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On the Earliest Use of Plate-Formed Cheekpieces and the Emergence of Horse Riding (Based on Finds from the Novoilyinovskiy II Cemetery in Northern Kazakhstan)

This study addresses the description, use-wear analysis, and date of three plate-formed cheekpieces from kurgan 5 at Novoilyinovskiy II, Kazakhstan. They were found in the same context with two sacrificed horses (a stallion and a mare), placed on the bottom of a ritual pit in the "flying gallop" posture. The emergence of horse riding, marking a new type of mobility and warfare, has been traditionally dated to ca 900 BC. However, cheekpieces suggest that this process spanned the entire 2nd millennium BC. They testify to the evolution of horsemanship and the search for the most efficient means of controlling draft and riding horses. Results of the use-wear analysis suggest that all three specimens likely belonged to riding horses' harnesses. Two AMS radiocarbon measurements referring to kurgan 5 suggest that these cheekpieces are among the earliest used for controlling riding rather than draft horses, implying that horse riding emerged on the Eurasian steppes as early as the beginning of the 2nd millennium BC.

Keywords: *Bronze Age, cheekpieces, use-wear analysis, radiocarbon dating, horse riding.*

Introduction. Plate-formed cheekpieces and the emergence of horsemanship

The origin of the horseback riding marks the emergence of new types of mobility and warfare. The development of horsemanship dates back to the 2nd–1st millennium BC (Drews, 2004: 149). However, this process can be traced back to the Eurasian steppe throughout the entire 2nd millennium BC, as these cheekpieces reflect the evolution in equestrianism, as well as the search for the most effective ways to control horses in various conditions (Kuzmina, 1994: 180).

We agree with the opinion of those researchers who distinguish two main classes of cheekpieces, according to their morphological features: shield-like and rod-shaped (for more details on the accepted typology, see (Chechushkov, 2013)). The defining feature of the former

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is the presence of a flat shield-like bone or antler, which bears all the other details on itself. Such cheekpieces are interpreted as controls for the draft horses. The second class includes cheekpieces made from a long narrow bone, or an outgrowth of an antler and usually not equipped with spikes. These were used to control a riding horse (Smirnov, 1961; Kovalevskaya, 1977: 15–17; Zdanovich, 1988: 138–145). Among the cheekpieces of the first type, it is reasonable to distinguish shield-like and plate-formed (although other options for classification do exist too) (Bochkarev, Kuznetsov, 2013). Both cases are characterized by spikes on their shields, which cause pain to the animal. The difference lies in the fact that the plate-formed cheekpieces are made of easily available tubular bone (usually split lengthwise) that is easy to process. The fact of finding such a pair of cheekpieces on the horse's skull in kurgan 5 of the Komarovka cemetery (Alikhova, 1955) allowed for their interpretation as means of controlling of a riding horse (Smirnov, 1961: 51; Usachuk, 2014).

However, it is difficult to determine the exact time when the historical process of horsemanship originated, as many plate-formed cheekpieces come from open settlement contexts, and archaeological finds from burial contexts are often dated relatively (cemeteries of Aksaiman, Komarovka, Obilkin Lug III, Novye Kluchi III, etc.). Nevertheless, the use of the radiocarbon method for dating the complexes with cheekpieces allows to outline the main milestones in this process.

This paper will examine three plate-formed cheekpieces from the Novoilyinovskiy II cemetery (the sites of the Lisakovsk area of the Bronze Age, in the Beimbet Mailin District, Kostanay Region, Kazakhstan). In kurgan 5, there were two funeral complexes with the Petrovka type ceramics, as well as ritual object 1a with the offering of two full horses, alongside with three cheekpieces (for more details, see (Usmanova et al., 2018; Snitkovskaya, Usmanova, 2019)).

A brief description of the burial structure

The burial structure was an earthen mound 0.4 m high, 18 m in diameter. At the level of the "B" soil horizon, the outlines of two graves and seven pits located around them were identified (Fig. 1). In the fill of grave pit 1, there were bones of the upper part of human skeletons and ceramic sherds (Fig. 2, *1)*. At the bottom of the pit, there were lower parts of the skeletons of four buried human bodies *in situ*. The dead were buried in two pairs in crouched poses, heads to the west. Among the offerings were beads and small fragments of plait ornaments, a bronze frame, a bone arrowhead, and a bronze spearhead (Usmanova, Malov, 2016). In grave pit 2, the bones of a child were found buried lying on its left side, head to the west, and also decomposed remnants from a rectangular wooden item, as well as several paste beads and a vessel.

Ritual object 1a was located in the southwestern sector of the complex. At the bottom, the pit acquired an oval shape; in this space, there were the bones of two horses and an upright 60 cm high post of hewn quartzite sandstone located behind them, interpreted as a symbolic hitch (Fig. 2, *2*).

