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## **Technologies Involved in Manufacturing Wooden Horns for the Ceremonial Masks of Horses from the Pazyryk Tombs in the Altai**

*We present the results of a technological analysis of the details of horse harness—the most numerous and the most representative category of wooden artifacts found in Scythian Age (Pazyryk) tombs. Basic techniques and specific operations involved in the manufacturing of horse masks are described. Especially noteworthy are the tops of these masks, fashioned like the horns of mountain goats. Such masks have been found in nearly all high-ranking burials. We reconstruct the carpentry of the Early Iron Age nomads. Wooden horns, the principal elements of the horse's headdress, differ in technique and complexity: some are solid, while others are composed of two or more parts. In terms of size and shape, some horns are robust, others are thin and elegant. Separate groups include composite horns with sophisticated carved figurines of feline carnivores, bone collets, bipartite semicircular inserts, or leather tops shaped like antlers. The analysis of horse harness decoration from burials differing in status suggests that wooden horns were mostly attributes of the members of the nomadic elite. Their size, accessory ornaments, and intricacy were markers of social status.*

**Keywords:** *Altai, Scythian age, wooden artifacts, funerary masks, horses, wooden horns.*

### **Introduction**

Materials of archaeological and ethnographic studies show that the equipment of riding horses has been one of the most important elements in the traditional culture of nomadic cattle-breeders from the Early Iron Age until the present day. In the Pazyryk culture, like in others, horse harness ensured comfortable riding, and a horse's headdress probably indicated the social status of its owner and his affiliation with a particular family clan. The headdresses of the Pazyryk horses show not only specific features of the art and imagery of the ethnic culture, but also many aspects of manufacturing technology. Elements made of wood possess a great

information carrying capacity because of the utmost sophistication of their manufacture, which required not only highly skilled carpenters, but also very experienced woodcarvers.

A complete set of horse harness, including a composite bridle, forehead plate, nose plates, chest plate, chest pendants, adornments of the saddle and undertail strap, crupper, headgear, etc., had 30–60 wooden elements, made using carpentry operations, carving, and artistic decoration (Rudenko, 1953: 175, fig. 109).

Funerary masks as elements of horse equipment are not a frequent category of archaeological finds at the sites of the Scythian period in the Altai; therefore these deserve a particularly focused and detailed study.

The main evidence was published and analyzed by M.P. Gryaznov (1950) and S.I. Rudenko (1948, 1953, 1960). The manufacturing techniques of individual elements of horses' funerary masks—in particular, wooden horns and sculpted tops—are being analyzed in detail for the first time.

Horse's headdresses (forehead pieces or masks with tops in the form of sculptural representations of various animal figures and heads, and also mountain goat horns and deer antlers) were found in the Altai Mountains and the Central Altai during the excavation of burial mounds 1–3 and 5 at the Pazyryk cemetery of the Scythian period. Almost all of them were sewn from white felt painted with cinnabar; only the sculpted tops from mounds 3 and 5 were made of wood. Whole sculpted objects and stiffening struts made of wood were inside felt tops of headdress masks of horses from burial mounds 2, 3, and 5, and inside leather deer antlers (Rudenko, 1953: 214–227, pl. LXX, 7; LXXII, 1–4). Massive tops in the form of variously shaped wooden horns of the mountain goat were also discovered during the excavation of mounds at Tuekta, Bashadar (the Russian Altai), and Berel (the Kazakh Altai).

#### **Sculpted tops and hard bases of soft funerary horse masks**

One of the horse headdresses from mound 2 of the Pazyryk cemetery was tailored and sewn entirely from soft white felt. In its center is the head of a goat with sewn horns steeply curving back. Wooden slats were inserted inside the horns to ensure their stability. A sculptural representation of a bird spreading its wings and preparing to fly was made of felt and fastened between the goat's horns. The rigid base of the bird's wings, and also the legs, were carved of wood.

