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EXPERIMENTAL STUDY OF LOGS FROM SHILIKTY CEMETRY (East Kazakhstan)

The article presents data from an experimental study of the technological function of the cross-cutting eyelets in the logs found in the wooden-stone part of the mound № 1 of the Shilikty-3 burial ground which located in East Kazakhstan. According to the earlier dendrochronological analyzes of wood materials, the age of the mound № 1 is determined within the 7th century BC. The wooden part of the tomb was built of thick, butt-stacked larch logs in two rows, according to the cage-frame principle. Due to the fact that the forest required for the construction of the tomb was at a distance of 25 km from the burial site, the eyelets in larch logs were most likely used for dragging with horses. To verify this observation, the authors of the article conducted a full-scale experiment for the first time using materials available to the ancient society of the Saka culture. The study also established the time spent on operations. Three horses of the local breed were involved in the process of transporting the logs. During the experiment, it turned out that not every horse can cope with this kind of load. Thus, the results of the study showed the reliability of the above mentioned observation. So after dragging, traces of beveling become noticeable on the thin end of the log, similar to an archaeological source. In general, the experimental study of the technology used to cut and transport logs helps researchers to draw attention to those details of the daily life of ancient societies that previously seemed natural and did not require proof.

Key words: experimental archeology, burial structure, Saka culture, East Kazakhstan.

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Шілікті қорымындағы (Шығыс Қазақстан) ағаш бөренелерді эксперименттік зерттеу

Мақалада Шығыс Қазақстан аумағында орналасқан Шілікті-3 қорымының № 1 қорғанынан табылған ағаш бөренелердегі көзшелердің технологиялық қызметін анықтауға бағытталған эксперименттік зерттеу нәтижелері келтіріледі. Қабірхана ағаштарына жүргізілген дендрохронологиялық талдауға сәйкес қорған б.з.д. VII ғ. мерзімделеді. Қорғанның ағаш құрылысы жеті қатар қос бөренелерден тұрғызылған сатылы пирамидаға ұқсас. Ендігі жерде, құрылысқа қажетті орман жерлеу орнынан 25 км қашықтықта орналасқанын ескерсек, Шілікті бөренелеріндегі көзшелер жылқылардың көмегімен сүйреу үшін қолданылуы мүмкін деген болжамға келеміз. Аталмыш гипотезаны тексеру мақсатында алғаш рет далалық эксперимент ұйымдастырылып, оның міндеттеріне ағаш кесу маусымын анықтау, әрбір жұмысқа кеткен еңбек күшін есептеу, сонымен қатар жылқымен бөренені тасымалдау барысындағы ерекшеліктерді сипаттау жатты. Осылайша, зерттеу нәтижелері жоғарыда аталған бақылаудың дұрыстығын көрсетті, өйткені тасымалдаудан кейін бөрененің жұқа ұшында археологиялық дереккөзге ұқсас қиғаштық іздері байқала бастады. Жалпы алғанда, қабірхана құрылысынан табылған бөренелерді дайындау, өңдеу кезінде қолданылатын технологияларды эксперименттік тұрғыда зерттеу сақ қоғамының осыған дейін табиғи әрі дәлелдеуді қажет етпейтіндей болып көрінетін күнделікті өмірінің жаңа қырларына назар аударуға көмектеседі.

Түйін сөздер: эксперименттік археология, жерлеу құрылысы, Сақ мәдениеті, Шығыс Қазақстан.

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Экспериментальное исследование бревен могильника Шиликты (Восточный Казахстан)