In the process of clearing the stone, three plate-formed cheekpieces were discovered (Fig. 3). Cheekpiece No. 1 laid flat on the east side of the stone, the bottom end of a shield directed towards the stone, with the rostral outset pointing away from the stone. The other cheekpiece (No. 2) was situated vertically, with the rostral outset pointing down, on the west side. Judging by such an arrangement, possibly a full bridle could be thrown on the stone, the organic part of which has not been preserved. Cheekpiece No. 3 was located above the stone, and was probably moved there during the post-depositional process. In addition, a small wedge of non-ferrous metal was found above the stone.

At the bottom of the pit, parallel to each other, there were two full skeletons of horses: remains of a 18-20-years-old stallion and of a 16-18-years-old mare (see Fig. 2, *2*). The horses were arranged in complex poses, and it appears that special manipulations were performed with their remains purposefully: limbs were cut, ligaments were also cut at the joints, and the body parts were bended. This positioning of the horses' skeletons can be interpreted as an attempt of spatial symbolism, which aimed to give the horses the posture of a "flying gallop" (Usmanova, Gumirova, Chechushkov, 2019). The age of the animals, and the presence of the cheekpieces, leave no doubt that both animals were used as work horses, and the further analysis of the artifacts aims to establish what sort of work exactly they performed.

The morphology of the cheekpieces and the results of use-wear analysis

The method to study the cheekpieces has been previously described in detail in several publications (Usachuk, 2013: 3–5; Bersenev et al., 2014; Chechushkov, Epimakhov, Bersenev, 2018), what makes it possible to switch to the description of the artifacts. All three artifacts were made from tubular bones split lengthwise, and all three have the similar shape: a rectangular, flat shield plate, and a trapezoidal rostral outset. In the center of the shield plate, a rectangular mouthpiece hole is located, in the rostral outset, an additional round hole. Spikes are carved along the edges of the bone on the inside of the piece. There are visible traces of a cut 4 mm wide and 10 mm long. The tool used for the cut had a 2–3 mm wide surface, which suggests the use of a stone knife.

