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

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

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

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

Introduction

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

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

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

Study results

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

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

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

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

Discussion

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

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

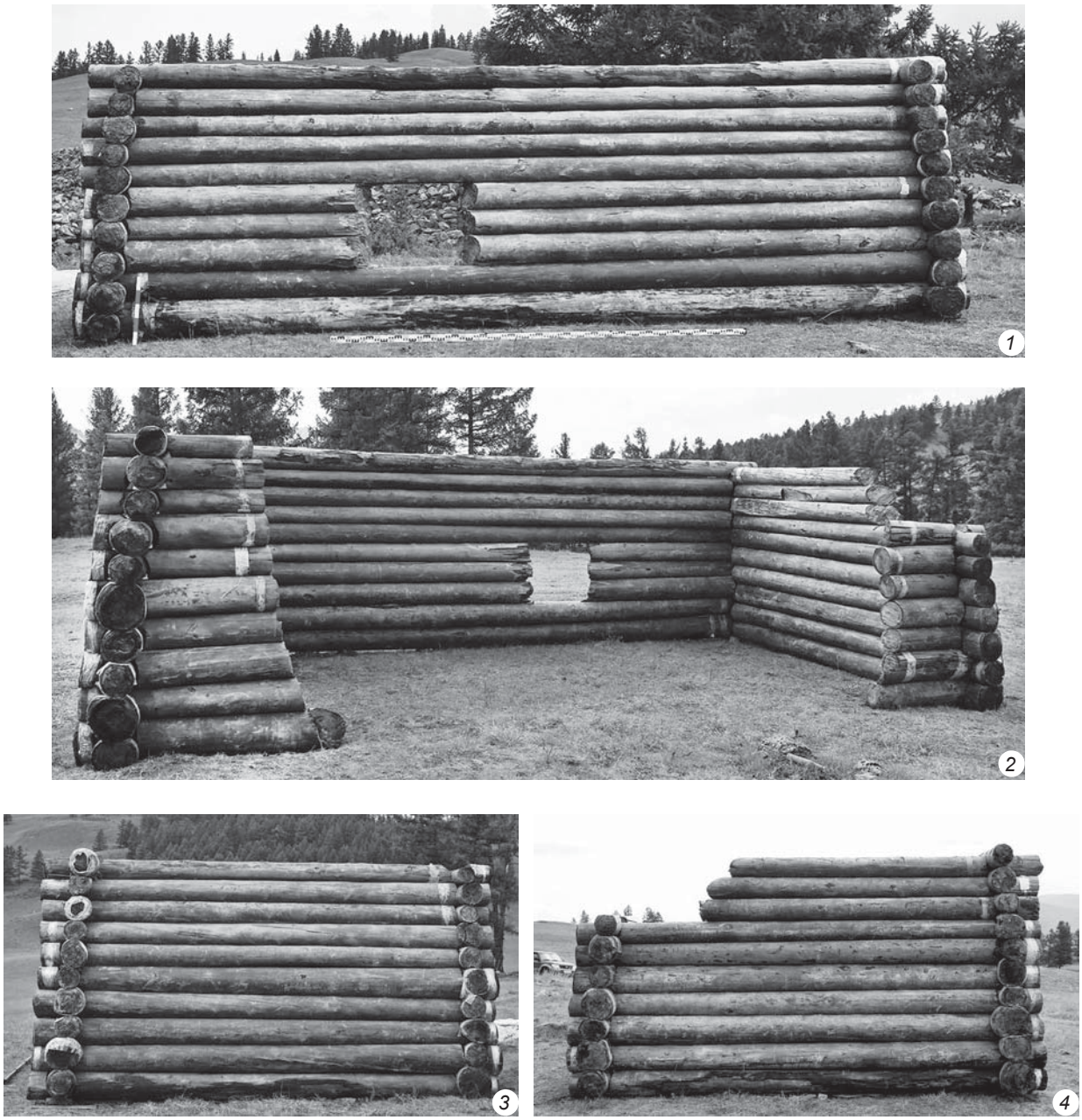

Fig. 1. Walls of the outer cribwork from kurgan 5 of the Pazyryk cemetery, after rapid reconstruction. 2019.
1 – southern; *2* – northern; *3* – eastern; *4* – western.

