Prior to excavation it was a small raised mound, insignificantly prominent in the surrounding landscape. A female burial was found in a simple earth pit, beneath a stone lining, on the back, with the head oriented to the east. The accompanying inventory is represented by an interesting set of costume decorations: a silver plate embossed all round, a diadem, silver wire earrings with inserted stones, beads of coloured stones, gold neck pendants, a cosmetic brush, large discs of limestone material, a comb, amulets of predator's teeth and silver discs with embossments, etc. (Fig. 5.-16–20).

Fence 109 had a rectangular ground structure at its base. A shallow grave pit with a stone box at the bottom was revealed in the centre of the fence. The construction is made of stone slabs, set on the rib, the box narrowed towards the feet of the buried person. The inventory is represented by an oval gold pendant richly decorated with grains and with an inlay of a red stone (a type of garnet?), fragments of a headdress in the form of remains of organics, silver plates and patches. In addition, bronze bracelets on both hands, a cowrie shell, an animal fang twisted into silver wire, paste beads and other articles of iron were found (Fig. 5.-8).

From the fence's object complex 109, interesting from cultural-chronological point of view, is an article executed in polychrome style (Fig. 5.-16). This find can be attributed to the early stage of polychrome style development, the initial centre of which is probably associated with the Northern Chinese-Mongolian region (Samashev, 2021, p. 76).

**Armament complex.** When solving the problems of relative dating and ethnocultural attribution of the sites of the Xianbei period, of particular importance is the analysis of armament and warfare in the context of funerary-memorial ritualism and the totality of other categories of material culture objects, which come from the Berel funerary-memorial sites of the considered cultural-chronological horizon.

It is known from written sources and archaeological materials that with the help of a more advanced complex of battle media in the 1<sup>st</sup> c. AD Xianbei were able to defeat the Hunnu and create their own nomadic union. The Chinese chroniclers, emphasizing the superiority of the Xianbei in the complex of weapons, stressed that their “weapons are sharper and horses are faster than those of the Huns” (Bichurin, 1950, p. 157).

In the areas adjacent to the Kazakh Altai, in the excavated burial sites of the Xianbei was found a considerable quantity of protective armament, weaponry of distant and close combat. The analysis of the whole complex showed that, unlike the Huns, the Xianbei had more developed melee weapons (Soenov, 2017) and especially high level of defensive means reached. Besides, lightly armed Xianbei riders used smaller bows with reinforced kibiti shoulders with shoulder pads to increase their range. Another distinguishing feature of Xianbei archers is that they most often used double-bladed and flat iron arrowheads. The latter were inferior to Hunns' arrows in accuracy, but were more effective in flying speed at short distances (Nikonorov and Khudyakov, 2004, p. 140; Bobrov and Khudyakov, 2005; Gorbunov, 2005).

A modest but interesting set of weapons for lightly armed equestrian warriors engaged in offensive ranged and close combat was developed from Berel fencing. Among the weapons we should note two three-blade petiolate and one long iron arrowhead from 40A fence (Fig. 7.-2, 4, 5).

Another long-shaped arrowhead was found accidentally in the area of the Berel burial ground. Both spearheads are typologically close, but they differ in details: the upper tier of the specimen from the excavation No. 40A is short, and the other is excessively long, and the parameters of the lower tiers correspond to this. The second arrowhead has a very short bottom tier, which could be used as a stabilizer. This type of arrowheads can be attributed to the category of the armour-piercing ones, they are intended for shooting at the long distance and must be calculated for the accuracy of hitting the target (Khudyakov, 2005, p. 23).

The end pieces on the bow were found in most of the burial sites of the Xianbei, so let us mention only some of them (Fig. 6.-1, 2). The most expressive category of findings from two Berel fences (69A, 81B) should be considered two sets of long and narrow bow-shaped bone plates with arched notches, which belong to the Hunnish type, therefore they are important cultural-chronological and ethnic indicators. One iron arrowhead with a flat triangular-rhombic feather comes from enclosure 81.

In terms of reconstruction of peculiarities of the Xianbei ceremonial practice, some interest is caused by the fact that in fence 81B the bow is located in a separate horse burial, without a man, and in fence 69A — on top of the stone box, under the ceiling. Also noteworthy is the fact that the bone plates on the bow in the grave pit were placed in accordance with the “part instead of whole” principle. Thus, in enclosure 81B, there was no second endpiece, and in another enclosure only one endpiece of the bow was overlaid. On the inner side of one of the end-plates there is a black stain, presumably from varnish. It is known that Xianbeians of Northern Wei dynasty (Toba, IV–V centuries) practiced covering bows with black lacquer (Bobrov, Khudyakov, 2005, p. 109).

Among materials attributed by different authors to the Xianbei period there are also short end plates on the bow. Similar overlays are also known among Berel materials (Samashev, 2011, p. 107). Based on the analysis of the totality of the material complex, we originally attributed

them to Early Turkic time. There are wide median overlays and narrow short ones, with trapezoidal broadened ends, which come from the same 81B fence. An interesting set of weapons, consisting of three bone and one iron arrowhead, was found in fence 90 (Fig. 6.-3; 7.-1–8).



Fig. 6. Bere.: 1 – the lining of the bow from the burials of the Xianbeian time; 2 – overlays on the bow with slotted lines; 3 – burial 90

Рис. 6. Берел: 1 – накладки на лук из погребений сяньбийского времени; 2 – накладки на лук с прорезными линиями; 3 – ограда 90

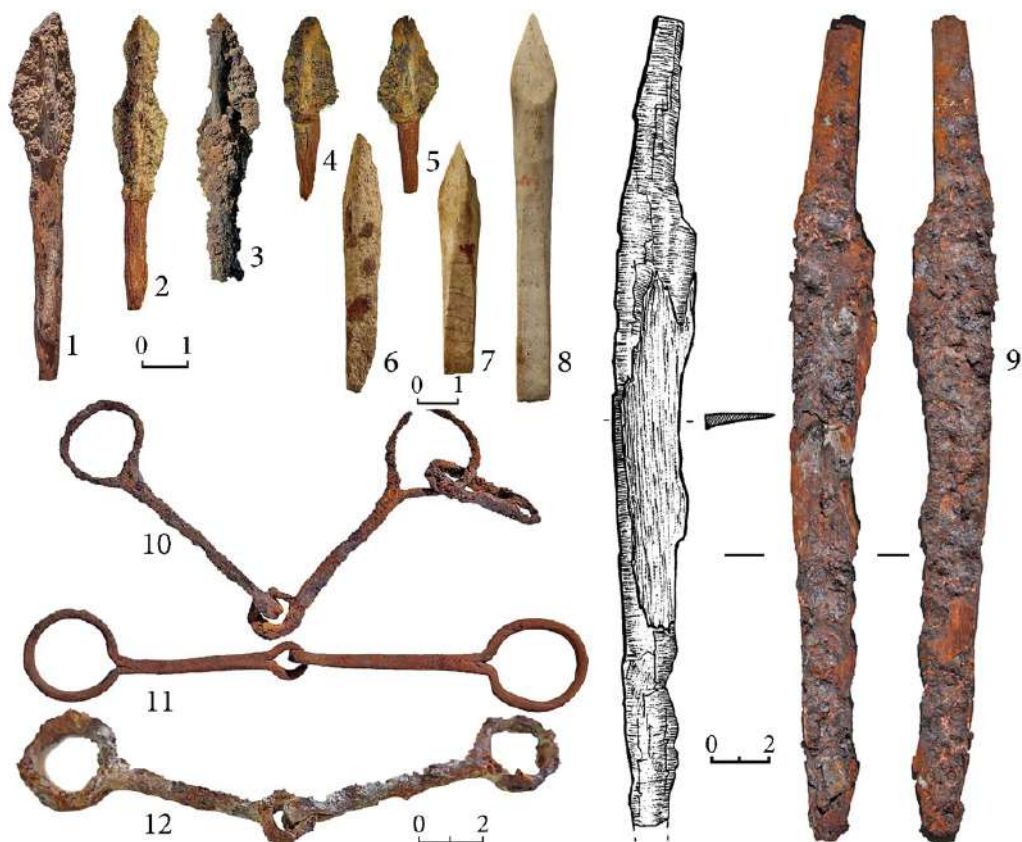


Fig. 7. Berel. Arrowheads from burials of the Xianbeian period: 1, 6–8 – burial 90; 2, 4, 5 – burial 40A; 3 – burial 81. An iron dagger: 9 – burial 82A. Bits from the burials of the Xianbeian time: 10 – burial 82B; 11 – burial 21; 12 – burial 67C

Рис. 7. Берел. Наконечники стрел из погребений сяньбийского времени: 1, 6–8 – ограда 90; 2, 4, 5 – ограда 40А; 3 – ограда 81. Железный кинжал: 9 – ограда 82А. Удила из погребений сяньбийского времени: 10 – ограда 82В; 11 – ограда 21; 12 – ограда 67С

Besides weapons of remote combat we should mention the find of a massive iron single-bladed “dagger-knife” at the waist of a man buried in an elongated position, with his head to the east, in a shallow ground grave pit within a rounded stone setting 82A, the initial structure of which, like at all other monuments of the period under study, was based on a stone fence. The tip of the dagger is broken off, the broad back of the weapon is slightly curved towards the blade, the hilt is noticeably oblique (Fig. 7.-9). The length of the weapon is about 30 cm, the hilt is 6–7 cm long and 2–3 cm wide. There was also a small iron knife beside the man’s skeleton.

Among the Berel findings of V.V. Radlov’s finds include bone plates on a bow, iron arrowheads, armour plates, as well as two broadswords, one with a ring-shaped tip and a clearly marked crossguard, while the other is represented in fragments. The enumerated types

of weapons testify that the population of the investigated time used some types of protective armament and, naturally, that heavy-armed elite units were part of their cavalry (Khudyakov, 2005, p. 50, fig. XII; Gorbunov, 2005, p. 200–223). It is also clear that lightly armed cavalry was the main nucleus of the Xianbei troops throughout their history. Other similar finds are known in Altai region, which researchers connect with the influence of Xianbei on the development of armament and military affairs of the local population (Soenov, 2017, p. 149).

**Items of horse equipment.** The achievements of the Xianbei in the field of military affairs were adopted and modernised by medieval ethnic groups, including the Juan-Juan and the Turks. The area where for the first time appeared a saddle with a rigid frame, one sided sling and stirrups for mounting a heavily armed rider, is associated by some scientists with the contact areas between the Xianbei and Korea and China (Khudyakov and Yu Su-Hua, 2005, p. 59).

In the context of development of military activities and generally the culture of nomadic peoples of the Middle Ages some items of horse equipment, originating from Berel horse trappings, should also be noted. For example, in the grave hole of fence 67A a massive bone buckle (7,1×3,4–4,2 cm, thickness 0,3–0,7 cm) was found next to a buried adult obviously belonging to a cinch belt, which by its shape and the presence of a fixed tongue on the outer arch and two cross slits for fastening the corresponding belt ends obviously has an archaic appearance characteristic of the previous Pazyryk time.

At the same time, the very staking-fence 67A, closely adjoining the main system of structurally identical “Xianbei” sites, by the time of erection (and by the method of burial) clearly gravitates to the latter. Another, category of equestrian equipment — iron shod bridles originate from several enclosures. The bridles from a single horse burial in fence 82B (Fig. 7.-10) belong to the classical type of two rectangular in cross-section links, connected by hook-shaped bent ends.

The ring-shaped end of one link has an oblong, thin, rectangular in cross-section with rounded corners and a loop for attaching the reins. Other well-preserved bridles with similar characteristics, but without additional rims on the ring-shaped ends of the links, were found among the stones of the fence structure, which did not contain a grave pit (Fig. 7.-11). Iron bridles with ringed ends were also found in fence 67C (Fig. 7.-12). Note that wrought-iron bridles of similar design are known in Altai, among the materials from the Verkh-Uymon burials (Soenov, 2000, fig. 7.8 and 10.6).

### Conclusion

The chronological arrangement of the materials from the Berel plots-figures, as a whole, fit in the extended framework of the so-called “Great Migration” epoch (the 2<sup>nd</sup> century BC — 5<sup>th</sup> century AD). The latter is confirmed by the dates of radiocarbon analysis of the bone from the burial 68 (Fig. 8). It is also necessary to take into account the possible influence on the formation of ethno-cultural aspect of the Kazakh Altai population of various contacts and interactions with the carriers of synchronous cultures from the Altai mountain system and the Southern Siberia (Tashtyk, Kokpash, Bulan-Koba and others) and of course with the events in the ancient Chinese kingdoms. For example, the Han dynasty (206 BC — 220 AD), the Three Kingdoms period (220–280 AD), the Jin dynasty (265–316 AD) and further, up to the Tang dynasty, which, as many believe, had Syanbi origin.

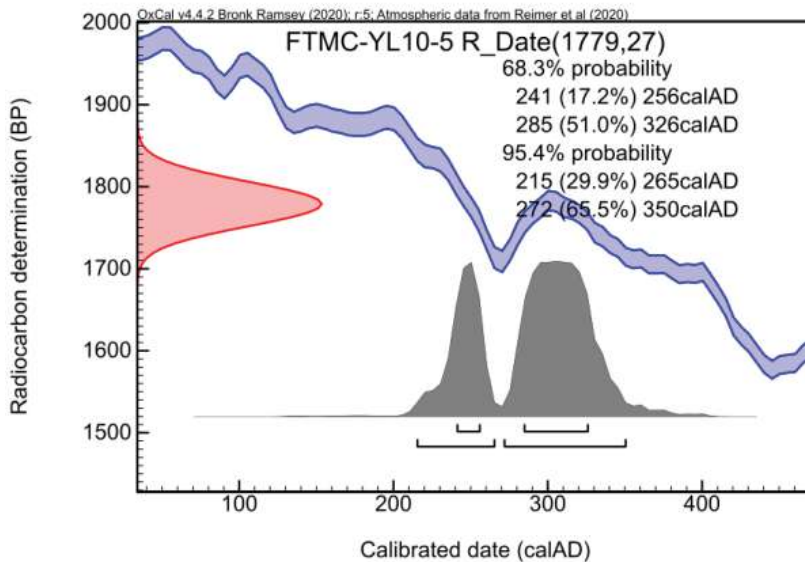


Fig. 8. Berel. Burial 68. Results of radiocarbon analysis

Рис. 8. Берел. Ограда 68. Результаты радиоуглеродного анализа

The considered cultural-chronological horizons in the future need to be substantiated and argued more deeply, using a set of the newest archaeological, anthropological data, written and other sources, as well as to develop clear criteria for their delineation. This procedure requires a search for new archaeological evidence.