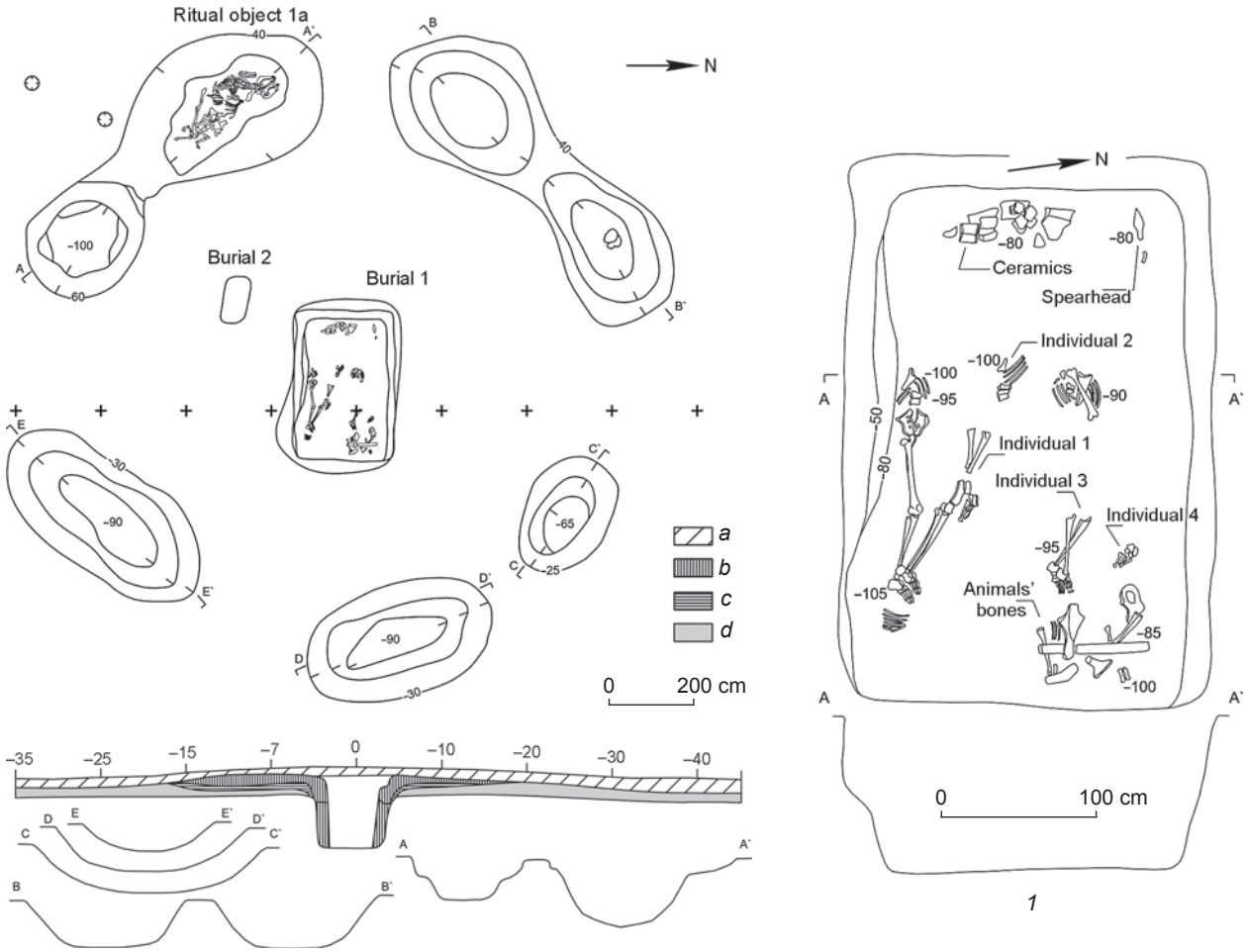

Fig. 1. Plan and section of the kurgan ground, kurgan 5.
a – mound (dark brown loam); *b* – spoil heap from the pit (whitish loam); *c* – buried soil (gray humus); *d* – bedrock loam.

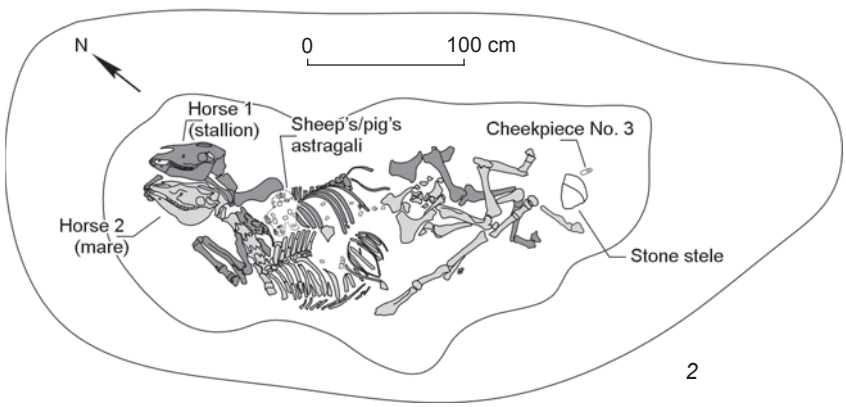

Fig. 2. Burial 1 (*1*) and ritual object 1a (*2*).

Cheekpiece No. 1 (Fig. 4, *1*). On the outside, under the mouthpiece hole, there is decoration: four rows of stamped equilateral triangles made by pressing, possibly with a use of heat, and an incised horizontal line. The approximate dimensions of the triangles: height 4 mm, base 2 mm, and stamp depth up to 1.5 mm.

The mouthpiece hole has uniform signs of wear in the form of a slightly beveled lower edge, as well as signs of wear in both lower corners. At the conjunction of the rostral outset to the shield plate (on the right and the left sides) the surface appears to be polished. An additional hole in the rostral outset is flared from wear, the portion of the hole with the most wear is located at a "five o'clock" sector.

The spikes are arranged symmetrically, five on each side. There are three rectangular spikes on the shield plate, size 5 × 6 × 3 mm, 8–9 mm apart. On the right side, between the spikes, the surface is polished. On the left side, the upper and lower spikes are partially worn down, but the middle spike is well preserved. The rostral outset

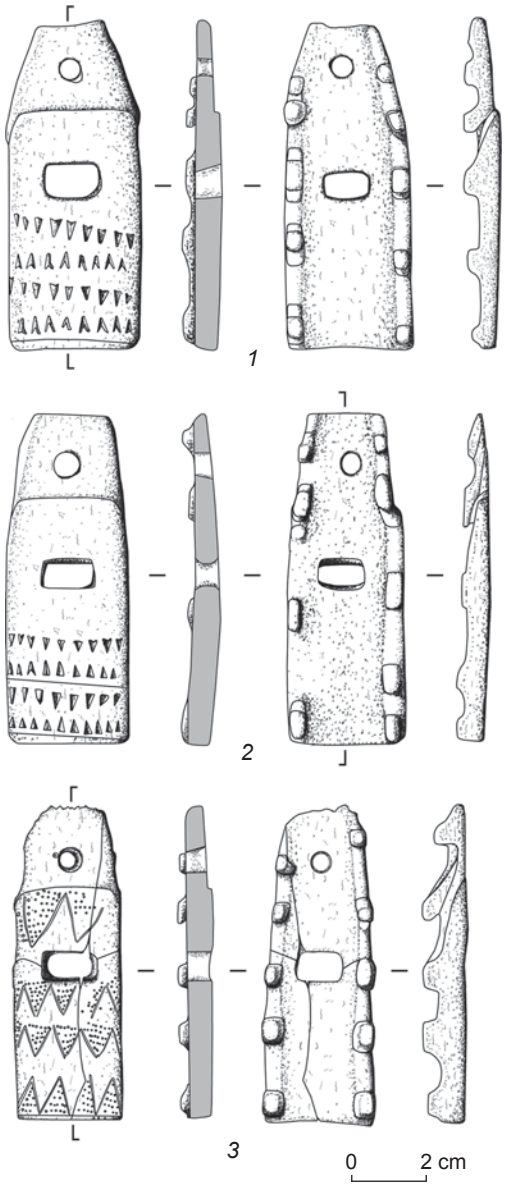

Fig. 3. Plate-formed cheekpieces from ritual object 1a.

has two spikes on each side. On the right side, the upper spike is partially destroyed, the other has sub-triangular shape. A groove is cut under it, so that the spike forms a hook. On the left side the upper one is worn down completely to the base, the other one is partially worn out. Notably, on the left side, spikes are showing more wear than on the right.

