



Two technical traditions of casting horse bits in China and their relationships with the steppe area

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Abstract

Horse culture was introduced to China from the West. The combination of the rod-shaped metal horse-bit with cheek-pieces with projections came from the West to become the origin of the horse harness in China. There, in the Shang period, the chain type horse bit was invented, which developed with some further transformations through the Spring and Autumn period. Before the Warring States period, a horse bit deriving from another technical tradition was introduced that replaced the earlier tradition. Bone-horn cheek-pieces with three holes of different directions came from the West at about the beginning of the Western Zhou period, and their bronze imitation became the mainstream of later cheek-pieces. The earliest metal horse bit in the Ukraine, dated to the end of the Bronze Age, could be the result of influence from the East. An innovation in the horse harness, with cheek-pieces inserted into the outer rings of the bit, is recognized in both the Steppe region and China, with the examples from China being earlier. A similar method of casting horse bits is recognized in Siberia and Central Asia from the earliest period of the early nomad period. It is the same as the later Chinese technology. Siberian nomads probably transferred it to the nomads of Northern China, for example, in the Yuhuangmiao Culture, then nomadic groups of Northern China introduced it to the peoples of the Central Plain.

Keywords China · Siberia · Steppes · Horse-bit · Cheek-piece

1 Introduction of the horse harness from the west

In early China, chariots and horses appeared suddenly in the Late Shang 商 period in Anyang 安阳, the capital of Shang. Their preceding types are not discovered in earlier periods, and so chariots and horse culture are generally thought to have come from the West. In this paper, the author tries to elucidate the development of the horse harness in China, which played a crucial role in the driving of horses. The second aim is, based on the chronological development of the horse harness in China, to make clear the changing influences between China and the West.

Several examples of early metallic horse harnesses are known from Western Asia, and these are composed of rod-shaped bits and cheek-pieces with projections inside (Fig. 1.1–2). A notable example was excavated in Tel Haror

in Israel, dated to the seventeenth century B.C., which was found inserted in a donkey's mouth (Littauer and Crowel 2001). Similar metallic horse harnesses are found in several places, such as Gaza in Palestine, Ras Shamra in Syria, Tel Amarna in Egypt and so on (see Potratz 1966).

Bone or horn disk-shaped cheek-pieces with projections inside are found in many locations in the western part of the Eurasian Steppe (Yukishima 2006), including Trakhtemirov in the Ukraine (Leskov 1964) (Fig. 1.3), and the well-known example from Sintashta. Their date is considered to be the first half of the second millennium B.C., approximately the same as the metallic horse harnesses in Western Asia. The easternmost site of their distribution is Zarča Chalifa near Penjikent (Bobomalloevev 1997) (Fig. 1.4), where bone cheek-pieces are found together with metallic rod-shaped horse bits with loops. The site is regarded to belong to the Andronovo Culture. The metallic bits resemble those of Western Asiatic horse harnesses.

Recently, Wang (2019) wrote on the influences from the West in Chinese horse harnesses, introducing the bronze chariot felloes from Gonur-tepe and other sites in Western Asia, as well as the rectangular horn cheek-pieces with projections from the western part of the Steppe.