For the moment, materials of excavation are at a stage of comprehension, more firm substantiation of all that is said is a matter of the nearest time. Currently, the materials of Berel necropolis available to us, allow raising the question of distinguishing an intermediate between the Hun and Old Turkic periods — the Xianbei cultural and chronological horizon.

## REFERENCES

Bichurin N. Ya. Collection of Information about the Peoples who Lived in Central Asia in Ancient times. Moscow; L. : Izd-vo AN SSSR, 1950. T. I. 382 p. (*In Russ.*)

Bobrov L. A., Khudyakov Yu. S. Military Affairs of the Xianbei States of Northern China the 4<sup>th</sup>–6<sup>th</sup> Centuries AD. In: Warfare of the Nomads of Central Asia in the Xianbei Era. Novosibirsk : B.i., 2005. Pp. 80–199. (*In Russ.*)

Gavrilova A. A. Burial Ground Kudyrge as a Source on the History of the Altai Tribes. Moscow; Leningrad : Nauka, 1965. 145 p. (*In Russ.*)

Gorbunov V. V. Xianbei Armor. In: Warfare of the Nomads of Central Asia in the Xianbei era. Novosibirsk : B.i., 2005. Pp. 200–223. (*In Russ.*)

Dashkovsky P. K., Meikshan I. A. Religious landscape of Western Siberia and Adjacent Regions of Central Asia. Late Antiquity — the Beginning of the Twentieth Century. Barnaul : Izd-vo Alt. un-ta, 2014. Vol. 1. 214 p. (*In Russ.*)

Kitov E. P., Kitova A. O. Report on the Study of Bone Remains from the Berel Burial Ground Using the Methods of Physical Anthropology. In: Report on the Topic “The Sites of the Sakas and Xianbeis of the Kazakh Altai” for 2018. Archive GIKZM “Berel”, 2018. 276 p. (*In Russ.*)

Kryukov M. V., Perelomov L. S., Sofronov M. V., Cheboksarov N.N. The Ancient Chinese in the Era of Centralized Empires. Moscow : Nauka, 1983. 410 p. (*In Russ.*)

Kychanov E. I. History of Ancient and Medieval States Bordering China (from the Huns to the Manchus). 2<sup>nd</sup> ed. St. Petersburg : Peterburgskoe lingvisticheskoe obshchestvo, 2010. 364 p. (*In Russ.*)

Lubo-Lesnichenko E. I. Imported Mirrors from the Minusinsk Basin. On the Issue of External Relations of the Ancient Population of Southern Siberia. Series: Culture of the Peoples of the East. Moscow : Nauka, 1975. 170 p. (*In Russ.*)

Nikonorov V. P., Khudyakov Yu.S. “Whistling Arrows” by Maodun and “Mars Sword” by Attila: Warfare of Asian Xiongnu and European Huns. St. Petersburg : Peterburgskoe vostokovedenie, 2004. 320 p. (*In Russ.*)

Savinov D. G. The Peoples of Southern Siberia in the Ancient Turkic Era. Leningrad : Izd-vo LGU, 1984. 174 p. (*In Russ.*)

Samashev Z. Berel. Almaty : Tajmas, 2011. 236 p. (*In Russ.*)

Samashev Z. Once Again about the Objects with Stone Ridges. *Vestnik KazNU. Seriya istoricheskaya = KazNU Bulletin. Historical Series.* 2021;102(3):81–92 (*In Russ.*)

Samashev Z., Kariev E.M., Erbolatov S.E. Xiongnu-Xianbei Cultural and Chronological Horizon of Berel. In: Margulan Readings-2019: Materials of the International Archaeological Scientific and Practical Conference Dedicated to the 95<sup>th</sup> Anniversary of the Birth of the Outstanding Kazakh Archaeologist K.A. Akisheva. Nur-Sultan : B.i., 2019. Pp. 385–393. (*In Russ.*)

Soenov V.I. The Results of Excavations at the Verkh-Uimon Burial Ground in 1999. In: Antiquities of Altai. Proceedings of the Laboratory of Archaeology of Gorno-Altai : GAGU, 2000. No. 5. Pp. 48–62. (*In Russ.*)

Soenov V.I. Finding of an Iron Broadsword in Altai // Preservation and Study of the Cultural Heritage of the Altai Territory. Barnaul : Izd-vo Alt. un-ta, 2017. Issue XXIII. Pp. 142–150. (*In Russ.*)

Tishkin A. A., Matrenin S. S., Schmidt A. V. Altai in the Syanbi-Zhuzhan Time (Based on the Materials of the Stepushka Site). Barnaul : Izd-vo Alt. un-ta, 2018. 368 p. (*In Russ.*)

Tishkin A. A., Seregin N. N. Metallic Mirrors as a Source on the Ancient and Medieval History of Altai (Based on the Materials of the Museum of Archaeology and Ethnography of Altai, Altai State University). Barnaul : Azbuka, 2011. 144 p. (*In Russ.*)

Tishkin A. A., Khavrin S. V. The Use of X-ray Fluorescence Analysis in Archaeological Research. In: Theory and Practice of Archaeological Research. Barnaul : Izd-vo Alt. un-ta, 2006. Issue 2. Pp. 74–86. (*In Russ.*)

Khudyakov Yu. S. Armament of the Central Asian Nomads in the the 2<sup>nd</sup> –5<sup>th</sup> centuries AD. In: Military Affairs of the Nomads of Central Asia in the Xianbei Era. Novosibirsk : B.i., 2005. Pp. 19–55. (*In Russ.*)

Khudyakov Yu. S., Yu Su-Hua. The Role of the Xianbei in the Development of the Weapons of the Nomads of Central Asia. In: Equipment of the Nomads of Eurasia. Barnaul : Izd-vo Alt. un-ta, 2005. Pp. 55–59. (*In Russ.*)



## СПИСОК ИСТОЧНИКОВ

Бичурин Н. Я. Собрание сведений о народах, обитавших в Средней Азии в древние времена. М.; Л. : Изд-во АН СССР, 1950. Т. I. 382 с.

Бобров Л. А., Худяков Ю. С. Военное дело сяньбийских государств Северного Китая IV–VI вв. н.э. // Военное дело кочевников Центральной Азии в сяньбийскую эпоху. Новосибирск : Б.и., 2005. С. 80–199.

Гаврилова А. А. Могильник Кудыргэ как источник по истории алтайских племен. М.; Л. : Наука, 1965. 145 с.

Горбунов В. В. Сяньбийский доспех // Военное дело кочевников Центральной Азии в сяньбийскую эпоху. Новосибирск : Б.и., 2005. С. 200–223.

Дашковский П. К., Мейкшан И. А. Религиозный ландшафт Западной Сибири и сопредельных регионов Центральной Азии. Поздняя древность — начало XX в. Барнаул : Изд-во Алт. ун-та, 2014. Т. 1. 214 с.

Китов Е. П., Китова А. О. Отчет об исследованиях костных останков из могильника Берел методами физической антропологии // Отчет по теме «Памятники саков и сяньбийцев Казахского Алтая» за 2018 год. Архив ГИКЗМ «Берел», 2018. 276 с.

Крюков М. В., Переломов Л. С., Софронов М. В., Чебоксаров Н. Н. Древние китайцы в эпоху централизованных империй. М. : Наука, 1983. 410 с.

Кычанов Е. И. История приграничных с Китаем древних и средневековых государств (от гуннов до маньчжуров). 2-е изд. СПб. : Петербургское лингвистическое общество, 2010. 364 с.

Лубо-Лесниченко Е. И. Привозные зеркала Минусинской котловины. К вопросу о внешних связях древнего населения Южной Сибири. Серия: Культура народов Востока. М. : Наука, 1975. 170 с.

Никоноров В. П., Худяков Ю. С. «Свистящие стрелы» Маодуня и «Марсов меч» Атитлы: Военное дело азиатских хунну и европейских гуннов. СПб. : Петербургское востоковедение, 2004. 320 с.

Савинов Д. Г. Народы Южной Сибири в древнетюркскую эпоху. Л. : Изд-во ЛГУ, 1984. 174 с.

Самашев З. Берел. Алматы : Таймас, 2011. 236 с.

Самашев З. Еще раз об объектах с каменными грядками // Вестник КазНУ. Серия историческая. 2021. Т. 102, №3. С. 81–92.

Самашев З., Кариев Е. М., Ерболатов С. Е. Хунну-сяньбэйский культурно-хронологический горизонт Береля // Маргулановские чтения-2019: материалы Международной археологической научно-практической конференции, посвященной 95-летию со дня рождения выдающегося казахстанского археолога К. А. Акишева. Нур-Султан : Б.и., 2019. С. 385–393.

Соенов В. И. Результаты раскопок на могильнике Верх-Уймон в 1999 году // Древности Алтая. Известия лаборатории археологии. Горно-Алтайск : ГАГУ, 2000. №5. С. 48–62.

Соенов В. И. Находка железного палаша на Алтае // Сохранение и изучение культурного наследия Алтайского края. Барнаул : Изд-во Алт. ун-та, 2017. Вып. XXIII. С. 142–150.

Тишкин А. А., Матренин С. С., Шмидт А. В. Алтай в сяньбийско-жужанское время (по материалам памятника Степушка). Барнаул : Изд-во Алт. ун-та, 2018. 368 с.

Тишкин А. А., Серегин Н. Н. Металлические зеркала как источник по древней и средневековой истории Алтая (по материалам Музея археологии и этнографии Алтая Алтайского государственного университета). Барнаул : Азбука, 2011. 144 с.

Тишкин А. А., Хаврин С. В. Использование рентгенофлюоресцентного анализа в археологических исследованиях // Теория и практика археологических исследований. Барнаул : Изд-во Алт. ун-та, 2006. Вып. 2. С. 74–86.

Худяков Ю. С. Вооружение центрально-азиатских номадов в II–V вв. н.э. // Военное дело номадов Центральной Азии в сяньбийскую эпоху. Новосибирск : Б.и., 2005. С. 19–55.

Худяков Ю. С., Юй Су-Хуа. Роль сяньби в развитии вооружения кочевников Центральной Азии // Снаряжение кочевников Евразии. Барнаул : Изд-во Алт. ун-та, 2005. С. 55–59.

---

#### INFORMATION ABOUT AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ

---

**Zainolla Samashev**, Doctor of Historical Sciences, Member of the Department of Al-Farabi Kazakh National University, Almaty, Kazakhstan.

**Самашев Зайнолла**, доктор исторических наук, член кафедры Казахского Национального университета имени Аль-Фараби, Алматы, Казахстан.

**Azat Aitkali**, Doctor Ph.D, Director of the Branch of the Institute of Archaeology Named A. N. Margulan, Nur-Sultan, Kazakhstan.

**Айткали Азат**, доктор Ph.D, директор филиала Института археологии им. А. Х. Маргулана, Нур-Султан, Казахстан.

*The article was submitted 26.06.2022;*

*approved after reviewing 22.08.2022;*

*accepted for publication 31.08.2022.*

*Статья поступила в редакцию 26.06.2022;*

*одобрена после рецензирования 22.08.2022;*

*принята к публикации 31.08.2022.*

Research Article / Научная статья

УДК 902.34(51)

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-12](https://doi.org/10.14258/tpai(2022)34(3).-12)

## THE RESULTS OF THE STUDY OF GOL MOD-2 SITE BY THE MONGOLIAN-CHINESE JOINT ARCHAEOLOGICAL RESEARCH TEAM

**Diimaajav Erdenebaatar<sup>1\*</sup>, Zhou Ligang<sup>2</sup>, Lan Wanli<sup>3</sup>, Liu Bin<sup>4</sup>,  
Enkhbayar Mijiddorj<sup>5</sup>, Baatar Galbadrah<sup>6</sup>**

<sup>1</sup>Ulaanbaatar State University, Ulaanbaatar, Mongolia; [ediimaajav@gmail.com](mailto:ediimaajav@gmail.com)

<sup>2</sup>Henan Provincial Institute of Cultural Heritage and Archaeology, Zhengzhou, China;  
[leag3210@126.com](mailto:leag3210@126.com)

<sup>3</sup>Henan Provincial Institute of Cultural Heritage and Archaeology, Zhengzhou, China;  
[lanwanli2011@163.com](mailto:lanwanli2011@163.com)

<sup>4</sup>Luoyang Municipals Institute of Cultural Heritage and Archaeology, Luoyang, China;  
[150392751@qq.com](mailto:150392751@qq.com)

<sup>5</sup>Ulaanbaatar State University, Ulaanbaatar, Mongolia; [e.mijiddorj10@gmail.com](mailto:e.mijiddorj10@gmail.com)

<sup>6</sup>Ulaanbaatar State University, Ulaanbaatar, Mongolia; [khasgalaa@gmail.com](mailto:khasgalaa@gmail.com)

\*Corresponding author

**Abstract.** As part of the Mongolian-Chinese joint archaeological project ‘Exploring Ancient Nomadic Culture in the North’, archaeological surveys, excavations and research activities were conducted in the Hanui River valley in the Arkhangai aimag of Mongolia from July 2017 to August 2019. Three field seasons at the Gol Mod-2 necropolis yielded rich results, which were partly published in Mongolian and Chinese scientific journals. In December 2019, one of the major discoveries of this collaborative project (the excavation of the Gol Mod 2 burial ground) was honoured as one of the ‘Top Ten Discoveries of 2019’ by American Archaeology Magazine. Thanks to the efforts of Chinese and Mongolian scientists, the joint project successfully achieved its research goals. New material has been obtained to study the history of the interaction between agricultural and nomadic civilizations.

**Key words:** Xiongnu, unicorn, golden crown, bronze cauldron, elite tomb, satellite burial, gold and silver artifacts, Gol mod-2, Hanui Valley, xiongnu ritual

**Acknowledgments:** prepared as part of a joint project of Mongolian-Chinese archaeologists “Ancient Nomadic Culture Research in the North”.