Cheekpiece No. 2 (Fig. 4, *2*). The surface of the artifact is slightly polished. Under the mouthpiece hole, there is decorative ornamentation similar to cheekpiece No. 1 in style and technique. On the left side, at the convergence of shield plate and the rostral outset, there appears to be a polished area 4 mm wide and 11 mm long; and it is less pronounced on the right side. The mouthpiece hole has signs of wear in the form of a slightly beveled edge in the area between "six o'clock" and "eleven o'clock", with pronounced vectors at its extreme points, as well as at the bottom left corner ("seven o'clock"). Also, there are parallel lines on the surface of the shield plate, left by the abrader, visible at ×16 magnification. At the place of their convergence with the mouthpiece hole, the lines are smoothed out, which indicates the effect of interaction with the organic-made reins. The edge of the hole in the rostral outset is slightly polished, with the main vector at "one o'clock".

The cheekpiece has nine spikes. There are five on the right side. Two spikes located on the rostral outset show the signs of heavy wear. A groove is cut out under the second spike, so the spike forms a hook. In the gap between the spikes (8 mm), there is a lightly polished 2–3 mm wide area. Three rectangular spikes on the right side of the shield plate are located 8–9 mm from each other. Between them, there are 3–5 mm wide polished areas. On the left side, there are remains of four spikes. Two of

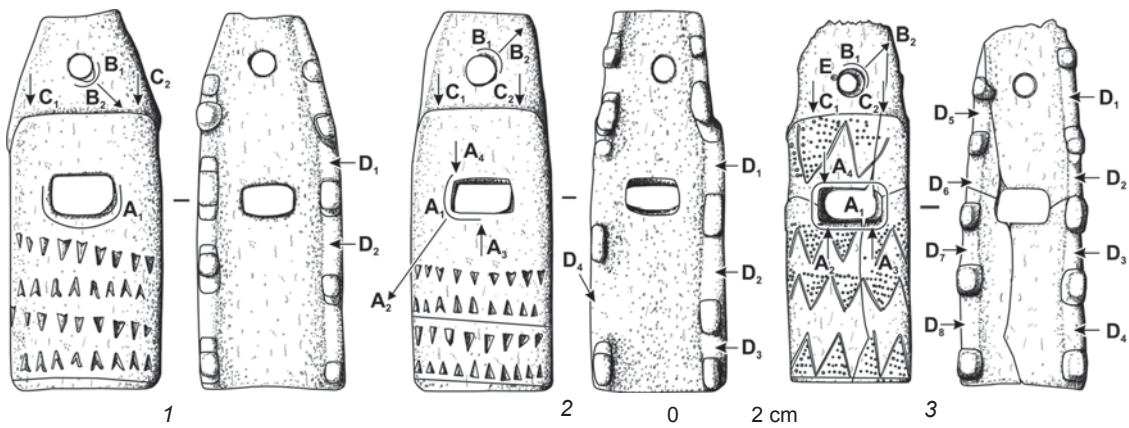

Fig. 4. Location of signs of wear on the cheekpieces.

A_1–A_4 – at the edges of the mouthpiece hole (A_2–A_4 – zones with the heaviest signs of wear); B_1 – at the edges of the additional hole (B_2 – direction of signs of wear); C_1, C_2 – at the point of convergence of the rostral outset and the shield plate; D_1–D_8 – between the spikes.

them are located on the rostral outset, the bottom worn down almost to the base, the top has an oval shape due to heavy wear. Two spikes on the shield plate are completely worn down to the base. Between them, at the edge of the cheekpiece, there is a 2 mm wide polished area.

Cheekpiece No. 3 (Fig. 4, *3*). On the rostral outset, at the edge of the additional hole, at an "eleven o'clock" sector, there are traces of the initial markup, but the craftsman apparently changed their mind about its location. The outside surface of the cheekpiece is thoroughly polished. Its entire rectangular part has a carved ornamentation: four rows of equilateral triangles, the inner spaces of which are filled with dots, marked with an awl-like tool, possibly with the use of heat. At the point of convergence of the rostral outset and the shield plate, there is a zone with less polish, which is 3 mm wide, 10 mm long. The mouthpiece hole shows signs of heavy wear in the form of significantly beveled edges on all four sides. Zones with the heaviest wear are located at its upper left corner (an "eleven o'clock" sector), and along the bottom edge, where the decorative dots, which fill the triangles, are almost worn-out by the friction. An additional hole in the rostral outset is also significantly worn all around from the wear, but the most pronounced vector is at an "one o'clock" sector.