Two remarkably sophisticated sculptural tops, in the form of eagles' heads carved of wood, were discovered in the elite mound 3 at Pazyryk. The heads are quite large in size, from 12 to 14 cm. The first head, with round eyes, resembles a goose's or a swan's head in its shape. The long open beak has a distinctive predatory bend like that of the griffin. The second head, also of fantastic shape, looks similar to the head of a waterfowl, with almond-shaped eyes and a very long wide-open beak. The tongue and powerful fangs are visible in the open beak. A large horn is carved above, on the tip of the beak. The remains of inserted leather ears and horns have survived in the holes on the top of the head.

Rudenko believed that the horse headdress with a wooden top from mound 5 at Pazyryk was not made specifically for the burial rite. It was damaged even in ancient times, and shows signs of repair (Rudenko, 1953: 226). The wooden top, 18.5 cm high, in the form of a sculpted deer head with a massive wide base, was split with a deep crack, and a part of the lower rim at the base was missing at the time of excavation. There are through-holes, made with a drill or awl-reamer on both sides of the crack along its entire length, for pulling together the separate parts with the help of rawhide straps threaded into the holes. Judging by the meticulous execution and elegance of the forms, the sculptured deer head was created by an artisan with extensive experience in three-dimensional artistic woodcarving.

A large sculpture of a fantastic animal from mound 11 of the Berel cemetery, in the Kazakh Altai (Berel – Berel, 2000: 31, 37; Samashev, Faizov, Bazarbaeva, 2001: 37, fig. 30), could (as we had believed earlier) have been a totem or talisman in a funeral ritual, and also the top of a banner over the burial chamber (Samashev, Mylnikov, 2004: 175–177, fig. 306–310). Today, taking into account new evidence, one more suggestion can be made. This unique wooden sculpture could have served as the head adornment of a horse headdress-mask. As an element of a horse's funerary headdress, it might have been fastened between the ears and the wooden horns.

#### **Wooden horns— elements of horses' funerary headdress**

Intact and fragmented items of this type were discovered in the early 1950s during the research at the Tuekty burial mound 1 (eight pairs) and the Bashadar burial mound 2 in the Central Altai (one pair) (Rudenko, 1960: 135–137, 230–231, pl. XXXVIII, LXVIII–LXXII). In the late 20th century, during the excavation of mound 11 at Berel, four pairs of horns were found, direct counterparts of the horns discovered in the Russian Altai (Samashev, Faizov, Bazarbaeva, 2001: 38–39; Samashev, Mylnikov, 2004: 165–174, fig. 285–304).

There are several points of view on the ritual and technological functions of the funerary masks of horses in the Pazyryk culture. M.P. Gryaznov and S.V. Kiselev shared the opinion of N.Y. Marr that horses were specially camouflaged as deer before being sent to the afterlife: in mythology, the horse as a means of transportation and carriage of goods appeared

later than tamed antlered animals (Marr, 1929: 324; Gryaznov, 1950: 85; Kiselev, 1951: 375). Rudenko regarded the construction of horn-masks, despite their sophisticated and highly artistic design, as having only the function of supporting the forehead piece (the forehead's wooden top) (1960: 230–231). As Rudenko argued, the ancient Altai nomads adopted from the ancient Assyrians the custom of decorating the heads of horses with tops of various shapes and sizes in the 7th century BC. He also believed that the custom of the Pazyryk people of decorating the necks of horses with a mane piece, and the cruppers with a withers piece carved of wood, was just as early (Ibid.). M.A. Ochir-Goryaeva regarded this as “a reflection of the hierarchy of mythical animals”; the nature of the myth could have been cosmological (the birth of the world) or ancestral (the origin of the tribe) (2012: 341–342).