**For citation:** Erdenebaatar D., Ligang Zhou, Wanli Lan, Bin Liu, Mijiddorj E., Galbadrah B. The Results of the Study of Gol Mod-2 Site by the Mongolian-Chinese Joint Archaeological Research Team. *Teoriya i praktika arheologicheskikh issledovanij = Theory and Practice of Archaeological Research*. 2022;34(3):193–207. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-12](https://doi.org/10.14258/tpai(2022)34(3).-12)

## РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЯ ПАМЯТНИКА ГОЛ МОД-2 МОНГОЛО-КИТАЙСКОЙ СОВМЕСТНОЙ АРХЕОЛОГИЧЕСКОЙ ЭКСПЕДИЦИЕЙ

Диймаажав Эрдэнэбаатар<sup>1\*</sup>, Жоу Лиганг<sup>2</sup>, Лан Ванли<sup>3</sup>, Лиу Бин<sup>4</sup>,  
Энхбаяр Мижиддорж<sup>5</sup>, Баатар Галбадрах<sup>6</sup>

<sup>1</sup>Улаанбаатарский государственный университет, Улаанбаатар, Монголия;  
ediimajav@gmail.com

<sup>2</sup>Институт культурного наследия и археологии провинции Хэнань, Чжэнчжоу, Китай;  
leag3210@126.com

<sup>3</sup>Институт культурного наследия и археологии провинции Хэнань, Чжэнчжоу, Китай;  
lanwanli2011@163.com

<sup>4</sup>Лоянский муниципальный институт культурного наследия и археологии, Лоян, Китай;  
150392751@qq.com

<sup>5</sup>Улаанбаатарский государственный университет, Улаанбаатар, Монголия;  
e.mijiddorj10@gmail.com

<sup>6</sup> Улаанбаатарский государственный университет, Улаанбаатар, Монголия;  
khasgalaa@gmail.com

\*Автор, ответственный за переписку

**Резюме.** В рамках монголо-китайского совместного археологического проекта «Исследование древней кочевой культуры на Севере» с июля 2017 г. по август 2019 г. проводились археологические изыскания, раскопки и исследовательские работы в долине р. Хануй в Архангайском аймаке Монголии. Три полевых сезона на некрополе Гол мод-2 дали богатые результаты, которые были частично опубликованы в монгольских и китайских научных журналах. В декабре 2019 г. одно из главных открытий этого совместного проекта (раскопки могильника Гол мод-2) было отмечено как одно из «Десяти лучших открытий 2019 года» журналом American Archaeology Magazine. Благодаря усилиям китайских и монгольских ученых совместный проект успешно достиг поставленных исследовательских целей. Получен новый материал для изучения истории взаимодействия между земледельческой и кочевой цивилизациями.

**Ключевые слова:** хунну, единорог, золотая корона, бронзовый котел, элитная гробница, сопроводительное захоронение, золотые и серебряные артефакты, Гол мод-2, долина Хануй, хуннуский ритуал

**Благодарности:** статья подготовлена в рамках реализации совместного археологического проекта монгольских и китайских археологов «Ancient Nomadic Culture Research in the North».

**Для цитирования:** Эрдэнэбаатар Д., Лиганг Жоу, Ванли Лан, Бин Лиу, Мижиддорж Э., Галбадрах Б. Результаты исследования памятника Гол мод-2 монголо-китайской совместной археологической экспедицией // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 193–207. [https://doi.org/10.14258/tpai\(2022\)34\(3\).-12](https://doi.org/10.14258/tpai(2022)34(3).-12)

### Introduction

The project process started on July 20, 2017, when four Chinese participants of the China-Mongolia joint archaeological project arrived in Ulaanbaatar. On 22, both Chinese and Mongolian teams headed to the Arkhangai Province and officially started the fieldwork. Surveying Gol Mod-2, they completed excavations of twelve satellite burials of tomb No.189

at the Gol Mod-2 cemetery, and cleared the turf of the main burial of tomb No. 189. In 2018, the investigation and mapping of the Gol Mod-2 was completed, and the clearing work of the main burial of the tomb No.189 was carried out to a depth of 6 meters from the surface. The Gol Mod-2 Cemetery is located in the Undur Ulaan county, the Arkhangai Province, Mongolia. It is about 12 km away from the Khanuy River in the west. Its geographical coordinates are N48°, E101°the13', and the altitude is around 1800 meters. The cemetery is 2.2 km from the east to west and 1.3 km from the north to south. It is surrounded by the mountains on three sides from the east to the south and opens up with a river on the north. The terrain is high in the south and low in the north. After several surveys, it was estimated that 571 different types of stone tombs were scattered in the cemetery. Among them, there are 104 square stone tombs with a passage (named as terrace tomb by some scholars), 326 circular stone tombs accompanying the square one (satellite tomb), and 141 independent circular stone tombs (Fig. 1).

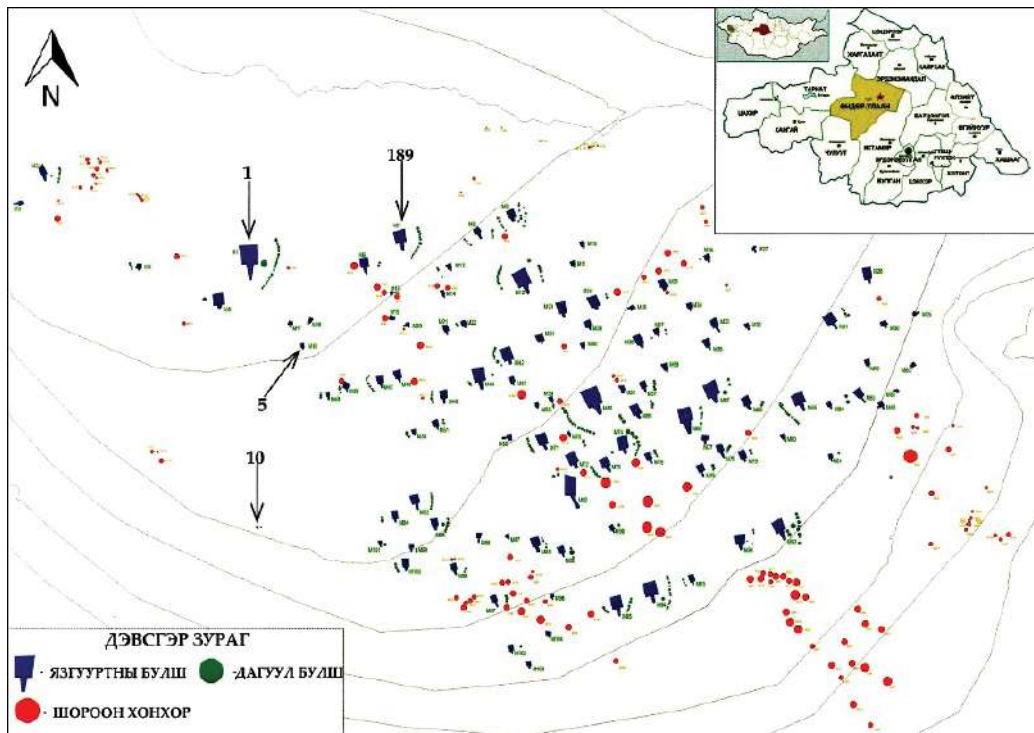


Fig. 1. Schematic map of the Gol mod-2 sites and its plan

Рис. 1. Карта-схема расположения памятника Гол мод-2 и его план

Because smaller tombs are usually covered with turf to varying degrees, it is difficult to confirm if all tombs are accounted. Among the cemeteries of the Xiongnu nobles that have been found in Mongolia, the area of Gol Mod 2 is smaller than that of Noyon Uul and Gol Mod-1. The number of tombs in these cemeteries is not directly related to the area of the cemetery.

For example, the Noyon Uul Cemetery has the largest area (17.5 km<sup>2</sup>), and a total of about 212 burials of various types (inconclusive because of dense forest), among which are 29 terrace tombs (Erdenebaatar et al., 2015). The area of Gol Mod-1 cemetery is 7.56 km<sup>2</sup> the latest survey result from 2014 show that there are 483 tombs in total, 214 of which are terrace tombs (Polosimak, Bogdanov, Tseveendorj, 2011). The latest survey results of Gol Mod-2 Cemetery (2.86 km<sup>2</sup>) reveals a total number of 571 tombs. Among them, there are 104 terrace tombs. Although the area of Gol Mod-2 is the smallest among the three, the total number of tombs is the largest and the distribution density is the highest. The Khanuy River basin where the Gol Mod-2 Cemetery located is one of the regions with the richest historical remains in Mongolia.

No.189. Between June 12 and August 7, the Chinese team divided into two groups and participated in the excavation in sequence. The excavation of the main burial of tomb No.189 was completed on July 4. The excavation of tomb No.10 was finished on July 27. As of August 3, 2019, the fieldwork of China-Mongolia Joint Archaeological Project completed successfully, and the project entered the stage of laboratory analysis and research.

**Preliminary Results** The three-year China-Mongolia joint archaeological project completed the surveying the excavation of tomb No.189 and No.10 at Gol Mod-2 cemetery 100 pieces of precious artifacts and produced more than 10 radiocarbon dates. The findings provide reliable evidence to date the tombs and address questions like the interactions between the steppe civilization and the agricultural civilization. Chinese scholars also conducted stable isotopic analysis and radiocarbon analysis on excavated human skeletons from the “Bayanbulag” site of South Gobi Province of Mongolia, which should be the Shouxiangcheng fortress erected by the Western Han government. The work acquired 15 effective carbon and nitrogen isotope samples and 2 radiocarbon samples, which further enriched the content of joint archaeological work.

The main tomb №189 is a terrace tomb that faces south in an orientation of 178°. The burial chamber is wide in the north and narrow in the south, 29 meters long in the east, west, and north, and 26 meters long in the south; the dromos or tomb passage is 20 meters long and 11 meters wide in the north, and 5 meters wide in the south. Stone walls were laid at the edges of the burial chamber and dromos, with a maximum height of 1.5 meters at the northern end and a minimum of 0.1 meters at the southern end. The area enclosed by the stone walls was filled with sand and gravels. The twelve satellite tombs are all circular stone tombs, which are lined in an arc shape on the east side of the main tomb, and are numbered PM1- PM12 from the south to north. The north end of the PM12 is close to the east-west line where the north wall of the main tomb is located, and the west end of the PM1 is close to the north-south line where the east wall of the main tomb is located. The centers of the PM1 and PM12 stone tombs are 40 meters and 41meters from the southeast corner of the main tomb. All other tombs are less than 40 meters away from the center of the main tomb. The ceremonial features are located at the north of the main tomb. About 20 meters north of the northern wall of the main tomb, there is a pile of stones distributed in a circle. To the north of this stone circle, three stone lines were arranged in the east-west direction. Each line is composed of 5–7 pairs of stones with a length of 23–27 meters. These stones and stone lines are still remained on surface, with ashes and burned animal bone debris between the stones. Thus the stone lines could be the ceremonial remains in relation to the main tomb (Fig. 2).

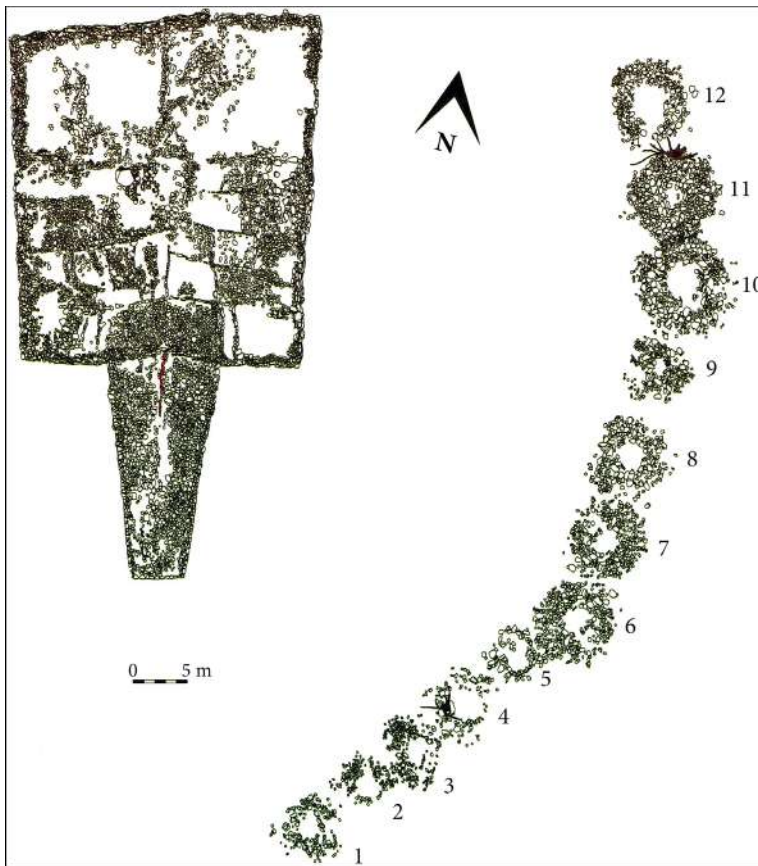


Fig. 2. Plan of mound №189

Рис. 2. План кургана №189

Twelve satellite tombs of M189 are all circular stone tombs, with openings under the turf layer. Most of the stones are exposed to the ground. Possibly due to the disturbance or collapse, a circular, empty area was formed in the center of the stone pile. As a result, the stones are distributed in the shape of a circle. From the south to the north, the sizes of the stone piles increase gradually, among which the stone piles of PM1-PM5 is 4–5 meters in diameter, and the size of the PM6-PM12 piles are all above 6 meters. PM11's stone pile is the largest and is 9 meters in diameter. Stones range from 0.1 to 0.5 meters above the ground. The tomb pits were dug under the stone pile. The exposed openings of satellite tombs seem to be irregular in shape, which could be caused by the collapse of the sandy tomb walls during the construction process. The tomb pits were filled with sand and mixed with fallen stones. PM11 is quite unique. It was intentionally filled with only stones from the top of the coffin to the tomb opening. The bottoms of tombs are mostly oblong or rectangular in shape, and the directions of the satellite tombs gradually change from southmost to northmost, from an orientation of northeast to northwest (from 28° to 336°). The PM7, which is located at the center of satel-

lite tombs, directly orient towards the north. Other than PM1 and PM3, which has no coffin, other nine tombs all have a rectangular wooden coffin. The human bones in the coffin were disturbed to varying degrees. Judging from the preservation condition, most of them were buried in extended position. Although these twelve satellite tombs of M189 had all been disturbed to varying degrees and the quantity of funerary objects unearthed is relatively small, the types of funerary objects are diverse, including pottery, iron, bronze, gold, silver, etc. A total of 5 pieces of potteries were discovered, including each one piece from PM8 and PM9, and three from PM11. These potteries all have a thick layer of soot outside, most of which fell off, indicating that they were utility utensils. Iron artifacts are severely corroded, which are mainly horse gears, iron arrowheads. Only iron arrowheads unearthed from PM6 are well preserved. Besides, one circular or crescent-shaped iron plate was unearthed from each of the five tombs including PM7, PM9, PM10, PM11 and PM12, are well preserved. The bronzes are mainly mirrors and cauldrons. PM8, PM11, PM12 each has a bronze mirror fragment. Judging from the inscription and the decoration, these are a Zhaoming (昭明) mirror and two TLV mirrors. Gold and silver ware are mainly ornaments. Among them, a belt on the waist of the skeleton in PM10 was made of iron with gold plates on the buckle. Another belt on the waist of the skeleton in PM12 is also iron and the buckle was covered by silver, and the surface was hammered into flower patterns. One piece of agate and turquoise inlaid gold ornament was discovered in PM12. This ornament has a gold flat base decorated with small beads. In the center, there is a hemispherical-shape agate bead, surrounded by a circular ring consisting of six connecting turquoise tubes. On the back, there is a silver buckle at the bottom (broken). So we assume the ornament was used for clothes decorations. The excavation report of the satellite tombs was published in the Chinese academic journal of *Huaxia Archaeology* (华夏考古) in 2021.