The spikes are arranged symmetrically (except for the first two), five on each side. On the right side, there are polished areas between all the spikes, which are 4 mm wide between the first two, and up to 5 mm wide between the rest of them. On the left side, the first and third spikes are heavily worn down and protrude only by 2–3 mm, while others by 4–5 mm. Between the spikes, some polished areas can be observed (approximately 3 mm wide), less polished as compared to the right side. Apparently, the main load was on the right side.

Thus, all three artifacts are made from diaphysis of tubular bones of a large mammal, and belong to the class of plate-formed cheekpieces with all-in-one spikes and accentuated rostral outsets (Table 1). The same decorative design on cheekpieces No. 1 and No. 2 suggests that they form a pair, while the third artifact is significantly different. The position of these artifacts in relation to one another also makes it reasonable to interpret them as accessories from two bridles: the first two cheekpieces were located on the sides of the upright stone behind the horses, and the third on top of it. Apparently, there were two bridles in the complex, but one of the cheekpieces of the second bridle was lost.

The analysis of the handiwork traces allows us to conclude the following. The cheekpieces were carved with a blade of small width; the surfaces were smoothed or sanded and, possibly, polished. The decorative design is made using a technique of carving and stamping, possibly with the use of heat. Round holes were drilled with some type of a bow drill, since there are visible crescent-shaped marks. In the making of the mouthpiece holes, first, a round-shaped hole was drilled, which was then sawn to a rectangle.

The polishing that overlaps the manufacturing traces indicates that artifacts were in use. For example, in cheekpiece No. 3, the sum of bevel of the surface (1 mm) and on the edges of the hole (≈0.5 mm) is approximately 1.5 mm, which according to experimental data corresponds to 7–13 hours of work (Chechushkov, Epimakhov, Bersenev, 2018: 132). Cheekpieces No. 1 and 2 show much less wear, although there are still some irregular polished areas on top of the fabrication marks.

When it comes to the method of attaching of the cheekpieces to the bridle, it should be noted that the morphology and signs of wear allow certain conclusions to be drawn about the bridle type (Fig. 5). First, there is no doubt that some straps were fastened to the rostral outset: the mounting cord was fitted at the convergence of the rostral outset and the shield plate, covering the cheekpiece with a loop, then it was fixed on the spikes on the inside (therefore, the polished area between the spikes), went out through an extra hole, and then headed up (so, it resulted in polishing the upper part of the rostral outset). Second, the mouthpiece hole of cheekpiece No. 3 has the most pronounced wear located along its lower edge, with a vector at five o'clock. Similar signs of wear are visible on the plate-formed cheekpieces from kurgan 5 at the Komarovka cemetery (Usachuk, 2014), and burial 1, kurgan 2 at the Aksaiman cemetery. These signs of wear are closest to those obtained in the experiments with the bridle in which a noseband was attached to the rostral outset (bridle type 2, intended for riding). However, in this case, it is not clear how the headpiece was fastened, since there are no other holes in the cheekpieces. From our point of view, two options are possible. Judging by the polished

Table 1. **Formal characteristics of cheekpieces**

Cheekpiece	X, mm	Y, mm	Z, mm	Size of mouthpiece hole, mm	Number of spikes	Height of spikes, mm	Diameter of additional hole, mm
No. 1	32	78	9	14 × 6 to 8	10	3–4	4
No. 2	30	80	9	14 × 4 to 5	10	2–3	5
No. 3	27	75	10	14 × 5 to 7	10	3–4	6