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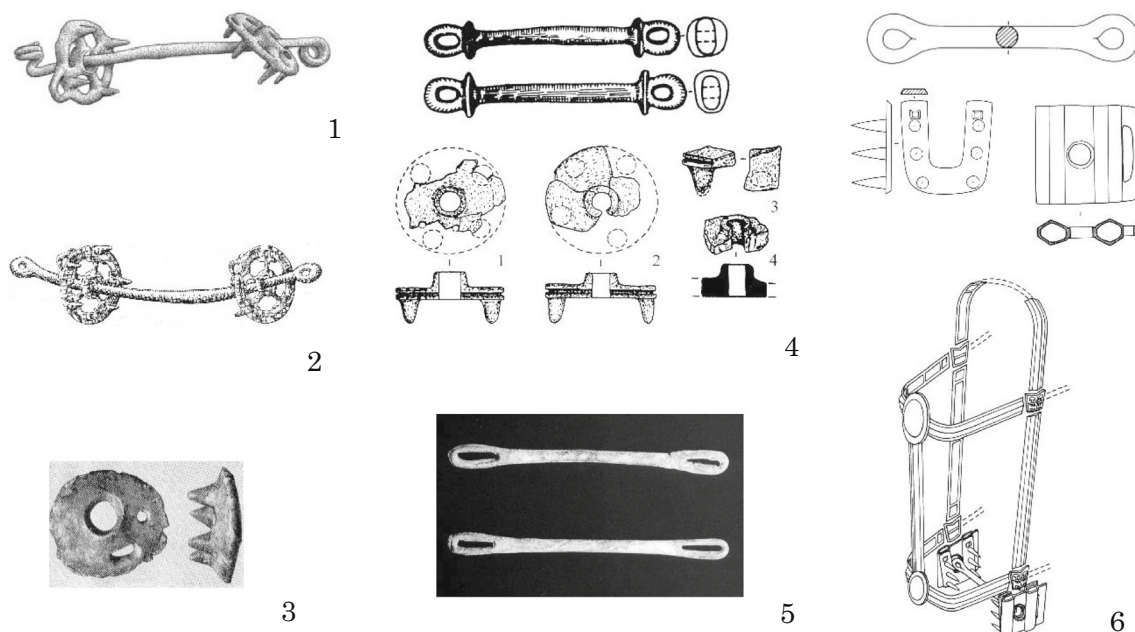


Fig. 1 Rod-shaped horse-bits and cheek-pieces with projections. 1. Bit with cheekpieces from Tel Haror (after Littauer et al. 2001: Fig. 1); 2. Bit with cheek-pieces from Gaza, Palestine (after Potratz 1966: fig. 46b); 3. Cheek-piece from Trakhtemirov (after Leskov 1961: Fig. 1); 4. Bit and cheek-pieces from Zardča Chalifa (after Bobomulloev 1997: Fig. 3.12-

13, Fig. 4); 5. Bits from Laoniupo (after Liu Shi'e 2001: fig. 253.1-2); 6. Bit, U-shaped object with projections, and rectangular cheek-piece from Qianzhangda and their reconstruction (after Kaoguyanjiusuo 2005: 643 Fig. 2, figs. 264.5, 265.1, 265.8)

In China, bronze rod-shaped horse bits with loops at the ends are found in Laoniupo 老牛坡, Shaanxi (Liu 2001) (Fig. 1.5), and Yinxu 殷墟, Anyang, Henan, and some other Shang or early Western Zhou 周 period sites. Sometimes they are accompanied with bronze rectangular cheek-pieces. Those cheek-pieces are at times found together with U-shaped objects furnished with projections, placed so as to contact the horses' cheeks, as seen in the reconstruction of a horse harness from Qianzhangda 前掌大, Shandong (Kaoguyanjiusuo 2005) (Fig. 1.6). These combinations of rod-shaped bits with loops, rectangular cheek-pieces, and U-shaped objects with projections are, in structure, almost the same as the Western Asiatic horse harness of the first half of the second millennium B.C. and also the finds from Zarča Chalifa near Penjikent. Thus, the horse harness was probably introduced into China from the West in such combination.

2 Development of horse bits in China

In the Late Shang period, in addition to the rod-shaped horse-bits, another type of horse bit appeared. It is composed of two or three 8-shaped parts, which are combined at right angles to each other like a chain. This kind of horse bit is found at Anyang (Kaoguyanjiusuo 1984) and in several Early Western Zhou period sites (Luoyang 1999) (Fig. 2.1–2).

In the Early Western Zhou period another type of horse bit was also invented, featuring a little improvement from the

preceding type (Fig. 2.3). It is composed of 2 parts: one is 8-shaped and the other part is a twisted 8-shape, with the inner rings placed at right angles to each other and both outer rings placed on the same plane. This type of bit became the origin of the horse bits used for a long time thereafter. Below, to simplify the further description of this type of horse bit, the 8-shaped part is called “part A” and the other, twisted part is called “part B” (Fig. 2.4).