The edge of the chamber and dromos of M189 main tomb were lined with stone walls above the ground. The walls have collapsed to varying degrees, but the outline is preserved well. The existing walls around the chamber have a maximum height of 1.5 meters (the middle of the north wall), and maximum height of dromos walls is 1.3 meters (the northern end connecting the chamber). On the surface of the main tomb, a stone partition beam in the middle of the chamber extended southward from the north of the chamber to the center of the passage, which is a feature that is present in many Xiongnu noble tombs excavated in the past. However, the structure and width of the central ceiling partition beam to the north of the looting hole is significantly different from the beams in the south (on the south ceiling and the central ceiling of the passage). The central partition beam also does not extend to the southern end of the passage. The surface of the dromos was covered with stones of various sizes. At the northern end where the passage connects the chamber, a stone beam of east-west direction separates the dromos from the chamber. The central beam continues to extend downwards. Both sides of the passage walls retracted inward irregularly, which may be caused by the collapse during the tomb construction process. The tomb passage was filled with sand and stones of various sizes without obvious stratification, and the stone filling is denser near the chamber. It is a feature that is present in many Xiongnu noble tombs excavated in the past. However, the structure and width of the central ceiling partition beam to the north of the looting hole is significantly different from the beams in the south (on the south ceiling and the cen-



tral ceiling of the passage). The central partition beam also does not extend to the southern end of the passage. The surface of the dromos was covered with stones of various sizes. At the northern end where the passage connects the chamber, a stone beam of east-west direction separates the dromos from the chamber. The central beam continues to extend downwards. Both sides of the passage walls retracted inward irregularly, which may be caused by the collapse during the tomb construction process. The tomb passage was filled with sand and stones of various sizes without obvious stratification, and the stone filling is denser near the chamber.

Traces of outer coffin were found at a depth of approximately 10.7 meters from the top of the tomb ceiling, and wooden top board was found at a depth of 11 m. The middle of the top board collapsed, thus the east and west ends were tilted upwards. After cleaning, it was found that on the east of the top board, a young male skeleton in an extended position was placed facing down with the head towards the south. The upper body was located in the middle on top of the coffin case. When the top board collapsed, the body fell into the coffin case and the lower body was still outside. From the archaeological remains, it is difficult to identify whether this body was one of the looters or was the tomb occupant who was disturbed and moved to the outside of the coffin. After excavation, we can confirm that the burial furniture consists of one inner coffin and two layers of outer coffin (or coffin cases), which were placed in the north-south direction. Affected by looting activities and heavy sand and gravel deposit on top of the coffin case, the coffin and cases all collapsed and were severely deformed. According to the remains, we can tell that the wooden coffin was painted with red lacquer, and the coffin cover was made of multiple wooden boards connected by dove-tail tenon (燕尾榫). The funeral objects in the coffin were all looted, and no skeletal remains of the tomb occupant were found. However, there are still many interesting phenomena. A layer of fabric was laid on the bottom of the coffin, and then a layer of millet with shell was spread, mixed with a small amount of *Chenopodium* seeds. Another layer of fabric was placed on top of the seeds, and covered with the second layer of millet with shell, mixed with a large amount of wood chips and small pieces of charcoals and fewer *Chenopodium* seeds. The third layer of textile was then placed on top under the corpse. 1 M189 墓底清理 to clean the bottom of the main tomb.

#### **Some observations and comparisons**

Most of the remaining funerary objects are located between the two layers of coffins, most of which are domestic wares, chariot gears, and ornaments. A large ceramic urn and a small guan pot were found in the northwest corner, and a guan pot was found in the southeast corner. The firing temperature of these utensils was not high, which indicates, they were not durable and were crushed by the collapse of backfill. The rest of the funerary objects were mostly discovered in the southeast corner between the inner and outer coffins, and a majority of them were placed in a wooden case. The case has only the bottom remained. The objects in the case are broken and fragmented, among which we can still identify some gold and silver ornaments, bronze fu containers, bronze objects decorated with animal-head pattern, bronze objects with sprout, iron hook, gold-gilded silver dragon ornament, a jade belt hook, wooden cups, leather horse harness, hair-woven textile, etc. (Fig. 3). In addition, there are a large number of pieces of gold-clad iron bars, which, according to previous excavation data, should be the surface decoration of the wooden coffin. There are also large number of turquoise fragments of dif-

ferent shapes, which could be clothing ornaments. Among these artifacts, two gold-gilded silver dragons attracted a lot of attention. One of them was situated in the coffin, and the other one was under the upper body of the skeleton above the top board of the outer coffin. The two dragons are similar in style and exhibit strong Western Han style. After studying the shape and foot design of both dragons, we think they are possibly ears or handles of an arcbelly object. The images of dragon were occasionally seen on the funerary objects of the Xiongnu noble tombs, all decorated on horse accessories. This kind of dragon-as-the-only-motif artifact was discovered in the tombs of the Xiongnu nobles for the first time. The jade belt hook is also found for the first time in Xiongnu noble tombs. The gold ornaments on the coffin, the petal-shaped chariot cover ornaments (*gai gong mao*), etc. are similar to the artifacts found in M1 of this cemetery. Meantime, gold-gilded silver dragon and jade (Fig. 3) belt hook which were discovered for the first time indicate the higher level of the tomb occupant M189 the northern grassland Tomb No.189 of the cemetery Gol Mod-2.



Fig. 3. Gol Mod-2. Some archaeological finds from the excavation

Рис. 3. Гол мод-2. Некоторые археологические находки, полученные при раскопках

Comparing with tombs of the Xiongnu nobles excavated in Mongolia and Russia in the past, M189 of Gol Mod-2 and the satellite tombs present many new features: (1) There are significantly fewer animal bones in the main and satellite tombs. Burying animal bones as part of funerary practices was one of the common features in Xiongnu burials (Эрдэнэбаатар, 2016). Animal bones were usually placed on top of the coffin or outside of the north of the coffin. Regardless of the size of the tomb or the severity of looting, animal bones were often well preserved. For example, among 29 satellite tombs of M1, 23 of them have animal bones (Хүннүгийн язгууртны..., 2021). However, the twelve satellite tombs of M189 have only yielded one deer antler (PM8), a horse skull (PM11), and some animal bones in the bronze fu container from PM12. Although the main tomb of M189 is a high rank tomb, only one sheep skull was found. It is significantly different from M1 in the same cemetery, where more than twenty horse skulls were discovered. The looting activities may have affected the distribution of animal bones. But it is highly unlikely that any animal bones were taken out of the tombs. Therefore, the lack of animal bones is not caused by looting. Instead, it indicates a difference in the funeral practices. (2) There are significantly fewer funerary objects. Of the twelve satellite tombs, only three tombs have a total of five potteries. Most tombs do not have any funerary objects. (3) The looting activities show strong characteristics of retaliation. All satellite tombs were disturbed (the upper part of PM11 also has traces of disturbances), but these disturbances are clearly different from the common looting activities. For example, the upper body and skull of the skeleton in PM7 are missing; a mandible was found outside the coffin of PM8, but no sign of the rest of skull and part of shoulders, although funerary potteries are all intact; a skull was outside of the coffin of PM9, while the rest of the skeleton and pottery artifacts are intact; the skull from PM10 was mixed with the stones in the backfill, while the rest of the skeleton was intact; in PM12, the lower body, funerary bronzes and golden objects are intact, while the skeleton and part of shoulders are missing. These phenomena indicate that most disturbance might have been for human skeleton, instead of robbing the funeral objects. Therefore, we speculate that this destruction might be a retaliation, different from looting activities that are commonly seen (Fig. 3). The ceiling and the internal structure of the tomb chamber of M189 main tomb exhibit new features. The stone grid structure on the ceiling is different from the herringbone structure seen in the past. The stone structure and herringbone wood structure in the middle of the chamber wasn't found in previous excavations, and most of the woods in the backfill have burning marks on one end. All these are first-seen phenomena. The bottom of the main tomb coffin was placed with layers of fabrics and cereal, and the skeleton was placed on top. This is also the first time to see in tombs of the same kind. The gold-gilded silver dragons and jade belt hook in the funeral objects were also discovered for the first time in similar tombs, which may indicate special background of the tomb owner. Other than these unique phenomena, we took seven samples for carbon 14 dating from different wood pieces, funerary animal bones, and the skull on top of the coffin case. Based on the results, we estimate that the dates of woods in the wooden structure on the south side of the looting hole was no earlier than 66 cal. A.D., and the dates of woods in the herringbone wood structure was no later than 20 cal. AD. The date of the skull was 22–170 cal. AD. The date of the sheep skull was 49 cal. BC – 72 cal. AD (Fig. 4).

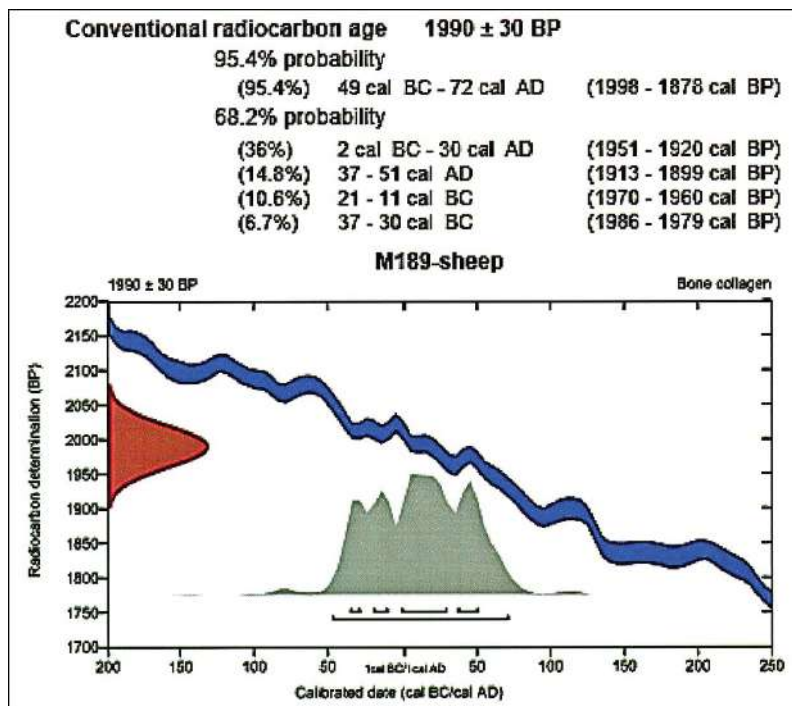


Fig. 4. Radiocarbon dates

Рис. 4. Радиоуглеродная дата

The dates from three samples of the wooden structure to the south of the looting hole is close to each other, which is different from the dates of woods from the herringbone structure. Therefore, we estimate that the wood structure was possibly used for supporting the looting hole. Considering that most of the woods in the herringbone structure have burning marks at one end, the possibility of using dry wood at the time is relatively large. Therefore, the dates of these wood samples may be slightly earlier than the time of burial. Because the sheep skull was stained green by patina and might have been placed in bronze, the date of the sheep skull shows a better association with the date of the tomb. In conclusion, we estimate that the tomb date is around 0 A.D. and no later than 72 A.D. The date of human skeleton not only provided very few clues about the owner's identity, but also led to a lot more questions. Since the date of the skeleton coincides with the date of the supporting structure of the looting hole and the sheep bones, the skeleton might have belonged to a looter who was buried by the collapse of the looting hole (the skeleton face downwards. The left arm extended towards the southeast corner of the coffin, where the funerary objects were stored). However, we cannot rule out the possibility that the skeleton was the tomb occupant, who was dragged out of the coffin (no human remains were found in the coffin, which is very rare in the Xiongnu noble tombs). Most of the similar tombs that have been excavated were disturbed or looted. Therefore the orientation of skeleton remains unclear. Currently, M10 is the only well-pre-

served square-shape tomb with a tomb dromos. The owner of the tomb owner was oriented towards north. The satellite tombs of M189 also have northward facing skeletons (sometimes slightly deviated from the north). Therefore we estimate that the deceased of M189 also oriented toward the north. If all these assumptions are confirmed, the skeletons outside of coffin (the skull is oriented towards the south) are unlikely to belong to the tomb owner.