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

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

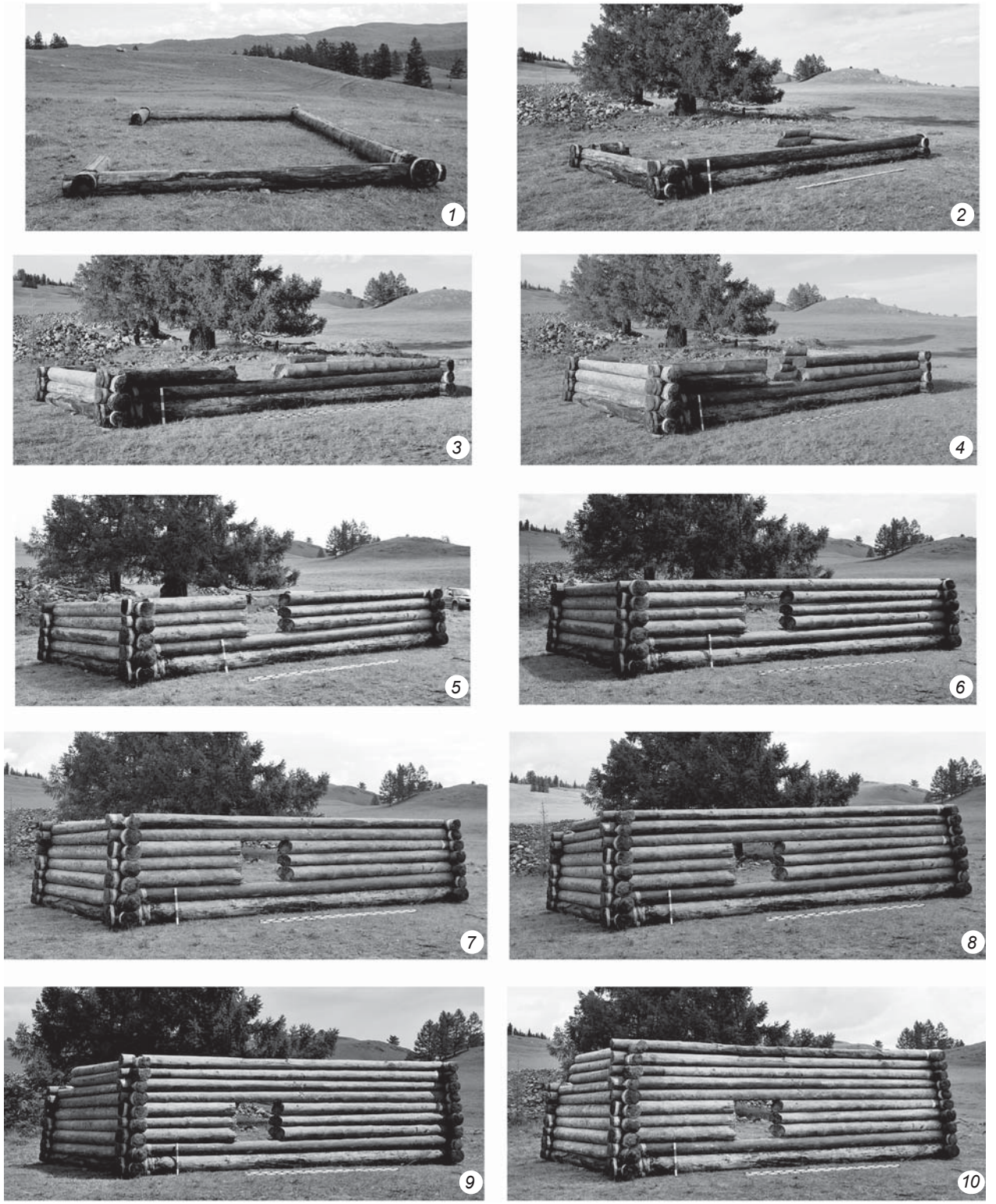

Fig. 2. Rapid reconstruction. Assembling the cribwork layer by layer on a special open ground.