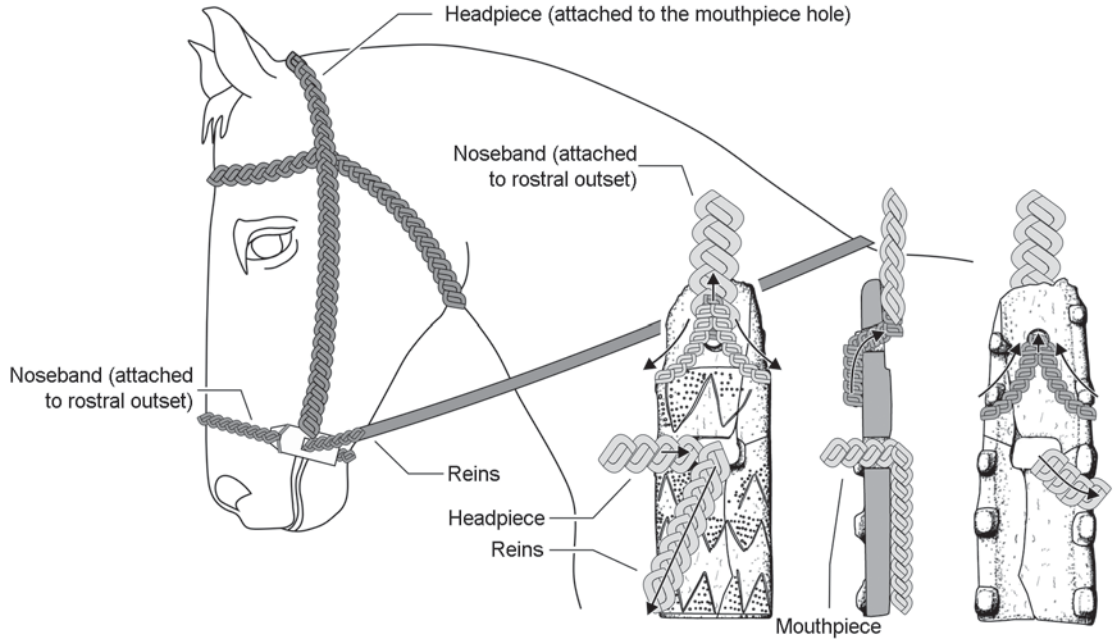

Fig. 5. Reconstruction of the bridle with plate-formed cheekpieces (belts are shown conventionally braided, because the experiment with the cheekpieces demonstrated the greatest reliability of this particular method of cheekpiece installation (Chechushkov, 2007)).

areas between the spikes of cheekpieces No. 1 and 3, as well as the pronounced signs of wear of cheekpiece No. 2 in the upper left corner (at "eleven o'clock") of the mouthpiece hole, the headpiece could have been looped through the mouthpiece hole over the shield plate and between the spikes. In another option, it is attached to the noseband mounted on additional holes of the shield plate (Bakhshiev, Usachuk, Verbovsky, 2020), which reduces the risk of control loss in case of breaking of the organic bits (Chechushkov, 2007).

Typology and absolute dating of cheekpieces

The multidimensional scaling of a series of cheekpieces ($n = 81$), with the use of the Gower's similarity coefficient, has demonstrated that plate-formed cheekpieces form an independent cluster, which is significantly separated from the antler-made shield-like and rod-shaped ones located on the same two-dimensional field, owing to significant morphological differences (Chechushkov, Epimakhov, Bersenev, 2018: 129). In addition, it revealed a chronological trend: the earliest artifacts are localized at one edge of the field, and the most recent ones at the opposite. Plate-formed cheekpieces occupy intermediate position, which correlates well with ideas about the relative chronology of archaeological cultures (Fig. 6). Although the statistical analysis of morphology demonstrates a temporal trend, it does not allow us to determine absolute chronological positions of the specific artifacts. Thus, the use of radiocarbon dating, derived from materials from the same contexts as cheekpieces, is the only dating method available.

For kurgan 5 of the Novoilyinovskiy II cemetery, two radiocarbon measurements were obtained: for a sheep's astragalus from ritual object 1a, and a human rib from burial 1 (Table 2)*. Their comparison with each other makes it possible to suggest that the ritual complex with the horse sacrifice was built later than the human burials, at least during the subsequent year or even up to several decades. According to the results of the radiocarbon analysis, the cheekpieces may be dated to the early 19th to the first third of the 18th century BC. Because the cheekpieces were in operation for a short time, it is unlikely that they were made much earlier than the equine sacrifice. The dating results can be compared with fourteen radiocarbon dates obtained for other closed (burial) complexes with cheekpieces (Fig. 7).

The calibrated radiocarbon interval of the ritual complex of Novoilyinovskiy II is located in the third quarter of the chronological series. The resulting interval intersects with the earliest date from the Lipetsk kurgan

*Dating was performed at the University of Arizona, with financial support from the US National Science Foundation (NSF # 1640341), the results were calibrated using the IntCal13 scale in OxCal 4.3 (Bronk Ramsey, 2009; Reimer et al., 2013).