Tomb No. 10 (M10) is a square-shaped tomb with a dromos, located in the west of the cemetery and facing south at 165 degrees. The tomb chamber and dromos are outlined with stones, with a total length of 13.3 meters (Fig. 2). The dromos is 3.4 meters long. The chamber is 9.9 meters long. On the east side of the main tomb, there is a circular stone satellite tomb, with no stone line or other ancillary structures. In 2019, the second group of members of the Henan archeological team arrived at Mongolia and completed the excavation of this tomb. This tomb is the only well-preserved tomb of the Xiongnu nobles that has been excavated so far, which is also a rare discovery among other Mongolian or Russian cemeteries. 1. Satellite tomb M10's satellite tomb is a circular stone tomb located on the east side of the main tomb. The stone mound covers an area about 2 meter's in diameter. A n empty area of around 1.6 meters in diameter due to disturbance is in the center of the mound. The burial chamber opens at the lower part of the rock pile and is filled with sand and stones inside. The wooden coffin is 1.15 meters deep from the tomb opening. A human skeleton was placed in the coffin with the head towards the north. No funerary objects were found. The chamber of the main tomb is in trapezoidal shape, wider in the north than the south. The chamber and the dromos were filled with sand and stones. Stone mound does not show any special arrangement of piling. A horse chariot and 15 horse skulls were placed at a depth of 1.8 meter from the opening. Horse skulls are located on the northeast side of the tomb, arranged neatly into two rows on the east and south side, with 12 skulls in the north and 3 in the south. During the excavation, we also found ribs and other bones in the area where the horse skulls located. After removing the skulls, 1-2 toe bones were discovered under each skull. The horse chariot is located in the middle of the chamber. The overall shape was damaged due to the collapse of sand. The first exposed half was a wheel on the east side. Judging from the existing traces, the chariot was placed in a north-south direction. Because the wheels on the other side were stacked under the vehicle and other components, we believe that the chariot was laid sideways when buried, or it rolled to the side due to soil subsidence. The upper wheel held 12 wooden spokes, the longest of which is 36 cm. We estimate that the complete wheel was about 98 cm in diameter. The north, east, and west sides of the compartment were well preserved, while the south side was in relatively bad condition. The compartment on the east side was 2.1 meters long and the north side was 1.5 meters wide. The wooden boards were decorated with painted cloud pattern. The structural integrity of the chariot was destroyed. The horse skulls and the lower part of the chariot were still filled with sand and stones when excavated, and the wooden funerary container, which consists of a chamber case and a coffin, were exposed at a depth of about 4.9 meters from the top. The chamber case is 2.9 meters long, 1.5 meters wide, and 0.35 meters in remaining height. The coffin is 2.1 meters long, 0.58 meters wide and 0.35 meters in remaining height. There are fabric marks on the coffin. A human skeleton was placed in the coffin in an extended position. The skull was pointed towards north facing up. According to the skeletal features, the skeleton belongs to an adult male. The fu-

nerary objects are mainly located between the chamber case and the coffin, made of varieties of materials like gold, silver, copper, iron, jade, stone, and pottery. The objects include containers, chariot objects, and coffin ornaments. In the coffin case, we found six ceramic vessels, 1 bronze cauldron container, 30 silver equestrian ornaments, and 5 pieces of gold plates. There are cloth marks on the surface of the bronze cauldron, and animal bones inside, which are likely to be horse bones. The equestrian ornaments were made of iron and covered with silver, and decorated with animal motifs such as unicorn. Ornaments are in strip, gourds, and circular shapes. Some of them are covered with fabrics. Since the tomb was not disrupted by looters, these horse ornaments may be a complete set. In the coffin, we unearthed jade sword decoration, a golden ring, silver hairpins, a silver ring, and small jade ornaments. There may also be persimmon-shaped copper pieces that could be part of the coffin ornaments. Preliminary Results According to the results of surveys, 77% of terrace tombs at the Gol Mod-2 Cemetery are between 10-29 meters in length, only 3% of tombs are more than 40 meters long. The remaining 20% are smaller than 10 meters in length. M10 is one of the smallest terrace tombs. M 10 is located in the west of the cemetery, far away from other tombs. The size is significantly smaller than most tombs of the same type, which may have saved it from large-scale looting activities at this cemetery, and made it the only well-preserved terrace tomb in the cemetery. Although the tomb is small in scale, it exhibits all the basic elements of Xiongnu noble tombs: a square-shaped main tomb with a dromos, a satellite tomb to the east, and chariot and horse skulls as funerary objects. The type and quantity of funerary objects are no less than those of other noble burials of the same kind, especially the jade sword ornament and golden crown-shaped ornaments that were discovered for the first time in Xiongnu tombs. The location of this tomb is markedly far from the main body of the cemetery, and no charcoal layer is seen on the top of the coffin. These characteristics are different from similar Xiongnu noble tombs found in the past, which need to be studied further in the future. The discovery of jade sword ornament in this tomb is particularly noteworthy. Jades are not uncommon in the Xiongnu noble tombs. Jade bi disks, jade huang disk, and small ornaments were found before, but the sword ornament was first seen in similar tombs. Records of Xiongnu (汉书·匈奴传) say that the Emperor Xuan of Han bestowed a jade decorated sword to the Xiongnu Tomb No. 10 (M10) is a square-shaped tomb with a dromos, located in the west of the cemetery and facing south at 165 degrees. The tomb chamber and dromos are outlined with stones, with a total length of 13.3 meters. The dromos is 3.4 meters long. The chamber is 9.9 meters long. On the east side of the main tomb, there is a circular stone satellite tomb, with no stone line or other ancillary structures. In 2019, the second group of members of the Henan archaeological team arrived in Mongolia and completed the excavation of this tomb.

### Conclusion

This tomb is the only well-preserved tomb of the Xiongnu nobles that has been excavated so far, which is also a rare discovery among other Mongolian or Russian cemeteries. Satellite tomb M10's satellite tomb is a circular stone tomb located on the east side of the main tomb. The stone mound covers an area about 2 meters and diameter area of around 1.6 meters in diameter due to disturbance is in the center of the mound. The burial chamber opens at the lower part of the rock pile and is filled with sand and stones inside. The wooden coffin is 1.15 meters deep from the tomb opening. A human skeleton was placed in the coffin

with the head towards the north. No funerary objects were found. The chamber of the main tomb is in trapezoidal shape, wider in the north than the south. The chamber and the dromos were filled with sand and stones. Stone mound does not show any special arrangement of piling. A horse chariot and 15 horse skulls were placed at a depth of 1.8 meter from the opening. Horse skulls are located on the northeast side of the tomb, arranged neatly into two rows on the east and south side, with 12 skulls in the north and 3 in the south. During the excavation, we also found ribs and other bones in the area where the horse skulls located. After removing the skulls, 1–2 toe bones were discovered under each skull. The horse chariot is located in the middle of the chamber. The overall shape has been damaged due to the collapse of sand. The first exposed half was a wheel on the east side. Judging from the existing traces, the chariot was placed in a north-south direction. Because the wheels on the other side were stacked under the vehicle and other components, we believe that the chariot was laid sideways when buried, or it rolled to the side due to soil subsidence. The upper wheel held 12 wooden spokes, the longest of which is 36 cm. We estimate that the complete wheel was about 98 cm in diameter. The north, east, and west sides of the compartment were well preserved, while the south side was in relatively bad condition. The compartment on the east side was 2.1 meters long and the north side was 1.5 meters wide. The wooden boards were decorated with painted cloud pattern. The structural integrity of the chariot was destroyed. The horse skulls and the lower part of the chariot were still filled with sand and stones when excavated, and the wooden funerary container, which consists of a chamber case and a coffin, were exposed at a depth of about 4.9 meters from the top. The chamber case is 2.9 meters long, 1.5 meters wide, and 0.35 meters in remaining height. The coffin is 2.1 meters long, 0.58 meters wide and 0.35 meters in remaining height. There are fabric marks on the coffin. A human skeleton was placed in the coffin in an extended position. The skull was pointed towards north facing up. According to the skeletal features, the skeleton belongs to an adult male. The funerary objects are mainly located between the chamber case and the coffin, made of varieties of materials like gold, silver, copper, iron, jade, stone, and pottery. The objects include containers, chariot objects, and coffin ornaments. In the coffin case, we found six ceramic vessels, 1 bronze cauldron container, 30 silver equestrian ornaments, and 5 pieces of gold plates. There are cloth marks on the surface of the bronze cauldron, and animal bones inside, which are likely to be horse bones. The equestrian ornaments were made of iron and covered with silver, and decorated with animal motifs such as unicorn. Ornaments are in strip, gourds, and circular shapes. Some of them are covered with fabrics. Since the tomb was not disrupted by looters, these horse ornaments may be a complete set. In the coffin, we unearthed jade sword decoration, golden ring silver hairpins, silver ring, and small jade ornaments. There may also be persimmon-shaped copper pieces that could be part of the coffin ornaments. We sampled charcoal, horse skulls, and human bones found in the tomb for carbon 14 dating. The charcoal was dated to 118 cal. BC – 26 cal. AD. The human bone was 0 cal. BC – 130 cal. AD, and horse skull was 66–222 cal. AD. Considering that the wood for charcoal may be older than the tomb, the dates of human bones and horse skulls are more similar to the date of tomb. Considering two dating results, the tomb is possibly dated to 66–130 AD. This date is later than that of M189, but similar to that of M1. Since the tomb was well-preserved, the deposition characteristics and the objects can provide more information to study funerary customs

of the ancient Xiongnu nobles. The complete set of horse ornaments can be compared with the set from M1, and provide new insights for studying the horse decoration characteristics of Xiongnu nobles, the differences in the ranks of the aristocracy and how these differences were reflected in the funerary practices.

In particular, in September 2019, Xinhua News Agency introduced our archaeological discoveries of the Gol Mod-2 Cemetery in English, which earned us global attention, and led to the honorable award as one of the “Top 10 Discoveries 2019” from the American Archaeology magazine. This project is by no means a task that a dozen archaeologists can complete. The leadership and colleagues of the Henan Provincial Institute of Cultural Heritage and Archaeology and the Luoyang Institute of Cultural Heritage and Archaeology have spent lots of time and energy helping us handling various procedures to work overseas and participate in field archaeological work. We are most grateful to the family members of the archaeologists, their selfless support strengthened us and enabled us to withstand the difficult work environment with water and electricity shortages and no internet, and completed this field work in high quality. We are also thankful to more than 100 college students from universities in Ulaanbaatar, students from Buryat University in Russia, and local residents, who participated in the field work. In the three seasons of working together, the team members from China and Mongolia broke through language barriers and built trust and friendship. We are deeply moved by the hard work and positiveness of these people. As Henan’s first overseas archaeological team consists of young archaeologists all under 40 year-old, we owe our success to the guidance of administrative authorities at all levels, the help of colleagues, the support from friends in the media, the hard work of team members, and the strong support from their families. We are proud to withstand various challenges and difficulties, and finally complete the project successfully. By this book, we would like to express our sincere gratitude to everyone who has supported, helped, and encouraged us

## REFERENCES

- Polosmak N. V., Bogdanov E.S., Tsevendorzh D. Twentieth Noin-Ulin barrow. Novosibirsk : INFOLIO, 2011. 184 p. (*In Russ.*)
- Diimaajav Erdenebaatar, Tomor-Ochir Iderhkangai, Enhkbayar Mijiddorj, Samdantsoodol Orgilbayar, Natsag Batbod, Baatar Galbadrah, Anarhaan Marathan. Study of the Xiongnu Tombs of Cemetery Gol Mod-2 in Balgasiin tal. Улаанбаатар, 2015. Pp. 28–34. (*In Mong.*)
- Diimaajav Erdenebaatar Heritage of the Xiongnu Culture UB., 2016. (*In Mong. and Eng.*)
- Diimaajav Erdenebaatar, Enkbayar Mijiddorj, Baatar Galbadrah, Jargalsaikhan Erdene. Study of the Xiongnu Tombs of Cemetery Gol mod-2 in Balgasiin tal. Улаанбаатар, 2021.

## СПИСОК ИСТОЧНИКОВ

- Полосьмак Н. В., Богданов Е. С., Цэвээндорж Д. Двадцатый Ноин-Улинский курган. Новосибирск : ИНФОЛИО, 2011. 184 с.
- Эрдэнэбаатар Д., Идэрхангай Т., Мижиддорж Э., Оргилбаяр С., Батболд Н., Галбадрах Б., Маратхаан А. Балгасын тал дахь Гол мод-2-ын Хүннүгийн язгууртны булшны судалгаа. Улаанбаатар, 2015. 28–34 р тал. Study of the Xiongnu Tombs of cemetery Gol mod-2 in Balgasiin tal. Улаанбаатар, 2015. С. 28–34. (На монг. яз.).



Diimaajav Erdenebaatar Heritage of the Xiongnu culture. UB, 2016. (in Mong. and Eng.).  
Diimaajav Erdenebaatar, Enkbayar Mijiddorj, Baatar Galbadrah, Jargalsaikhan Erdene.  
Study of the Xiongnu Tombs of cemetery Gol mod-2 in Balgasiin tal. UB, 2021.

---

**INFORMATION ABOUT THE AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ**

---

**Diimaajav Erdenebaatar**, Ulaanbaatar State University, Ulaanbaatar, Mongolia.

**Эрдэнэбаатар Диймаажав**, Улаанбаатарский государственный университет, Улаанбаатар, Монголия.

**Ligang Zhou**, Henan Provincial Institute of Cultural Heritage and Archaeology, Zhengzhou, China.

**Лиганг Жоу**, Институт культурного наследия и археологии провинции Хэнань, Чжэнчжоу, Китай.

**Lan Wanli**, Henan Provincial Institute of Cultural Heritage and Archaeology, Zhengzhou, China.

**Ванли Лан**, Институт культурного наследия и археологии провинции Хэнань, Чжэнчжоу, Китай.

**Liu Bin**, Luoyang Minicipal Institute of Cultural Heritage and Archaeology, Luoyang, China.

**Бин Лиу**, Лоянский муниципальный институт культурного наследия и археологии, Лоян, Китай.

**Enkhbayar Mijiddorj**, Ulaanbaatar State University, Ulaanbaatar, Mongolia.

**Мижиддорж Энхбаяр**, Улаанбаатарский государственный университет, Улаанбаатар, Монголия.

**Baatar Galbadrah**, Ulaanbaatar State University, Ulaanbaatar, Mongolia.

**Галбадрах Баатар**, Улаанбаатарский государственный университет, Улаанбаатар, Монголия.

*The article was submitted 12.05.2022;*

*approved after reviewing 22.08.2022;*

*accepted for publication 31.08.2022.*

*Статья поступила в редакцию 12.05.2022;*

*одобрена после рецензирования 22.08.2022;*

*принята к публикации 31.08.2022.*

# HISTORY OF ARCHAEOLOGICAL DISCOVERIES AND RESEARCH

---

Research Article / Научная статья

УДК 902:378.4(571.16)

[https://doi.org/10.14258/tpai\(2022\)34\(3\).-13](https://doi.org/10.14258/tpai(2022)34(3).-13)

## TOMSK ARCHAEOLOGICAL SCHOOL IN THE SECOND HALF OF THE 1970s — 1990s

**Vladimir Yu. Ganenok, Liudmila Yu. Kitova**

<sup>1</sup>Kemerovo State University, Kemerovo, Russia;  
vova.ganenok.96@mail.ru, <https://orcid.org/0000-0003-1760-1593>

<sup>2</sup>Kemerovo State University, Kemerovo, Russia;  
lyudmila.kitova@mail.ru, <https://orcid.org/0000-0003-4769-9819>

\*Corresponding Author

**Abstract.** The article analyzes the development of the Tomsk Archaeological School after its leader V. I. Matyushchenko moved to Omsk in 1976. The authors focus on the role of L. A. Chindina, who headed the school in the second half of the 1970s, highlighting her contribution to the development of the problems of West Siberian archaeology in the Early Iron Age and the Early Middle Ages. Having created an original concept of cultural and historical development in Western Siberia, the researcher promoted it as a specific research programme for her disciples. The authority of the Tomsk school was consolidated through holding the regular West Siberian archaeological and ethnographic meetings/conferences in 1978–1990s as well as by establishing the Department of Archaeology and Local History at Tomsk State University (TSU) in 1991. The paper identifies some features of the development of the archaeological school at TSU.