The State Hermitage Museum exhibits large and small horns of the mountain goat found in mounds 1 and 2 of the Tuekta cemetery in the Central Altai. Despite their impressive size, these large horns were made very carefully: traces of primary processing by chisel and knife remained only in the depth of the grooves between semicircular rollers. The horns were apparently covered with gold foil, which hid the traces of processing. Small horns were cut less diligently. The tops on the decayed leather headdress from mound 2 at Bashadar in the same region, imitating the horns of a mountain goat, are average in size (Rudenko, 1960: 231, pl. XXXVIII).

Significant new knowledge about the techniques and methods of manufacturing wooden horns and tops that were the bases of funerary headdress-masks of horses belonging to the Pazyryk elite was obtained in the course of our research in the late 20th–early 21st century in Kazakhstan; and in 2012–2016 in the collection of the State Hermitage Museum. These studies resulted in identification of the groups of horns on the basis of their main technological features of wood-processing (Mylnikov, 1999, 2008): horns of solid wood, composite horns of two or more parts, thin openwork horns of two parts, sophisticated composite horns, and horns with artistic sculptural carving.

**Horns of solid wood.** Tops of funerary headdress-masks of horses, in the form of pairs of horns of the mountain goat from mound 11 at Berel, belong to the category of sculpted items made by three-dimensional artistic carving. Two types of such horns have been identified. The first type consists of horns with massive arched stiffeners semicircular in cross-section—arched plates with completely flat inner surfaces and external

surfaces in relief, showing carved semicircular growth rings (Fig. 1, 1). The second type consists of horns with narrow rounded arched stiffeners—arched plates with carved rectangular growth rings both on the outer and inner surfaces (Fig. 1, 2).

**Composite horns of two or more parts** are divided into two types: thick massive horns with large details, and thin elegant horns with fine details. The outer surfaces of the horns, facing each other, are made in relief, with hemispherical stiffeners along the inner arcs; the inner surfaces are flat. The horns were each composed (tabled) of two or more wooden blanks, firmly interconnected by oblique planes, straight grooves and cam slots, through-holes, round rods (pins), and glue (Fedorov, 1993: 21, 22; Samashev, Mylnikov, 2004: 167–174, fig. 289–305).

In terms of shape, size, and structural features, the massive horns from mound 11 at Berel are direct analogs of the items from the burial mounds of Bashadar and Tuekta in the Altai (Rudenko, 1960: Pl. XXXVIII, LXIX). The large horns from mound 1 at Tuekta are a true works of art, made by the Pazyryk carpenters and woodcarvers. The good preservation of the artifacts has made it possible to reconstruct all aspects of their manufacture. The restorers glued two additional flat rollers onto one horn (Rudenko, 1960: Pl. LXIX) (Fig. 2, 1); but only one additional roller has been preserved (Fig. 2, 2). The second horn had 11 rollers (Rudenko, 1960: Pl. LXIX, 1) (Fig. 3, 1). During the time of storage, the extreme roller at the ending of the horns was lost (Fig. 3, 2).

The Scythian collection of artifacts in the State Hermitage Museum contains some large fragments remaining from two pairs of horns made of solid wood, half burnt. Despite their degradation and poor state of preservation, they show traces of processing with tools. Wooden fastening-nails have survived in neatly cut grooves at the butts of the bases of the horns, and in numerous holes for fastening decorative horn collars (Fig. 4, 1).

Drilling was an operation very often used by the Pazyryk people for attaching tops in the form of zoomorphic sculptures, mountain goats' horns, and additional details to the leather bases of horses' headdress-masks. Fastening-elements (wooden nails and leather straps) have survived in many holes (Fig. 4, 1, 2, 5–7). Thin curvilinear traces of preliminary marking for cutting have been found on the items; relatively rough traces of only primary processing appeared on some elements (Fig. 5, 1, 2). These areas of horns were probably covered with foil, so fine secondary surface treatment was not needed.



Fig. 1. Wooden horns of ceremonial funerary masks of horses from mound 11 at Berel.

1 – with massive arched stiffener semicircular in cross-section, and semicircular growth rings; 2 – with narrow rounded arched stiffener and rectangular growth rings.