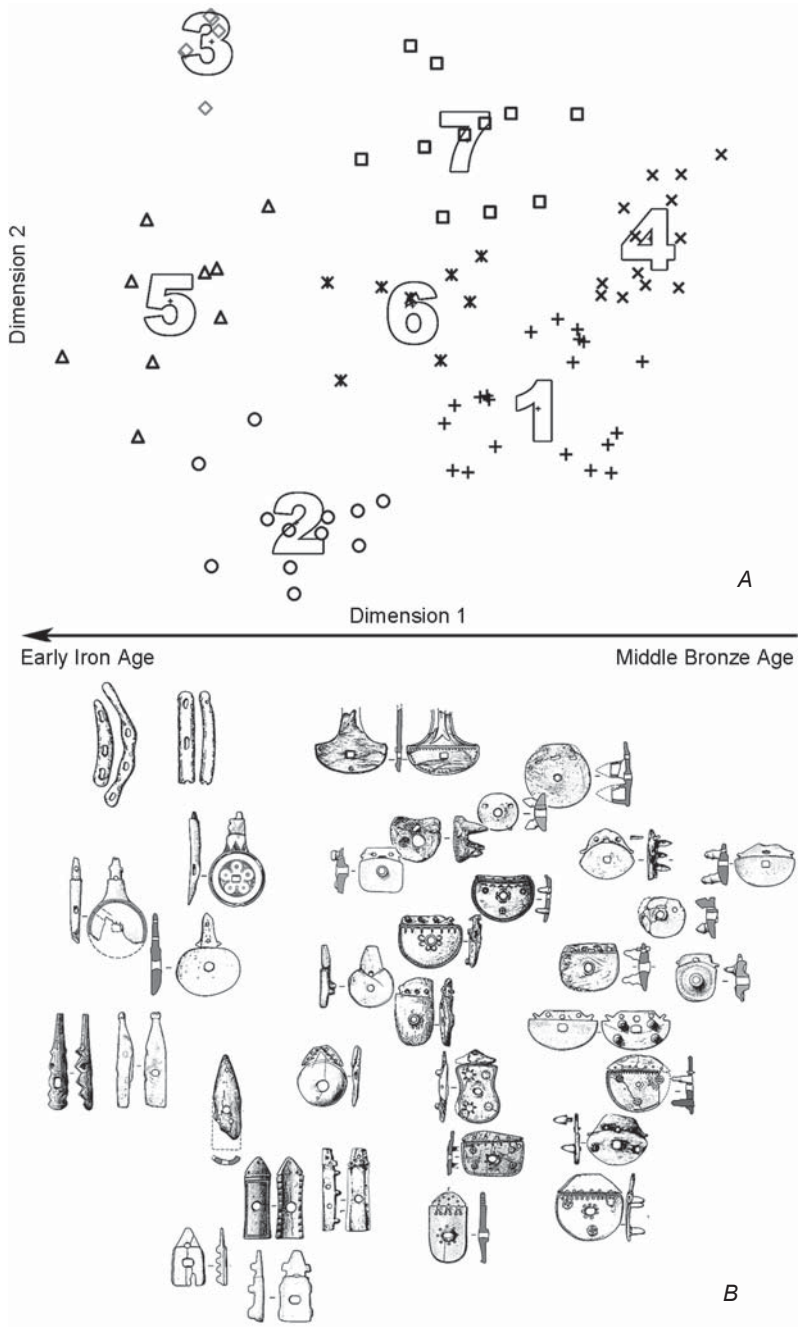

Fig. 6. Results of multidimensional scaling of similarity coefficients for a series of the Bronze Age cheekpieces (*A*), and part of the cheekpieces from the sample (*B*).

Table 2. **Results of the AMS radiocarbon dating**

Sample	Material	^{14}C-date, BP	Fraction of modern carbon, Fm	δ^{13}C (± 0.1), ‰	Calibrated interval, years BC	
					± σ (68.2 %)	± 2σ (95.4 %)
AA109587	Sheep's astragalus from ritual object 1a	3514 ± 30	0.6457 ± 0.0024	–19.7	1890–1774	1921–1751
AA109588	Human rib from burial 1	3572 ± 30	0.6410 ± 0.0024	–18.4	1956–1885	2024–1781