**Key words:** L. A. Chindina, TSU, archaeological school

---

**For citation:** Ganenok V. Yu., Kitova L. Yu. Tomsk Archaeological School in the Second Half of the 1970s — 1990s. *Teoriya i praktika arheologicheskikh issledovanij = Theory and Practice of Archaeological Research*. 2022;34(3):209–221. (In English). [https://doi.org/10.14258/tpai\(2022\)34\(3\).-13](https://doi.org/10.14258/tpai(2022)34(3).-13)

---

## ТОМСКАЯ АРХЕОЛОГИЧЕСКАЯ ШКОЛА ВО ВТОРОЙ ПОЛОВИНЕ 1970-х — 1990-х гг.

Владимир Юрьевич Ганенко<sup>1</sup>, Людмила Юрьевна Китова<sup>2\*</sup>

<sup>1</sup>Кемеровский государственный университет, Кемерово, Россия;  
vova.ganenok.96@mail.ru, <https://orcid.org/0000-0003-1760-1593>

<sup>2</sup>Кемеровский государственный университет, Кемерово, Россия;  
lyudmila.kitova@mail.ru, <https://orcid.org/0000-0003-4769-9819>

\*Автор, ответственный за переписку

**Резюме.** В статье анализируется история развития томской археологической школы после отъезда в 1976 г. ее лидера В. И. Матюшенко в Омск. Отмечается роль Л. А. Чиндиной, которая возглавила эту школу во второй половине 1970-х гг. Определяется ее вклад в разработку проблем археологии Западной Сибири раннего железного века и раннего Средневековья. Она, создав оригинальную концепцию культурно-исторического развития в Западной Сибири, представила ее в качестве определенной исследовательской программы для своих учеников. Указывается на укрепление позиций томской школы при проведении регулярных Западно-Сибирских археолого-этнографических совещаний/конференций в 1978–1990-е гг., чему также способствовало открытие кафедры археологии и исторического краеведения в 1991 г. Выявляются некоторые особенности развития археологической школы в ТГУ.

**Ключевые слова:** Л. А. Чиндина, ТГУ, археологическая школа

---

**Для цитирования:** Ганенко В. Ю., Китова Л. Ю. Томская археологическая школа во второй половине 1970-х — 1990-х гг. // Теория и практика археологических исследований. 2022. Т. 34, №3. С. 208–220. [https://doi.org/10.14258/tpai\(2022\)34\(2\).-13](https://doi.org/10.14258/tpai(2022)34(2).-13)

---

### Introduction

The Tomsk archaeological school has gone through a long period of formation. In their previous discussion of this way, the authors noted that Tomsk is unique among other centres in Siberia in that it had certain advantages for the emergence of the research school basis as early as in the final quarter of the 19<sup>th</sup> century (Kitova, 2005, p. 68). With the creation of the university and the Museum of Archaeology and Ethnography at TSU, there were opportunities for consolidating researchers and finds. An important chronological milestone for the further formation of this school was the period of 1919–1922, when first academic leaders appeared with their disciples. However, external circumstances proved to be destructive. As a result, the formation of research directions and building an academic team of different ages was stopped abruptly and even thrown back to the 19<sup>th</sup> century. New prerequisites for the formation of an archaeological school in Tomsk emerged in the 1940s. They included the restoration of the Faculty of History and Philology at Tomsk University, activities of the Museum of the History of Material Culture at TSU, the arrival of K. E. Grinevich and A. P. Dulzon, archaeological research on the Basandaika river and the Chulyum, as well as actively functioning students' archaeological circle. However, it was the activity of V. I. Matyushchenko in 1953–1976 that became the key factor for the formation of the archaeological school. During this period, he was able to build a team of like-minded people at TSU, to organize the training of students through the archaeological circle, specialized major undergraduate programme, and postgraduate studies. Under V. I. Matyushchenko, in continuation

of the established tradition of a comprehensive study of archaeology, anthropology and ethnology of Western Siberia the academic ties between Tomsk archaeologists and researchers in related areas as well as natural science were strengthened. Launching the FRLHAES at TSU contributed to a large-scale expansion of research in the field of archaeology and the formation of research programme of the scientific school. Thus, it is possible to claim that by the mid-1970s the formation of the Tomsk Archaeological School occurred (Kitova, 2005; 2017; Ganenok and Kitova, 2020). The paper aims at analyzing the activities of the Tomsk Archaeological School in the 1970s–1990s.

### **Results and discussion**

After the departure of V.I. Matyushchenko to Omsk in 1976, the leadership of the Tomsk Archaeological School was rightfully assigned to Lyudmila Alexandrovna Chindina. Not only L. A. Chindina substituted her senior colleague and teacher in lecturing on archaeology for history students of TSU, but headed the Department of Archaeology and Ethnography of the FRLHAES at the university and became the successor in the organization of the West Siberian Archaeological Sessions (WSAS). In 1978, under her guidance the conference expanded its area including ethnography (WSAES). She stood at the origin of the Research and Coordinating Council for Archaeology and Ethnography of Western Siberia. Since 1981, L.A. Chindina was the permanent Deputy Chairman of this Council. At that time, the Research and Coordinating Council dealt with a wide range of tasks related to the organization of the WSAEC and other forums in Siberia. Its activities were aimed at the enhancement of cooperation between fundamental academic and university research in archaeology and ethnography. The Council often coordinated the themes of theses and plans of individual research centres. The Research and Coordinating Council also discussed the issues of preserving the historical and cultural heritage of Siberia.

It is notable that, like V.I. Matyushchenko, L. A. Chindina became more than just a leader possessing the knowledge, experience, and organizational skills sufficient for the coordinated activities of her followers. She was also both a solid armchair researcher and a tireless field archaeologist. For 50 years, she led the Narym archaeological expedition of TSU, which explored archaeological sites in the Kolpashevo, Parabel, Kargasok and Molchanovo districts of Tomsk Region, and took students there for archaeological practical work. Among the outstanding archaeological complexes investigated by L. A. Chindina for 20 years was Malget in the Kolpashevo district. Based on the research on this multi-layered site Lyudmila Chindina was able to recreate the history of the peoples of the Middle Ob region for 5 thousand years: from the Neolithic – the 3<sup>rd</sup> millennium BC to the Developed Iron Age — 17<sup>th</sup> century AD.

Research papers of L. A. Chindina on the Kulayka and the Ryolka cultures are considered as a part of the foundation of Siberian archaeology (Chindina, 1977, 1984, 1991, and others). As a result of archaeological excavations, she not only obtained materials, carefully systematized and attributed them culturally and chronologically, but also considered the issues of the origin of the Kulayka and Ryolka population, their historical and cultural ties, migration processes in Siberia and their consequences. Analysis of material sources made it possible to reconstruct social and economic relations in the 5<sup>th</sup> century BC — 9<sup>th</sup> century AD, moreover, the researcher described the religious beliefs and determined the ethnic affiliation of the Ryolka population. Thus, L. A. Chindina is the successor of the ideas of V.I. Matyushchenko that

an archaeologist is a historian who studies nonliterate peoples, and he is to recreate ancient history according to material evidence. Lyudmila Alexandrovna succeeded in gradually restoring those cultural-historical changes that were taking place in the Middle Ob region during the Early Iron Age and the Early Middle Ages and in describing their features. She managed to reconstruct the ethnic genesis of the southern taiga zone population of Western Siberia. In 1986, she defended her Doctoral thesis on the “History of the Middle Ob Region in the 5<sup>th</sup> Century BC — 9<sup>th</sup> Century AD” (Chindina, 1985). It proved that the Ryolka culture discovered by her in 1970, which “developed the traditions of the Kulayka culture bearers in the Middle Ob region and was connected with the Selkups in a continuous chain, reflecting the existence of the pra-Selkup community” (Chindina, 1985, p. 34).

L. A. Chindina proposed an original concept of cultural and historical development in Western Siberia, which became a specific research programme for her disciples and served as the foundation for the informal emergence and building of the research team. This is clearly indicated by the topics of Doctoral and Candidate theses defended under her supervision (Dissertations..., 2009, p. 33), as well as her long-term leadership in the students’ research laboratory (SRL) “Archaeologist” established in 1986.

Nevertheless, it is noteworthy that fellow archaeologists of TSU were also engaged in the development of issues unrelated to the research of the leader of the school. The interests of E. A. Vasiliev, for example, primarily included the Stone and Bronze Ages of Northern Eurasia. Under the supervision of M. F. Kosarev, the researcher defended his thesis “Eneolithic and Early Bronze Age of the Middle and Northern Taiga Area of the Ob Region” (Vasiliev, 1989). M. P. Chernaya (daughter of L. A. Chindina), by the will of fate, had to reshape her research to study the Siberian Russian city — the Tomsk Kremlin (Chernaya, 1986). On the other hand, back in the days of V. I. Matyushchenko, the task had been set to study sites of the forest and forest-steppe Ob region from the Stone Age to ethnographic modernity. In addition, Tomsk archaeologists have traditionally focused on the combined development of archaeological and ethnographic problems and writing the history of the region based on material evidence. Research by E. A. Vasilyev and M. P. Chernaya complemented the historical picture created by L. A. Chindina.

However, the 1990s became a time of crisis for Tomsk archaeology (Chindina, 1998, p. 23; Belikova, 2005, p. 53). D. V. Haminov observes that in the 1990s–2000s the Tomsk Archaeological School lost their former positions (Haminov, 2011, p. 214). The collapse of the USSR led to hardships in all spheres of Russian society. For Tomsk archaeologists, this manifested itself in the actual cessation of budget funding which caused a sharp reduction in field research and research staffing (Bobrova, 2001, p. 22). In the 1990s, the staff of FRLHAES at TSU almost disintegrated (Pletneva, Chernyak, 2018, pp. 149–150). An acute problem for TSU archaeologists was the lack of suitable premises for the Museum since the university had a considerable shortage of available space at that time. The renovation of the university’s main building had been dragging on since the early 1980s. During this time, the Museum funds were repeatedly moved. The description of the condition state of the MAES made in 1993 by director of the Museum Yu. I. Ozheredov paints a sad picture. The Museum funds were located in a damp basement where they were ruined due to unfavorable temperature and humidity conditions, the activity of rodents and moths. In 1992, some of the collections were flood-

ed. Low wages and uncomfortable working conditions led to the departure of employees from the Museum. The lack of premises with appropriate conditions for storing collections, the deterioration of control over the funds resulted in such a new phenomenon as the theft of exhibits from the MAES (Vorobeva, 1993, p. 2). So, in 1994, bronze items prepared for an exhibition were stolen from the Museum (Summer news, 1994, p. one). Only in 1996, the MAES found its permanent facility, when the central part of the TSU main building was opened (Last year's news, 1996, p. 2).

Despite various challenges, archaeologists of Tomsk continued their research in the 1990s. In July 1991, at the very end of the Soviet period (A. I. Bobrova and L. A. Chindina erroneously indicate 1992 (Bobrova, 2001, p. 22; Chindina, 2004, p. 218)), the Department of Archaeology and Local History was established at the Historical Faculty of TSU. The Department's task was to train professionals in the archaeology, local history, ethnography, as well as personnel for museums and archival institutions. This event provided a significant impetus for the development of archaeology in the Tomsk Region. In 1991–2009 the department was headed by the historian A. T. Topchiy (Haminov, 2011, p. 185). The archaeological direction at the department was represented by L. A. Chindina, M.P. Chernaya and E. A. Vasiliev, who taught students a block of general and special courses and supervised field practical activities. In addition, such well-known researchers as V.I. Molodin, A.M. Maloletko, M. F. Kosarev and others were invited to give specialized courses (Chindina, 2004, pp. 218–219). By the mid-1990s, 4 professors worked at the Department of Archaeology and Local History at TSU (Haminov, 2011, p. 228). However, in fact, since its establishment, the Department has experienced a shortage of teachers (Competition to fill..., 1995, p. 8). The form of organization of research activity of archaeology students also changed. The activities the archaeological circle of TSU ceased (Gusev, 2003, p. 42), which was a consequence of the lack of opportunities for classes at the MAES, which "...ceased to be an educational unit, and thus the Museum ceased to be a member of the Fundamental Laboratory. Now it is quiet here, there is no need to teach students, the connection between generations is almost interrupted" (Chindina, 1998, p. 22). An important element in the training of future archaeologists was the activity of SRL "Archaeologist" at the Department of Archaeology and Local History of TSU. Some students received excavation permits and conducted archaeological surveys (E. V. Ugdyzhkov, O. V. Zaitseva and others) (Gusev, 2003, p. 42). In the 1990s, the succession of generations of the Tomsk Archaeological School was maintained through the effective postgraduate training at TSU. Under the supervision of L. A. Chindina, in this decade, O.B. Belikova (1990), A. I. Bobrov (1992), Yu. V. Shirin (1994), V. I. Semyonova and S. A. Terekhin (1997) (Chindina, 1998, p. 24), and E. V. Ugdyzhkov (1998) defended their Candidate theses. In 1999, M. P. Chernaya defended her Doctoral thesis under the supervision of V. F. Starkov (Chindina, 2004, p. 220).