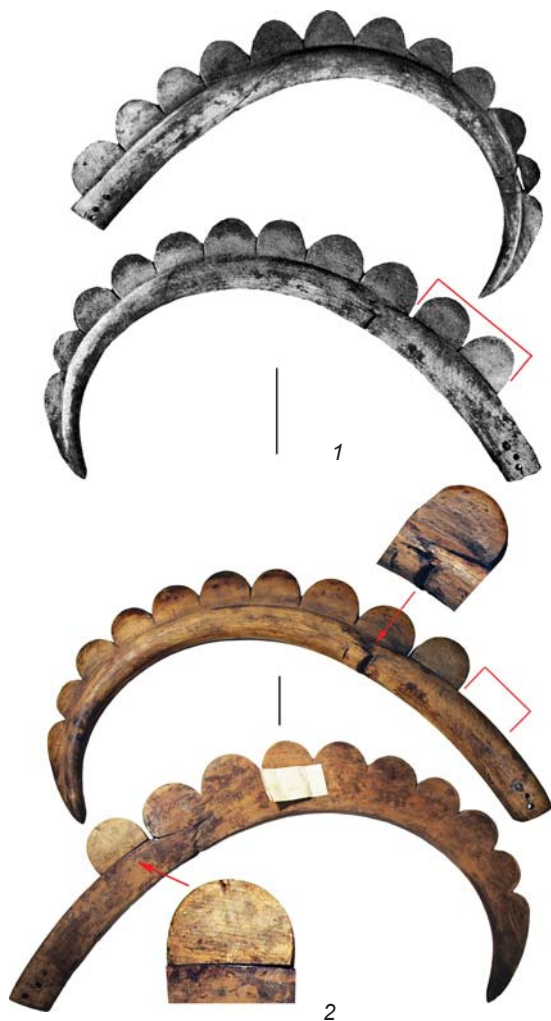


Fig. 2. Wooden horns of ceremonial funerary mask of horse from mound 1 at Tuekta.

1 – composite horns with semicircular growth rings after the excavations (after (Rudenko, 1960)); 2 – current state of one of the horns.

The remains of additional pins can be seen at the butts of the flat bases of the horns, intended for their rigid attachment to the leather base of the headdress-mask (Fig. 5, 3). Marking-notches, made with a flat-bladed chisel for the subsequent removal of wood during the formation of depressions, are visible (Fig. 5, 4), and also traces of repair by the restorers in places of splitting in the items along the lines of the tree rings (Fig. 5, 5); fractures appeared during the looting of ritual objects by robbers (Fig. 5, 6).

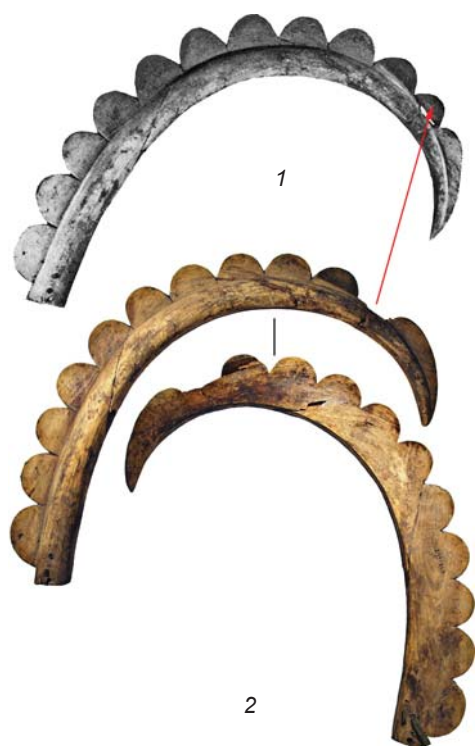
#### **Thin openwork composite horns of two parts.**

Thin graceful horns from mound 11 at Berel were made according to the same technological procedure: they are similar in side view, length, configuration of the bending arch, and relief of the carving. The inner plane is even and smooth; the outer plane has a stiffener semicircular in cross-section. Growth rings are broad and oval, weakly expressed in height, and wedge-shaped in cross-section (Fig. 6, 1). Differences appear only in connecting two billets with a pin-joint. In one billet, both planes with oblique cuts were joined with a peg and three round rods (pins)—two in front and one in back. In the other billet, the planes processed with an “oblique wedge” and located diagonally are joined with two pins (Fig. 6, 2, 3).