В статье приводятся данные экспериментального исследования технологической функции проушин в бревнах, найденных в деревянно-каменной части кургана № 1 могильника Шиликты-3, расположенного в Восточном Казахстане. Согласно проведенным ранее дендрохронологическим анализам древесных материалов возраст кургана определяется в пределах VII в. до н.э. Деревянная часть кургана построена из впритык уложенных двурядных листовидных толстых бревен по принципу сруба-клетки. В связи с тем, что лес, необходимый для строительства усыпальницы, находился на расстоянии 25 км от места захоронения, то проушины в бревнах, вероятнее всего, использовались для волочения с помощью лошадей. Для более тщательной проверки этого наблюдения авторами статьи впервые был проведен полномасштабный эксперимент с использованием материалов доступных для древнего общества сакской культуры. В ходе исследования также были установлены временные трудозатраты по операциям. В процессе транспортировки были задействованы три лошади местной породы. Однако во время эксперимента выяснилось, что не каждый жеребец может справиться с такого рода нагрузкой. Таким образом, результаты исследования показали достоверность вышеуказанного наблюдения, так как после волочения на тонком конце ствола стали заметны следы скошенности, схожие с археологическим источником. В целом, экспериментальное изучение технологии, используемой при рубке и транспортировке бревен, помогает исследователям обратить внимание на те детали повседневной жизни древних обществ, которые раньше казались естественными и не требующими доказательств.

Ключевые слова: экспериментальная археология, погребальное сооружение, сакская культура, Восточный Казахстан.

Introduction

The wooden structure of the elite burial structures of the Saka time on Kazakhstan's territory is diverse in terms of complexity of execution and in the form of construction. Nevertheless, issues related to the peculiarities of harvesting and transporting logs used in the construction of tombs remain poorly understood. Meanwhile, some technical and technological aspects of woodworking are quite amenable to modeling and analysis from an experimental point of view (Samashev, Mylnikov, 2004: 188-193; Jacques, Raymond, 2008: 95-101; Ergersheimer-Experimente.de; Franzen, 2020). The specifics of such kind of research, according to E.Yu. Girya is conditioned by three phenomena: the original, the source and the model. In this regard, for the possibility of transferring the information received to the past, a theoretical substantiation of the similarity between the models and the primary object is assumed. After that, a working hypothesis is developed, and an experiment is carried out using materials and conditions similar to those of the ancients (Girya, 1992: 14-15).

In turn, the burial mound № 1 of the Shilikty-3 cemetery is located at the southernmost tip of the

mound group not far from the village of Zhalshi, Zaisan district, East Kazakhstan region. Initially, the mound was called «Chilikta № 1», but later it was renamed to the local name «Baigetobe», which means «The hill of the Races» in Kazakh. The mound diameter from south to north is 99 m, from east to west – 97.4 m, height – 7.9 m. The excavations were carried out in 2003 by the archaeological expedition of the Al-Farabi Kazakh National University (headed by A.T. Toleubaev). The Baigetobe gold collection, which is distinguished by the high purity of gold, cast metal, and a perfect soldering method, has gained worldwide fame (Minosyan, 2018: 403).

Materials and Methods

The architecture of this mound consisted of three building levels (parts): a wooden-stone tomb, a stone mound on top of it, and a gravel layer interspersed with turf fixing materials from slipping. Large and small underground corridors-dromos were built on the eastern side of the tomb. The length of the large dromos, connected to the tomb by a small door, is 15.65 m, the width is 2.5–3 m, and the depth is 0.9–1 m. Its upper part is covered with stacked logs. The middle part of the dromos is completely strewn with

stones. The absence of an entrance to the dromos, the retaining part of the underpass with stones already during its construction, the complete lack of finds testifies to its purely ritual purpose (Toleubaev, 2018: 183-184). The wooden tomb of the mound was built from seven rows of two-row logs stacked end-to-end. In shape, it resembles a pyramidal structure, tapering upward in steps. At the corners, the logs

that make up the longitudinal and transverse walls of the chamber are not connected but only touch (Figure 1). Because the predatory maintenance hole was laid directly above the western part of the tomb, the wood was preserved in the eastern wall. In contrast, the remaining parts were affected by the external atmospheric environment and precipitation (Toleubaev, 2019).