A great role in the development of archaeological research in Siberia in the 1990s belonged to the grants from various funds and archaeologists' activities under contract. Such archaeological research teams as, for example, the one from Altai State University, were able to quickly adapt to the new system of funding field research (Tishkin, 2005, p. 35). It was somewhat more difficult for TSU archaeologists to adapt to changing environment of their activity, since in previous decades, funds for archaeological research were allocated main-

ly from budgets of the university, the city authorities, etc. (Chindina, 1998, p. 23). However, in the 1990s, Tomsk archaeologists were actively involved in the implementation of a number of research projects funded by grants. For instance, by the early 2000s, six contracts were concluded with Tomsk Mayor's Office, the Institute of Archaeology RAS, the regional authorities of the Khanty-Mansi and Yamalo-Nenets Autonomous Okrugs, etc. (Chindina, 2004, p. 219). In 1995–1996, in the framework of the federal programme “Preservation of the Archaeological Heritage of the Peoples of the Russian Federation” L. A. Chindina conducted archaeological survey on the sites in Kozhevnikovo district of Tomsk Region. In 1997–2001, Tomsk University together with the Institute of Archaeology RAS (M. F. Kosarev, M. A. Devlet, V. F. Starkov) developed the topic “Field Archaeological and Ethnographic Research in the Southern Taiga Zone of Western Siberia and its Cultural Significance: Traditions and Innovations of the Life Subsistence”. It was done as part of the federal target programme “Integration” (Gusev, 2004, p. 306).

The staff of the Department of Archaeology and Local History at TSU (L. A. Chindina, O. M. Ryndina, V. M. Kulemzin and others) and students of the SRL “Archaeologist” (D. Rybakov, O. Pristupa and others) took most active part in these programmes funded by grants. Field research covered the Kolpashevo, Chainsk, Kozhevnikovo and Tomsk districts of the Tomsk Region. For example, in 1995–1996, 42 new sites were discovered (from the Neolithic to the 16<sup>th</sup> century, most of them belonging to the Iron Age) in the Kozhevnikovo district. In 1995–2000, in this area, extensive work was conducted on the Kireevsky III fortified settlement, which produced evidence to trace the history of interaction and succession of three early Iron Age cultures in the southern taiga zone of the Ob River region (Bolshaya Rechka, Kizhirovo, Kulayka). L. A. Chindina, E. V. Barsukov, A. M. Maloletko did their research on Mount Kulayka in Chainsk district. In 1997–2002, M. P. Chernaya studied a significant part of the wall of the Tomsk Kremlin, the *voivode* (military governor) estate of the second half of the 17<sup>th</sup> — mid-18<sup>th</sup> centuries (Chindina, 2003, pp. 5–7). To summarize, in the 1990s, field research by TSU archaeologists covered vast forest-steppe and taiga zones of Western Siberia and some regions of the Far North. The chronological framework of these activities was also impressive: from the early metal age to the late Middle Ages and the beginning of the Russian exploration of Siberia (this includes the activities of M. P. Chernaya on the historical and archaeological study of the early history of Tomsk). “It is difficult to overestimate the importance of contracts and grants... Due to this funding, it was possible to conduct educational practical work, specialized training in general, and engage in research projects” (Chindina, 2004, p. 219). In the 1990s, The Tomsk Regional Museum of Local Lore (in 1984–1998 — the Tomsk State Historical and Architectural Museum, TSHAM) launched its archaeological research programme in Tomsk. It was associated with the activities of a recent graduate of the TSU Institute of Philosophy, Ya. A. Yakovlev. He succeeded in forming a small team of archaeologists (including A. I. Bobrova, G. I. Grebneva and others) and in establishing the Archaeological Department in the Museum in 1997. In the 1990s, the group of TSHAM archaeologists was engaged in the preparation of a catalogue of the Museum archaeological collections and in carrying out both scheduled and salvage surveys and excavations (Grebneva, 1998, pp. 14–18).

An important moment that summed up the original result of the Tomsk archaeologists' activities in the previous decades was the publication of the first and second volumes of the “Ar-

chaeological Map of Tomsk Region” in 1990 and 1993 respectively. In preparing these works, Tomsk archaeologists did a significant job of searching for information in the archives of Tomsk, Moscow, Omsk, and Kolpashevo. In total, the “Archaeological Map of Tomsk Region” included descriptions of 1315 sites that were known in 1980 (Chindina, 1990, pp. 3–6). In the 1990s, the work on the four-volume “Studies in the cultural genesis of the peoples of Western Siberia” was completed. The “Studies...” were of a truly fundamental owing to the participation of Tomsk archaeologists, ethnographers, anthropologists and their colleagues from a number of Russian cities (Pletneva, Chernyak, 2018, p. 149). In the second half of the 1980s, a group of Tomsk researchers headed by the ethnographer N. V. Lukina developing the research subject “Ethnocultural History of Western Siberia” set the goal of “tracing the process of the formation and development of a number of important components of culture (dwelling, funeral rite, ornamentation), as well as changes in the anthropological composition of population in Western Siberia from ancient times to the present” (Dremov, Lukina, Chindina, 1990, p. 227). In 1994 the project results were presented in the first two published volumes (“Settlements and Dwellings” and “The Real and Other Worlds”) covering the period from the Stone Age to the present. The third volume on ornamentation was published in 1995 (due to the lack of specialists, only ethnographic materials were used). In 1998, the fourth volume (“Racial Genesis of the Indigenous Population”) was published (Pletneva, Chernyak, 2018, pp. 149–151). L. A. Chindina rightfully stated that the Studies “...is an invaluable territorial and chronological collection of data...” on various aspects of the material and spiritual culture of the peoples of Western Siberia from antiquity to ethnographic modernity (Chindina, 1998, p. 23).

Consideration of the problems of cultural genesis and ethnogenesis of the West Siberian population, the development of a comprehensive approach to solve these problems was also facilitated by the continuing tradition of West Siberian archaeological and ethnographic sessions in Tomsk (since 1998 — WSAEC conferences). Thus, the 1993 meeting was focused on “Cultural and genetic processes in Western Siberia.” In 1995, the key issue under discussion was “Methodology for comprehensive research of cultures and peoples of Western Siberia” (Chindina, 1995, p. 6). In 1998, the participants of the XI WSAEC were invited to make reports on “The Life Subsistence System of Traditional Societies in Antiquity and Modernity: Theory, Methodology, Practice.” Regrettably, financial difficulties caused a pronounced decrease in the number of speakers in these forums in the 1990s (104 researchers took part in the 1990 meeting, 60 — in 1993, and 54 — in 1995). Nevertheless, it was during this period that the representation of foreign speakers from countries of near and far abroad (Ukraine, Germany) increased (Chindina, Chernaya, 2010, p. 7). As before, an important scientific and organizational role in the archaeology and ethnography of Western Siberia was played by the Research and Coordinating Council (Chairman — Academician A. P. Derevyanko, Vice-Chairman — Professor L. A. Chindina).

Council members, working on a voluntary basis, continued to coordinate the plans of the centres of West Siberian archaeology, holding forums, etc. (Life in science, 1997, p. 24). Holding sessions/conferences in Tomsk, as it was noted earlier, reflects the merits of Tomsk researchers in the development of interdisciplinary studies. In the 1980s–1990s, the interaction of archaeologists and ethnographers of Tomsk reached a new level “characterized by deep analytics and attention to the source, a detailed study of the versatile and multicomponent ethnic culture” (Gusev, 2009, p. 200). A number of research methods innovative for that



time and recognized by the scientific community were developed at Tomsk University. Thus, in the second half of the 1980s — 1990s the Tomsk archaeologists L. A. Chindina and her student S. A. Terekhin were among the first in the country to develop “an experimental method for the technology of bronze casting production, and along the way, the construction of dwellings based on ancient models.” In 1997, S. A. Terekhin defended his Doctoral thesis on non-ferrous metallurgy of the Kulayka culture (Vasyugan stage) (Chindina, 1998, p. 20).

In the 1990s, Tomsk archaeologists established active contacts with their foreign colleagues. For example, in 1992 a TSU delegation visited Valencia (Spain), where they signed an agreement on scientific and humanitarian cooperation between TSU and University of Valencia. Moreover, “the Spanish side showed particular interest in archaeological research” (“In Spain they have...”, 1992, p. 4). In the first half of the 1990s, L. A. Chindina participated in the VII Congress of Finno-Ugric Studies (1990, Debrecen, Hungary) and a symposium on issues of Uralic studies (1993, Szombathely, Hungary) (Nekrylov, 2003, p. 373). In 1999, long-term joint research by Tomsk scientists (headed by Yu. I. Ozheredov) and their Mongolian colleagues was launched to study the archaeological sites of Western Mongolia (Haminov, 2011, p. 233). Since the 1990s, TSU hosted international conferences “Natural Conditions, Culture and History of Western Mongolia and adjacent regions” where reports on archaeology were presented. Thus, field research by Tomsk archaeologists expanded beyond Russia for the first time (Conference..., 1999, p. 7).

### Conclusion

Thus, the considered period (the second half of the 1970s — 1990s) in the development of the Tomsk Archaeological School is connected with the activity of L. A. Chindina. She became the leader of this school and proposed an original concept of cultural and historical development in Western Siberia in the 5<sup>th</sup> century BC — 9<sup>th</sup> century AD. This concept became the basis of the research programme for her disciples: both postgraduate and undergraduate students.

Despite the social and economic challenges of the 1990s, Tomsk archaeologists were able to continue developing their research in the West Siberian region and even enter the international arena. Owing to the creation of the Department of Archaeology and Local History (1991), involvement in various research programmes and grants, TSU archaeologists managed to maintain the system of training professionals, organize the publication of major scientific papers and hold representative Tomsk sessions/conferences. A number of new areas of research were developed (the early history of Tomsk, experiments in studying non-ferrous metallurgy of the Kulayka population, etc.). The Tomsk Archaeological School retained its potential, and Tomsk remains the coordinating centre of the university archaeology and ethnography of Western Siberia.

### REFERENCES

- Belikova O. B. Bronze Age Pottery from the Taiga Area of the Chulym Region (south of Western Siberia). In: Western and Southern Siberia in Antiquity. Barnaul : Izd-vo Alt. un-ta, 2005. Pp. 47–53. (*In Russ.*).
- Bobrova A. I. Archaeological Research of Tomsk Region, History. In: Peoples and Cultures of the Tom-Narym Area of the Ob Region: Materials for the Encyclopedia of the Tomsk Region. Tomsk : Izd-vo Tom. un-ta, 2001. Pp. 16–23. (*In Russ.*).

Vasiliev E. A. The Eneolithic and Early Bronze Age of the Middle and North Taiga Areas of the Ob Region: the Author's Abstract of the Candidate's Thesis in History. Moscow, 1989. 21 p. (*In Russ.*).

Vorobieva N. University Museums: Poverty with Wealth. *Alma Mater*. 1993;24(2126):4. (*In Russ.*).

Ganenok V. Yu., Kitova L. Yu. Tomsk Archaeological School. Formation period. *Teoriya i praktika arheologicheskikh issledovanij = Theory and Practice of Archaeological Research*. 2020;4(32):7–19. (*In Russ.*).

Grebneva G. I. Archaeological Research of the Tomsk Regional Museum of Local Lore in 1980–1996. In: History and Culture of Tomsk Region. Tomsk : Izd-vo Tom. un-ta, 1998. Pp. 14–20. (*In Russ.*).

Gusev A. V. On the History of the Organization of Students' Archaeological Research at Tomsk State University (Second Half of the 20<sup>th</sup> Century). In: Culture of Siberia and Adjacent Territories in the Past and Present. Tomsk : Izd-vo Tom. un-ta, 2003. Pp. 39–42. (*In Russ.*).

Gusev A. V. Tomsk University Archaeological Centre (1940–1990). In: Universities as Region-Forming Scientific and Educational Complexes. Omsk : Izd-vo Om. gos. un-ta, 2004. Ch. 3. Pp. 303–306. (*In Russ.*).

Gusev A. V. On the Way of Integration of Archaeology and Ethnography: Research of Tomsk University Archaeologists in the 1940s–1990s. In: Problems of Archaeology and History of Northern Eurasia. Tomsk : Agraf-Press, 2009. Pp. 198–200. (*In Russ.*).

Dissertations Written under the Supervision of L. A. Chindina. In: Problems of Archaeology and History of Northern Eurasia. Tomsk : Agraf-Press, 2009. P. 33. (*In Russ.*).

Dremov V. A., Lukina N. V., Chindina L. A. Archaeology, Ethnography and Anthropology at Kuibyshev Tomsk State University (To the 100<sup>th</sup> anniversary of the University establishment). In: Rituals of the Peoples of Western Siberia. Tomsk : Izd-vo Tom. un-ta, 1990. Pp. 214–227. (*In Russ.*).

Life in Science. In: Topical Issues of Ancient and Medieval History of Siberia. Tomsk : Izd-vo Tom. gos. un-ta sistem upravleniya i radioelektroniki, 1997. Pp. 21–42. (*In Russ.*).

Kitova L. Yu. Tomsk as a Centre for Archaeological Studying of Siberia in the 1920s and 1930s. In: Archaeology of Southern Siberia. Kemerovo : Kuzbassvuzizdat, 2005. Vyp. 23. Pp. 68–75. (*In Russ.*).

Kitova L. Yu. L. A. Chindina and the Tomsk Archaeological School. In: Cultures and Peoples of Northern Eurasia: a Look through Time. Tomsk : ID “D’Print”, 2017. Pp. 48–50. (*In Russ.*).

Competition to Fill the Vacancies. *Alma Mater*. 1995;6(2172):8. (*In Russ.*).

Conference Focusing to Mongolia. *Alma Mater*. 1999;8(2266):12. (*In Russ.*).

Summer News. *Alma Mater*. 1994;21(2155):4. (*In Russ.*).

Nekrylov S. A. Lyudmila Aleksandrovna Chindina. In: Professors of Tomsk State University: Biographical Dictionary (1980–2003). Tomsk : Izd-vo Tom. un-ta, 2003. T. 4. Ch 2. Pp. 370–374. (*In Russ.*).

Pletneva L. M., Chernyak E. I. Contribution of Staff of FRLHAES to the Activities of the Museum of Archaeology and Ethnography of Siberia. *Vestnik Tomskogo gosudarstvennogo universiteta. Kul'turologiya i iskusstvovedenie = Bulletin of Tomsk State University. Cultural Studies and Art History*. 2018;32:144–154. (*In Russ.*).