The spacer, which served to prevent the camber or displacement of the horns relative to each other, was an integral part of horse’s funerary mask. It was found among the pairs of horns that decorated the head of the animal.

Analysis of thin openwork horns from the headdresses of horses found in mound 1 at Tuekta has made it possible to establish that the same technological methods were used for manufacturing billets and the initial processing of raw material to





*Fig. 3.* Second wooden horn of the ceremonial funerary mask of horse from mound 1 at Tuekta. 1 – horn with semicircular growth rings after the excavations (after (Rudenko, 1960)); 2 – current state.



*Fig. 4.* Wooden horns of ceremonial funerary masks of horses from mound 1 at Tuekta.

1 – encircling grooves and small wooden nails for fastening decorative horn collets; 2 – remains of wooden fixing-pins in the holes; 3, 4 – holes for attaching additional parts; 5 – remains of rawhide lashing-straps in the holes; 6, 7 – remains of leather straps in the bases of horns for their fastening to the base of the funerary headdress-mask of horse.



*Fig. 5.* Traces of primary processing (1, 2), additional pins for rigid fastening of wooden horns to the leather base of the horse mask (3), marking notches with a chisel for the subsequent removal of wood (4), traces of repair by restorers in places of splitting in the items along the lines of tree rings (5), fracture appearing on wooden horns (6) from mound 1 at Tuekta during the looting of ritual items by the robbers.