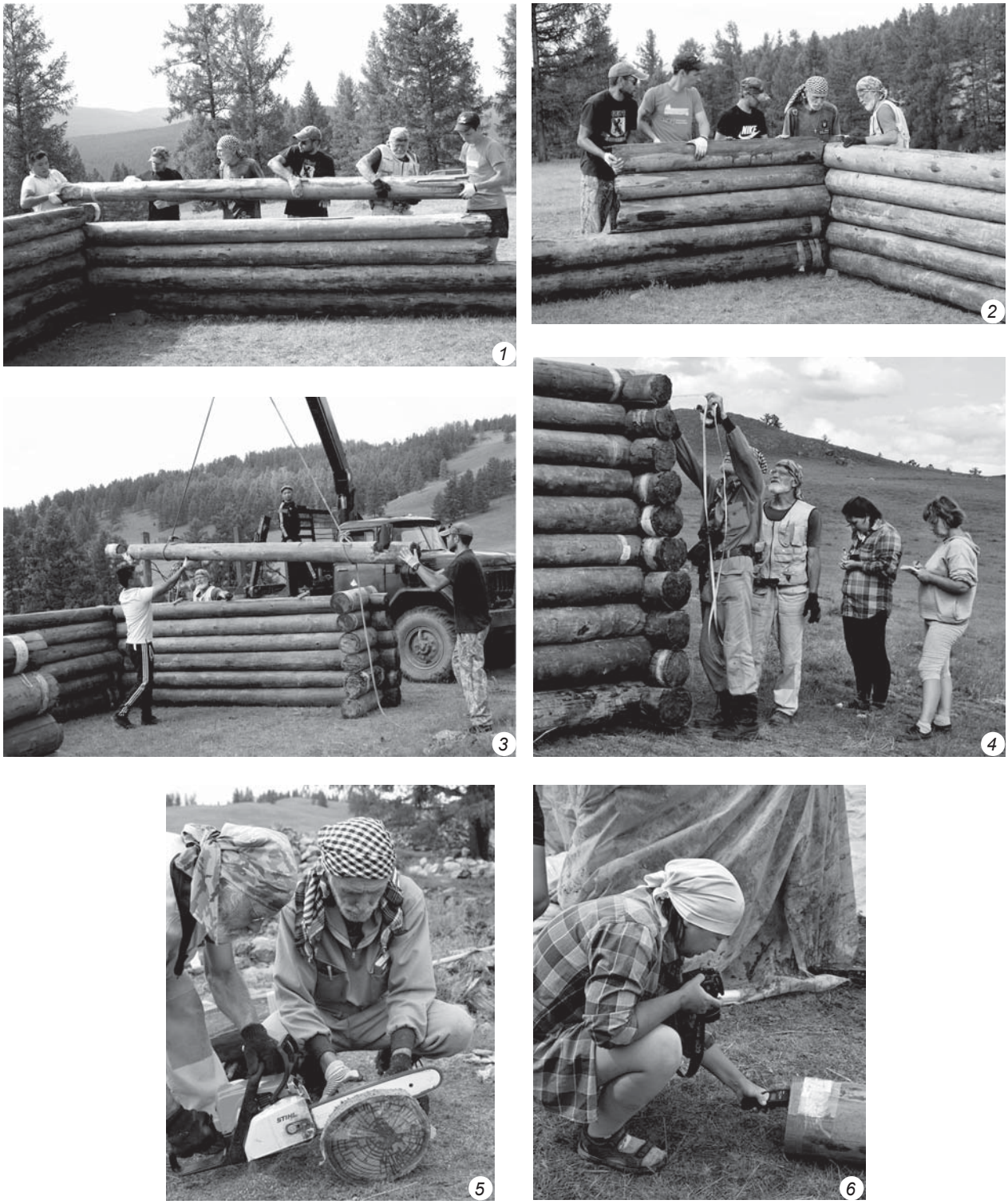

Fig. 3. Rapid reconstruction.
1–3 – manual assembling of the cribwork; *4* – technical and technological examination of cribwork walls; *5* – sampling for dendrochronological analysis; *6* – attribution of a log in the outer cribwork for conservation and restoration.

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

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

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

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

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

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

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

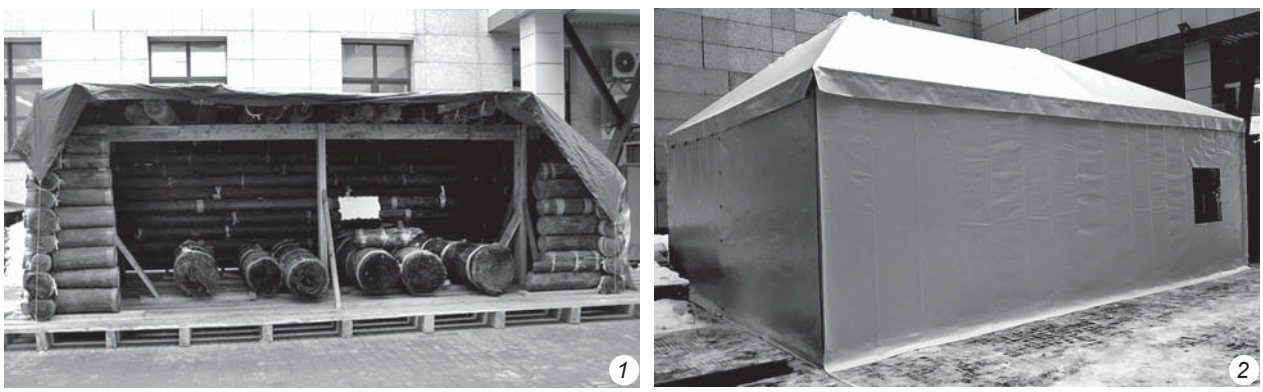

Fig. 5. Burial structure made of logs on the museum exposition ground (*1*); protective pavilion above the cribwork (*2*).

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

Methodology for follow-up research of burial structures

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

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

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

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

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

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

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

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

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

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

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

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

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

Conclusions

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

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

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