- Last Year's News. *Alma Mater*. 1996;23(2219):8. (*In Russ.*).
- Tishkin A. A. Past Times.... In: Western and Southern Siberia in Antiquity. Barnaul : Izd-vo Alt. un-ta, 2005. Pp. 24–35. (*In Russ.*).
- In Spain They Have... *Alma Mater*. 1992;19(2085):4. (*In Russ.*).
- Haminov D. V. Historical Education and Research at Tomsk University in the Late 19<sup>th</sup> — Early 21<sup>st</sup> Century. Tomsk : Izd-vo Tom. un-ta, 2011. 270 p. (*In Russ.*).
- Chernaya M. P. Research in Tomsk and Tomsk Region. In: Archaeological Discoveries of 1984. M. : Nauka, 1986. P. 205. (*In Russ.*).
- Chindina L. A. The Ryolka Burial Ground in the Middle Ob Region. Tomsk : Izd-vo Tom. un-ta, 1977. 192 p. (*In Russ.*).
- Chindina L. A. Ancient History of the Middle Ob Region in the Iron Age: the Kulayka Culture. Tomsk : Izd-vo Tom. un-ta, 1984. 255 p. (*In Russ.*).
- Chindina L. A. The History of the Middle Ob Region in the 5<sup>th</sup> Century BC — 9<sup>th</sup> Century AD: an Author's Abstract of the Doctoral Thesis in History. Tomsk, 1985. 38 p. (*In Russ.*).
- Chindina L. A. Introduction. In: Archaeological Map of the Tomsk Region. Tomsk : Izd-vo Tom. un-ta, 1990. T. I. Pp. 3–6. (*In Russ.*).
- Chindina L. A. History of the Middle Ob Region in the Early Middle Ages (Ryolka culture). Tomsk : Izd-vo Tom. un-ta, 1991. 184 p. (*In Russ.*).
- Chindina L. A. From the Editor. A Quarter of a Century from the History of West Siberian Archaeology. In: Methods of Comprehensive Research of Cultures and Peoples of Western Siberia. Tomsk : Izd-vo Tom. un-ta, 1995. Pp. 5–8. (*In Russ.*).
- Chindina L. A. Thirty-year Period of Archaeology in Tomsk University. In: From the History of Siberia. To the 30<sup>th</sup> Anniversary of the Laboratory. Tomsk : Izd-vo Tom. un-ta, 1998. Pp. 17–24. (*In Russ.*).
- Chindina L. A. Some Results of Archaeological and Ethnographic Research in the Southern Taiga Region of the Ob River Region. In: Archaeological and Ethnographic Research in the Southern Taiga Zone of Western Siberia. Tomsk : Izd-vo Tom. un-ta, 2003. Pp. 5–8. (*In Russ.*).
- Chindina L. A. Archaeological Department of the History Faculty at TSU. *Vestnik Tomskogo gosudarstvennogo universiteta. Seriya: Istoriya. Kraevedenie. Etnologiya. Arheologiya = Bulletin of the Tomsk State University. Series: History. Local history. Ethnology. Archaeology*. 2004;281:218–223. (*In Russ.*).
- Chindina L. A., Chernaya M. P. On the History of the West Siberian Archaeological and Ethnographic Conferences. Instead of a Preface. In: Culture as a System in a Historical Context: Experience of the West Siberian Archaeological and Ethnographic Conferences. Tomsk : Agraf-Press, 2010. Pp. 3–8. (*In Russ.*).

### СПИСОК ИСТОЧНИКОВ

- Беликова О. Б. Керамика эпохи бронзы из таежного Причудлымья (юг Западной Сибири) // Западная и Южная Сибирь в древности. Барнаул : Изд-во Алт. ун-та, 2005. С. 47–53.
- Боброва А. И. Археологическое исследование Томской обл., история // Народы и культуры Томско-Нарымского Приобья: Материалы к энциклопедии Томской области. Томск : Изд-во Том. ун-та, 2001. С. 16–23.

Васильев Е. А. Энеолит и ранний бронзовый век средне- и северотаежного Приобья: автореф. дис. ... канд. ист. наук. М., 1989. 21 с.

Воробьева Н. Университетские музеи: нищета при богатстве // *Alma Mater*. 1993. №24 (2126). 4 с.

Ганенок В. Ю., Китова Л. Ю. Томская научная археологическая школа. Период формирования // *Теория и практика археологических исследований*. 2020. №4 (32). С. 7–19.

Гребнева Г. И. Археологические исследования Томского областного краеведческого музея в 1980–1996 гг. // *История и культура Томской области*. Томск : Изд-во Том. ун-та, 1998. С. 14–20.

Гусев А. В. К истории организации студенческих археологических исследований в Томском государственном университете (вторая половина XX в.) // *Культура Сибири и сопредельных территорий в прошлом и настоящем*. Томск : Изд-во Том. ун-та, 2003. С. 39–42.

Гусев А. В. Томский университетский археологический центр (1940–1990 гг.) // *Университеты как регионообразующие научно-образовательные комплексы*. Омск : Изд-во Ом. гос. ун-та, 2004. Ч. 3. С. 303–306.

Гусев А. В. На пути интеграции археологии и этнографии: исследования археологов Томского университета в 1940–1990-е гг. // *Проблемы археологии и истории Северной Евразии*. Томск : Аграф-Пресс, 2009. С. 198–200.

Диссертации, написанные под руководством Л. А. Чиндиной // *Проблемы археологии и истории Северной Евразии*. Томск : Аграф-Пресс, 2009. С. 33.

Дрёмов В. А., Лукина Н. В., Чиндина Л. А. Археология, этнография и антропология в Томском государственном университете им. В.В. Куйбышева (К 100-летию открытия университета) // *Обряды народов Западной Сибири*. Томск : Изд-во Том. ун-та, 1990. С. 214–227.

Жизнь в науке // *Актуальные проблемы древней и средневековой истории Сибири*. Томск : Изд-во Том. гос. ун-та систем управления и радиоэлектроники, 1997. С. 21–42.

Китова Л. Ю. Томск как центр археологического изучения Сибири в 1920–30-е гг. // *Археология Южной Сибири*. Кемерово : Кузбассвузиздат, 2005. Вып. 23. С. 68–75.

Китова Л. Ю. Л. А. Чиндина и Томская археологическая школа // *Культуры и народы Северной Евразии: взгляд сквозь время*. Томск : ИД «Д`Принт», 2017. С. 48–50.

Конкурс на замещение вакантных должностей // *Alma Mater*. 1995. №6 (2172). 8 с.

Конференция, посвященная Монголии // *Alma Mater*. 1999. №8 (2266). 12 с.

Летние новости // *Alma Mater*. 1994. №21 (2155). 4 с.

Некрылов С. А. Чиндина Людмила Александровна // *Профессора Томского государственного университета: Биографический словарь (1980–2003)*. Томск : Изд-во Том. ун-та, 2003. Т. 4. Ч. 2. С. 370–374.

Плетнева Л. М., Черняк Э. И. Вклад сотрудников ПНИЛ ИАЭС в деятельность Музея археологии и этнографии Сибири // *Вестник Томского государственного университета. Культурология и искусствоведение*. 2018. №32. С. 144–154.

Прошлогодние новости // *Alma Mater*. 1996. №23 (2219). 8 с.

Тишкин А. А. Времена минувшие... // *Западная и Южная Сибирь в древности*. Барнаул : Изд-во Алт. ун-та, 2005. С. 24–35.

У них в Испании... // *Alma Mater*. 1992. №19 (2085). 4 с.

Хаминов Д. В. Историческое образование и наука в Томском университете в конце XIX — начале XXI в. Томск : Изд-во Том. ун-та, 2011. 270 с.

Черная М. П. Исследования в Томске и Томской области // Археологические открытия 1984 года. М. : Наука, 1986. С. 205.

Чиндина Л. А. Могильник Рёлка на Средней Оби. Томск : Изд-во Том. ун-та, 1977. 192 с.

Чиндина Л. А. Древняя история Среднего Приобья в эпоху железа: Кулайская культура. Томск : Изд-во Том. ун-та, 1984. 255 с.

Чиндина Л. А. История Среднего Приобья в V в. до н.э. — IX в. н.э.: автореф. дис. ... д-ра ист. наук. Томск, 1985. 38 с.

Чиндина Л. А. Введение // Археологическая карта Томской области. Томск : Изд-во Том. ун-та, 1990. Т. I. С. 3–6.

Чиндина Л. А. История Среднего Приобья в эпоху раннего средневековья (рёлкинская культура). Томск : Изд-во Том. ун-та, 1991. 184 с.

Чиндина Л. А. От редактора. Четверть века из истории западносибирской археологии // Методика комплексных исследований культур и народов Западной Сибири. Томск : Изд-во Том. ун-та, 1995. С. 5–8.

Чиндина Л. А. Тридцатилетний этап археологии Томского университета // Из истории Сибири. К 30-летию лаборатории. Томск : Изд-во Том. ун-та, 1998. С. 17–24.

Чиндина Л. А. Некоторые итоги археолого-этнографических исследований в южно-таежном регионе Приобья // Археолого-этнографические исследования в южнотаежной зоне Западной Сибири. Томск : Изд-во Том. ун-та, 2003. С. 5–8.

Чиндина Л. А. Археологическое направление исторического факультета ТГУ // Вестник Томского государственного университета. Серия: История. Краеведение. Этнология. Археология. 2004. №281. С. 218–223.

Чиндина Л. А., Черная М. П. К истории Западносибирских археолого-этнографических конференций. Вместо предисловия // Культура как система в историческом контексте: Опыт Западно-Сибирских археолого-этнографических совещаний. Томск : Аграф-Пресс, 2010. С. 3–8.

---

#### CONTRIBUTION OF THE AUTHORS / ВКЛАД АВТОРОВ

---

V. Yu. Ganenok: preparation of the main text of the article, discussion of the results.

Ганенок В. Ю.: подготовка основного текста статьи, обсуждение результатов.

L. Yu. Kitova: Idea of publication, discussion of the results and scientific editing of the text.

Китова Л. Ю.: идея публикации, обсуждение результатов, научное редактирование статьи.

There is no conflict of interest / Конфликт интересов отсутствует.

---

#### INFORMATION ABOUT THE AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ

---

**Vladimir Yurievich Ganenok**, Postgraduate Student of the Department of Archaeology at Kemerovo State University, Kemerovo, Russia.

**Ганенок Владимир Юрьевич**, аспирант кафедры археологии Кемеровского государственного университета, Кемерово, Россия.

---

**Liudmila Yurievna Kitova**, Doctor of Historical Sciences, Professor of the Department of Archaeology at Kemerovo State University, Kemerovo, Russia.

**Китова Людмила Юрьевна**, доктор исторических наук, профессор кафедры археологии Кемеровского государственного университета, Кемерово, Россия.

*The article was submitted 26.06.2022;*

*approved after reviewing 10.07.2022;*

*accepted for publication 16.08.2022.*

*Статья поступила в редакцию 26.06.2022;*

*одобрена после рецензирования 10.07.2022;*

*принята к публикации 16.08.2022.*

## СПИСОК СОКРАЩЕНИЙ

---

- АлтГПУ — Алтайский государственный педагогический университет.  
АН — Академия наук.  
БНЦ — Бурятский научный центр.  
БПЛА — беспилотный летательный аппарат.  
ГАГУ — Горно-Алтайский государственный университет.  
ГИКЗМ — Государственный историко-культурный музей-заповедник.  
ГИС — геоинформационная система.  
ДВО — Дальневосточное отделение.  
ЗабГУ — Забайкальский государственный университет.  
ЗСОРГО — Западно-Сибирский отдел Русского географического общества.  
ИА — Институт археологии.  
ИАЭТ — Институт археологии и этнографии.  
ИГУ — Иркутский государственный университет.  
ИИМК — Институт истории материальной культуры.  
ИОН — Институт общественных наук.  
ИрГТУ — Иркутский национальный исследовательский технический университет.  
КазНИИ — Казахский научно-исследовательский институт культуры.  
КарГУ — Карагандинский государственный университет им. Е.А. Букетова.  
КГПУ им. В.П. Астафьева — Красноярский государственный педагогический университет им. В.П. Астафьева.  
КемГУ — Кемеровский государственный университет.  
ЛГУ — Ленинградский государственный университет.  
НГПУ — Новосибирский государственный педагогический университет.  
НГУ — Новосибирский государственный университет.  
НИЦИА — Научно-исследовательский центр истории и археологии.  
ОмГУ — Омский государственный университет.  
ПНИЛ ИАЭС — Проблемная научно-исследовательская лаборатория истории, археологии и этнографии Сибири.  
РАН — Российская академия наук.  
РИО — редакционно-издательский отдел.  
РНФ — Российский научный фонд.  
РТ — Республика Таджикистан.  
РФФИ — Российский фонд фундаментальных исследований.  
САИПИ — Сибирская Ассоциация исследователей первобытного искусства.  
СВКНИИ — Северо-Восточный комплексный научно-исследовательский институт им. Н.А. Шило.  
СО — Сибирское отделение.  
СССР — Союз Советских Социалистических Республик.

---

ТГУ (ТомГУ) — Томский государственный университет.

ТувИКОПР — Тувинский институт комплексного освоения природных ресурсов.

УГПИ — Уссурийский государственный педагогический институт.

УрО — Уральское отделение.

ФНЦ БСТ — Федеральный научный центр биологических систем и агротехнологий.

ЦММ — цифровая модель местности.



*Научное издание  
Журнал*

# ТЕОРИЯ И ПРАКТИКА АРХЕОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ

**Том 34 №3 2022**

Редактор: *Н. Ю. Ляшко*

Перевод и редактирование текстов на английском языке, References: *Е. А. Россинская*

Подготовка оригинал-макета: *Ю. В. Луценко*

Журнал распространяется по подписке АО «Почта России»

Подписной индекс П4317

Подписка через каталог «Урал-Пресс», индекс ВН018441

Цена свободная

Подписано в печать 06.09.2022.

Дата выхода издания в свет 23.09.2022.

Формат 70×100<sup>1/16</sup>. Гарнитура Minion Pro. Бумага офсетная.

Усл. печ. л. 18,06.

Тираж 500 экз. Заказ 462.

Отпечатано в типографии Алтайского государственного университета  
656049, Барнаул, ул. Димитрова, 66