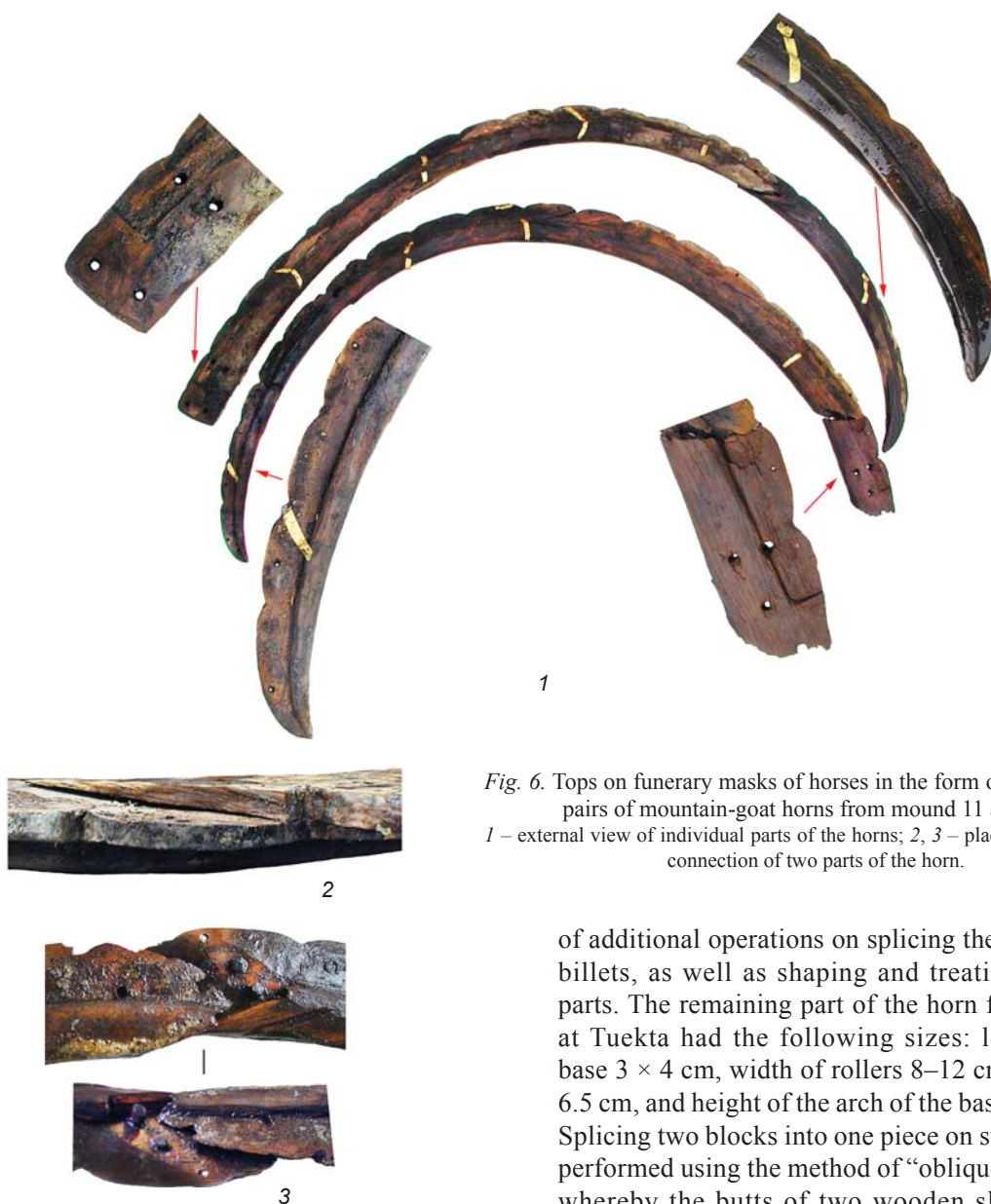


Fig. 6. Tops on funerary masks of horses in the form of thin openwork pairs of mountain-goat horns from mound 11 at Berel.

1 – external view of individual parts of the horns; 2, 3 – places and features of connection of two parts of the horn.

form the item, and for the manufacture of the massive solid wooden horns discussed above. Drilling was carried out for fastening some decorative cover with the help of small pointed wooden nails (Fig. 7, 1), and for connecting individual composite parts (Fig. 7, 2). Additional methods of processing with several types of chisel were used for removing wood during the formation of grooves semicircular in cross-section on the inner side of the horns (Fig. 7, 3). Figurative butts on the bases of horns were formed by simple cutting with a knife blade (Fig. 7, 4).

**Sophisticated composite horns.** Manufacturing horns with semicircular rollers-inserts and bone collets on the bases required a lot of time and a variety

of additional operations on splicing the halves of the billets, as well as shaping and treating individual parts. The remaining part of the horn from mound 1 at Tuekta had the following sizes: length 56 cm, base  $3 \times 4$  cm, width of rollers 8–12 cm, height 3.0–6.5 cm, and height of the arch of the base bend 12 cm. Splicing two blocks into one piece on such horns was performed using the method of “oblique splintering”, whereby the butts of two wooden slabs were cut symmetrically at a very sharp angle so that they would lean tightly on each other (Fig. 8). The received wide planes were faced with precision. For greater strength, the spliced planes were slightly scraped with an abradar, and glued.

On other horns, semicircular growth rings, glued to the base, were made of both solid wood and of two halves glued together with the removed internal planes. These reflect various manufacturing methods and techniques of forming attachment points (Fig. 9). Deep rectangular or round slots for connecting small leather deer antlers with the ear are present in the middles of the tops of almost all semicircular rollers of large horns. These were either cut with a thin-bladed knife and narrow-bladed chisel, or were drilled (Fig. 10, 1, 2).



Fig. 7. Thin openwork wooden horns for funerary mask of horse from mound 1 at Tuekta.