Figure 1 – View on the wooden chamber during excavation of Baigetobe kurgan
(According to A.T. Toleubayev)

The eyelets (through holes) are fixed only in the lowest logs. It should be noted, that similar eyelets are found in the ground burial structures of Kazakhstan and Tuva. In accordance to K.A. Akishev in Besshatyr burial mound they served for dragging and tying into a raft, as evidenced by traces of wear and smoothness on one side of the log. In addition, according to the fragments of ropes found between the logs, the author believes that they could also be used to raise the ropes to the height of the walls and roll up the tomb (Akishev, Kushaev, 1963: 82). It is a remarkable fact that, unlike the Shilikty eyelets, in Besshatyr they are found at the ends and in the middle of the logs, and on the thickest logs they are double. In turn, based on the analysis of numerous

burial structures of Altai and adjacent territories, V.P. Mylnikov writes that eyelets and girdle grooves were a universal invention used both for lowering stems into burial pits (Altai) and for forming burial chambers (Tuva) (Mylnikov, 2012:10).

Analyzing the above mentioned conclusions of the researchers, we believe that the eyelets in the logs of Shilikty were most likely used for dragging with the help of horses since the wood was harvested 25 km from the burial site in the Karasai tract. To test this hypothesis, we conducted a full-scale experiment, the tasks of which also included determining the logging season, establishing labor investment for operations, and identifying the features of transportation using horses.

Results and Discussion

The source fund of the study consisted of logs with eyelets numbered 1, 2, 5, 7, 10, 14, 15, XII, XVI, XVIII from mound № 1 of the Shilikty-3 cemetery. The size of the smallest eyelets is 8 x 10 cm, medium – 10 x 17 cm, large – 16 x 27 cm (Toleubaev, 2018: 170). According to dendrochronological studies carried out in the laboratory of the University of Arizona, the wood species belonged to the Siberian larch (*Larix sibirica*), the age of mound № 1 is determined within the 7th century BC. Five out of seven samples had the same cutting time. In general, researchers conclude that logging was carried out for one year during the growing season (May-September) (Panyushkina et al., 2016). Based on this, the experiment was carried out in the natural distribution area of Siberian larch on the Saur ridge not far from the village of Shurshitsu, Zaisan district, East Kazakhstan region.

Due to the fact that no traces of processing were preserved on the surface and internal structure of the Shilikty wood, cutting trees, harvesting logs of the required length and other rough work was done using an ordinary iron ax and adze. The length of the adze handle, for which the time costs are calculated, is 30.5 cm, the width of the iron blade is 5 cm. In this case, K.A. Akishev writes that the logs were processed with a longitudinal long or short notch, apparently, bronze finger-like adzes, with a blade width of 4.5 – 5.2 cm (Akishev, Kushaev, 1963: 82). According to V.P. Mylnikov, the adze was the most used tool among Berel craftsmen (Samashev, Mylnikov, 2004: 185). At the same time, the author notes that the main problem in woodworking study remains the extraction of maximum information about the primary source (Mylnikov, 2017: 49). In general, the metal tools of the Saka period are still a poorly studied topic. Only a few finds of iron axes are known (Beisenov et al., 2021: 196).

Logs for the experiment were selected in size close to archaeological. Thus, the diameter of the larch logs of the wooden-stone tomb in Shilikty varies from 0.2 m to 0.44 m, the length is from 3.92 m to 12 m. We chose an average size. In total, three men (age 20, 32 and 33) and three horses took part in the experiment. All stages of the experiment were photographed and described in detail.

In general, logging work turned out to be the most time-consuming and challenging part of the

experiment. Because the larch of the required size (diameter 25 cm, length 12 m) grows in the thick of the forest, located high in the mountains, it took a lot of man's effort and time to cut and haul the tree. The proof of this is that after cutting the first tree fell into a dense part of the forest, from where it could not be removed without sawing. To fell the tree on a more open part of the forest in the second attempt, an incision was made in the log with an ax to the core on the right side. After that, the same incision, only slightly higher than the first one, was made on the other side. As a result of these operations, the tree fell in the right direction. During the fall, some of the branches broke, the rest were chopped off. It is noteworthy that freshly cut larch is very heavy (1 cube of larch (12% moisture) weighs 650 kg on average) and hard, so it sinks in water (Woodschool.ru).

The process of gouging an eyelets on the thick part of the log measuring 10 x 11 cm was carried out in a sitting position to hold the log in one place. The work was carried out from two sides, alternately. As a result of these operations, the finished hole was obtained after 1 hour and 10 minutes. Further, a long rope and clamp were used to transport the log. The rope that passed through the hole was tied to the arc from both sides (Figure 2). In the traditional Kazakh society, this process was known as «muryndyktap tartu» (drag with the help of eyelets) (Traditional system ... 2011: 49). According to a local resident, Akramkhanov Serik (b. 1959) «...this method of hauling logs was used before the advent of trucks in the region» (AFD, 2021).