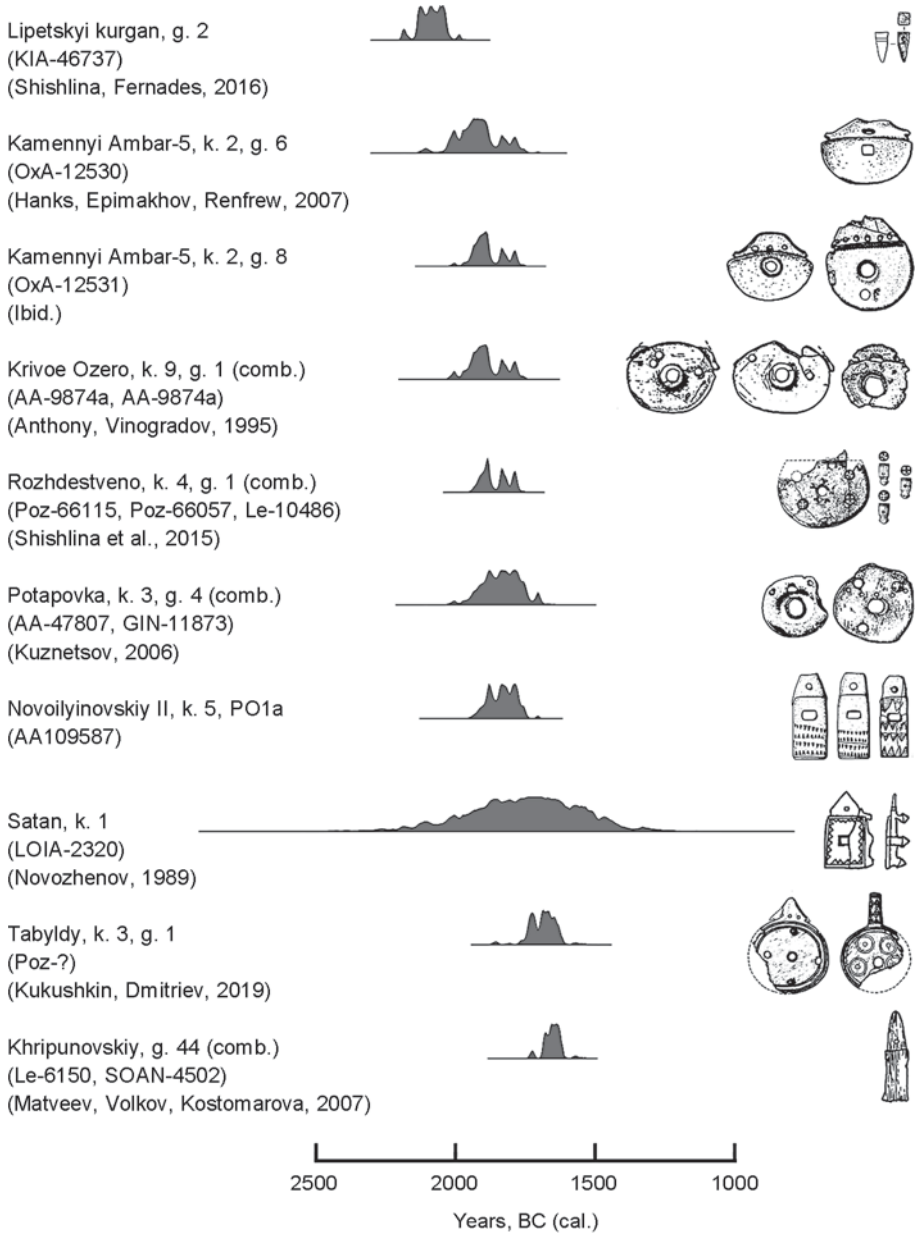

Fig. 7. The absolute chronology of the cheekpieces of the Eurasian steppes ("*comb.*" means using the OxCal 4.3 R_Combine method (Bronk Ramsey, 2009; Reimer et al., 2013)).

that yielded a spike from a shield-like cheekpiece, and practically does not differ from combined intervals for the cemeteries of Potapovka, Rozhdestveno, and Krivoye Ozero, where shield-like cheekpieces were found. At the same time, this complex is earlier than the bone cheekpieces from the cemeteries of Tabyldy and Khripunovsky. It follows that the plate-formed cheekpieces from Novoilyinovskiy II are some of the earliest artifacts of this kind, which began to be used when the typical shield-like antler-made cheekpieces were not yet obsolete and the skills and traditions of their carving were still maintained (Usachuk, 2014).

Discussion

It is quite difficult to give a definite answer as to the question of how the studied cheekpieces were applied. On the one hand, they were found in the context with a pair of horses, which is usually interpreted as symbolism for a harnessed vehicle. On the other hand, the observed traces of wear on the cheekpieces rather correspond to the work of a riding horse, and not to harnessing to a vehicle. We can only suppose that the semantics of the funeral rite required a symbolic representation of a chariot carrying away the "souls of the deceased" to another world.

However, only the cheekpieces that were used for horse riding were available. Moreover, the pair of artifacts No. 1 and 2 could have been made specifically for the ceremony with cheekpiece No. 3 as a model, and they were used only for a very limited time shortly before the sacrifice.

In favor of the idea that the plate-formed cheekpieces could have served to control both draft and riding horses, the following facts are indicated. First, they are not found in burials with chariots. Second, the later rod-shaped cheekpieces probably evolved from plate-formed ones, since the latter are transitional between shield-like and rod-shaped ones. Third, plate-formed cheekpieces often come from settlement complexes (there are 15 of 23 monuments with such finds), which suggests their everyday use. Most shield-like cheekpieces are found in kurgans (75 of 95 monuments) and are associated with chariots. This implies their use only in special cases (Chechushkov, Epimakhov, Bersenev, 2018; Usachuk, 2014).

This observation supports the idea that the role of the chariot was gradually diminishing during the Late Bronze Age, while the use of horses for riding was increasing. The control of a ridden horse requires no less skill, but at the same time a person has a variety of means to control the animal, including his own weight and the use of his arms and legs (Kovalevskaya, 1977: 5–10). Fewer numbers of plate-formed cheekpieces than shield-like cheekpieces (30 : 192) indicate the disappearance of the need for increased control of the external parts of the horse's head, which is necessary for chariot riding and much less necessary in horse riding, owing to the reduced distance between horse's mouth and the rider (Brownrigg, 2006). At the same time, the fact of the preservation and further development of cheekpieces testifies to the emergence of new, more complex tasks in managing a riding horse, namely in warfare, as compared to previous eras when simple halters could have been used (Kovalevskaya, 2014). The emergence of a full-fledged warrior-rider, and the beginning of nomadism was the culmination of this process.

Conclusions

Considering radiocarbon dates, the results of use-wear analysis and experimentation, we can conclude that the plate-formed cheekpieces from the Novoilyinovskiy II cemetery are among the earliest used to control the riding horses, not the draft horses. The signs of wear on all three artifacts and their comparison with the experimental data work in favor of this assumption. Thus, the investigated artifacts may indicate the emergence of horsemanship in the Eurasian steppe as early as the beginning of the 2nd millennium BC. Unlike the Near East, where the mass use of horses for work began relatively late, namely at the turn of the 2nd to 1st millennium BC (Drews, 2004: 29–32), in the Eurasian steppe a long evolution of the relationship between humans and horses can be traced. It is these early experiments in using horses for riding (for which these cheekpieces serve as evidence) which directly influenced the emergence of warriors on horseback, as well as new forms of mobility at the beginning of the Early Iron Age.

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