1 – section of a groove-like recess on the inner side, and a place for fastening decorative coating with small wooden nails; 2 – joint of two parts with an “oblique wedge”; 3 – place with traces of chisel with semicircular blade in a groove-like recess; 4 – joints with “oblique wedge” using through-pins at the base of the figured butt of the horn.

Numerous attached semicircular rollers made of solid wood and of two halves with slots for pegs and decorations in the form of leather deer antlers with ears (Fig. 10, 3), as well as sculptural tops, testify to the development of their manufacturing technology and mass production. Semicircular rollers were attached to the arched base in two ways: by hard joining with glue and round pegs, or by movable joining with holes and round pins. Taking into account the diversity of the types, specific manufacturing aspects of the attached figurate endings of such composite horns in late elite burials, and also the methods of their attachment to the base, we can conclude that the structural design of such funerary headdress became more sophisticated (Fig. 10, 4).

The large number of semicircular rollers and endings of roughly the same size, and made according to the same technology, suggests that these were mass-produced using a pair template (Mylnikov, 1994; 1999: 38; 2011, 2014, 2015).

**Horns with artistic sculptural carvings.** This category of wooden artifacts from the elite burials left by the Pazyryk people shows elegance of form and high-quality workmanship. The ethnographic preservation of the material indicates that it was prepared in advance, carefully selected, and underwent all the necessary preparation procedures for processing and all subsequent manufacturing operations. This can be seen particularly clearly from the study of the completed horn, decorated with the attached sculptural representations of snow leopards, from mound 1 at Tuekta (Fig. 11). Its length is 62.5 cm; the height of the arch in the bend is 33.5 cm. The inner surface of the arch is flat; the outer surface is semicircular; the arch gradually decreases in thickness (4.6 cm at the base) reaching the minimum at its pointed end. Fourteen semicircular rollers, gradually and proportionally decreasing in size (from 12 to 8 cm) from the base to the pointed end of the horn, were glued to the upper

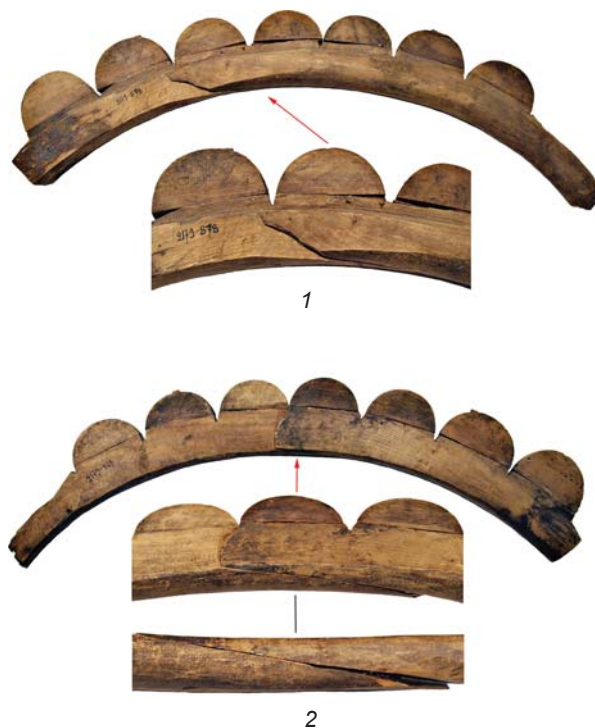


Fig. 8. Massive composite horns with semicircular inserted growth rings from mound 1 at Tuekta.

1 – joint of two halves on the front side; 2 – formation of the “oblique wedge” on the reverse side of the horn.





Fig. 9. Bipartite growth rings of composite horns with removed internal planes and rectangular holes at the top, from mound 1 at Tuekta.



Fig. 10. Narrow rectangular and round holes with the remains of inserted leather decorations (1, 2), leather decorations on ends of semicircular rollers (3), figured endings (4) of sophisticated composite horns from mound 1 at Tuekta.