A further experiment was carried out on a stallion of the Kostanay breed (5 years old). After some time, it became obvious that the stallion could not move the huge, damp log from its place. The second to start the experiment was a jebe stallion (10 years old). After the third attempt, he managed to drag the log down to an open clearing. Later, one of the participants in the experiment explained that these stallions are more accustomed to riding than to this kind of strength work. Based on this, it was decided to continue the experiment after finding a suitable horse. As for the log, it was delivered by truck to the village of Shurshitsu. In the same place, we managed to find a more experienced stallion of the Karabayr breed (6.5 years old), who dragged a 12-meter log on the first try. As a result of dragging, obvious traces of beveling were formed (Figure 3).

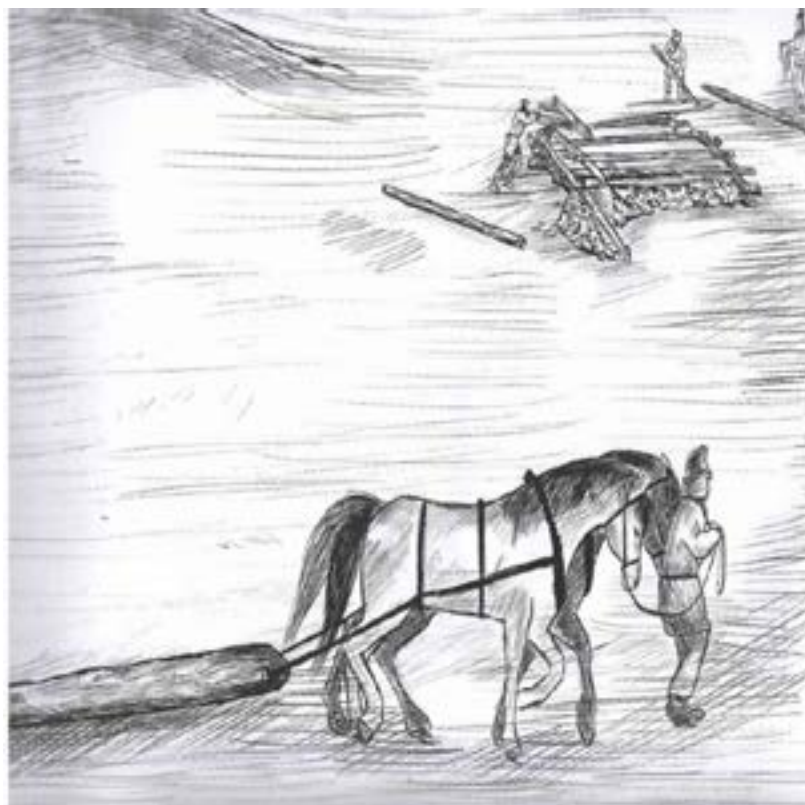


Figure 2 – The visual reconstruction of the process of transporting a log
(According to U.U. Umitkaliev)



Figure 3 – The process of experiment
(Photo: D.B. Ayapova)

Conclusion

Thus, the experiment results confirm the assumption that the eyelets in the logs of the Shilikty mound were intended for the removal and transportation of logs using horses. At the same time, it is worth noting that logging work with all indirect operations to construct a wooden tomb in such majestic burial structures of the Saka elites requires particular time and power resources. So, it took a little more than an hour to make one eyelet measuring 10 x 11 cm. As for the horses, they also had to be accustomed to constant physical exertion.

Summarizing the information obtained during the experiment, we can draw the following conclusion. Considering that about 60 logs were used to build only the log-cage of the tomb, then transporting them one at a time in the summer at a distance of 25

km is a challenging task for horses. Based on this, the issue of the log transportation season remains relevant and requires additional research. In this regard, we plan to continue a series of experiments at different times of the year to determine the most suitable season. The results of these works will be presented in a separate publication.

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