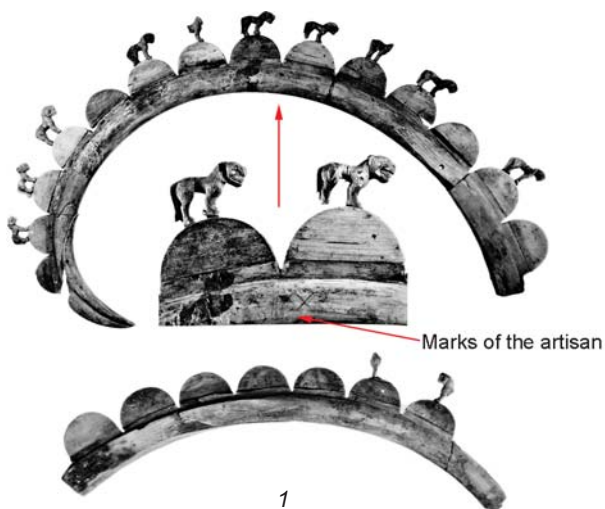


Fig. 11. Composite horns with small inserted sculptures of snow leopards from mound 1 at Tuekta. 1 – after the excavation of the mound (after (Rudenko, 1960)); 2 – current state.



plane of the horn's base. Thin rounded pins were cut on the bases of the double front and hind paws of 14 graceful figurines of a feline predator, which proportionally decrease in size (from 6 to 3.5 cm) from the base to the pointed end of the horn. The pins were inserted into the corresponding round slots drilled in the tops of the semicircular rollers. The figurines were carved by an artisan who had extensive experience in carving with a knife. Using this simplest universal tool, he managed to render all the distinctive features of the animal in quite a realistic manner. Cruciform marks, probably the technological marks of the artisan, are present in two places on the plane of the stiffener of the complete horn (Fig. 11, *I*).

### Conclusions

Horse headdress-masks were a mandatory element in the funerary equipment of horses belonging to the elite of the Pazyryk society. They consist of leather helmet bases and tops in the form of sculpted heads of animals and birds, and also pairs of horns of hoofed animals. Comprehensive analysis of these artifacts, which was conducted for the first time, has made it possible to reconstruct the technological cycle of manufacturing wooden tops in the form of mountain goat horns and sculptural images of deer, birds, etc., and distribute them in accordance with their main technological features.

Massive horns were made mostly of thick wooden slabs following two techniques: from a single solid billet, or from a billet assembled from two wooden slabs, which were spliced with an “oblique cut” and glued together. Thin openwork horns were cut from two or three thin boards, fastened together with the “oblique cut” and three round transverse pins, inserted into through-holes and additionally reinforced with glue. The most sophisticated composite horns were decorated with skillfully carved figurines of feline predators, which were set up and attached to the ends of separately made flat semicircular rollers, fastened to the thick arched bases of each horn, semicircular in cross-section. These bases were assembled from two or three billets, which were interconnected by means of “oblique cuts” with rectangular removals, planted on glue, and additionally reinforced with through round pins.

Use-wear analysis has shown that the artisans used such tools as axes, adzes, awls, chisels with flat and semicircular blades, drills, and well-sharpened thin-bladed knives. The manufacture of all types of horns

included the following operations: procurement of raw materials, preparation, splitting, trimming, face-cutting, marking, carving, planing, drilling, gluing, fastening with round pins and through-holes, sanding, smoothing, and polishing. The accuracy of execution and the strict observance of proportions and sizes, thoroughness of creating lines, grooves, and relief rollers of horns suggest that the carvers had extensive working experience.

All operations mentioned above were performed for manufacturing sculpted tops in the form of heads of deer or birds, as well as figures of fantastic animals, from whole massive billets of tree trunks of various diameters. The main shaping operation was carving with knife. Additional decorations in the form of figurines of feline predators were carved with a knife from small wooden pieces.

### Acknowledgements

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