A casting seam can be observed around part A pieces of the Early Western Zhou horse bit, except at the end of the inner ring. The casting seam of part B similarly runs around the circumference, crossing the inner ring to its end. The inner wall of the inner ring is not convex, but flat. The excavation report of the Yingguo 应国 cemetery in Pingdingshan 平顶山, Henan, explains the method of casting of this kind of horse bit as follows (Henan 2012: 382–383, 594): when casting part A with 2 piece molds, an opening is made at the place of the inner ring. After casting part B, part B is fit into part A through this opening, and then the opening is closed by additional casting. I think this explanation is basically right. The manufacture of horse bits from other sites has also been surmised in the same way (e.g., Shanxi 2018: 252–253).

Horse bits cast by this method undergo formal changes through different time periods. In the Middle Western Zhou period, the stem part gets longer, the outer ring smaller, and the inner ring larger, becoming teardrop-shaped (Gansu 2009) (Fig. 2.5–6). This type of horse bit is typically seen in the bits from Pingdingshan and Yujiawan 于家湾 in Gansu (Gansu

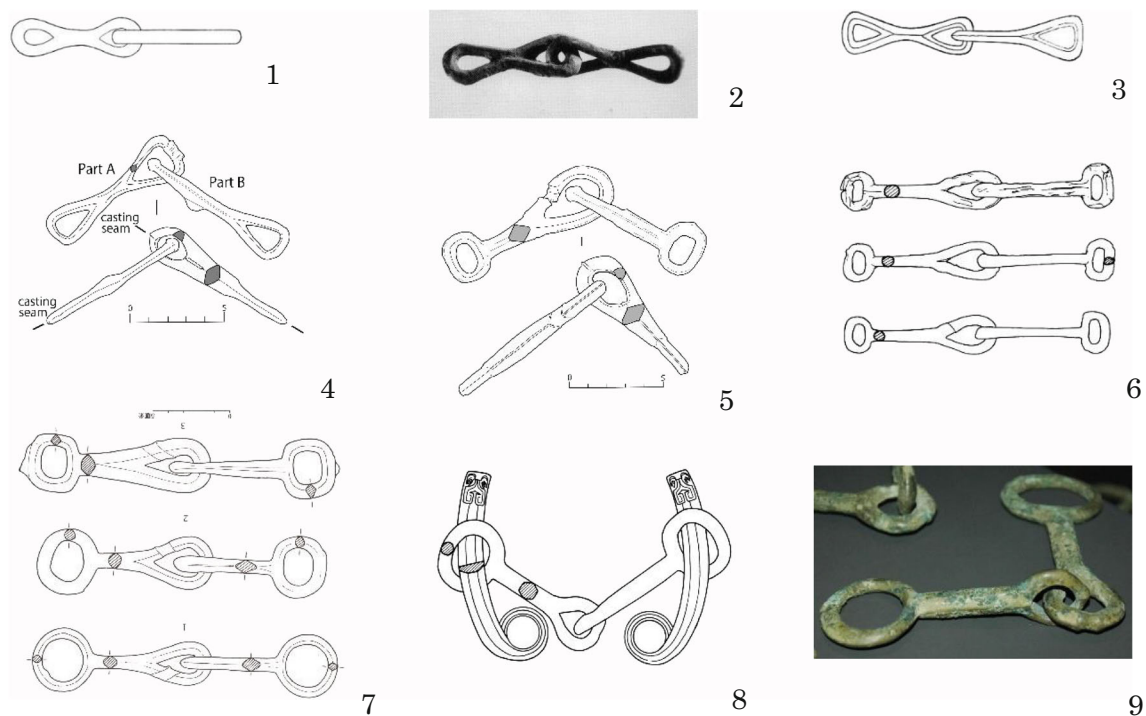


Fig. 2 Horse bits from the Western Zhou to Spring and Autumn periods 1. Bit from Yinxu (after Kaoguanjiusuo 1984: Fig. 3.9); 2. Bit from Luoyang Beiyao (after Luoyang 1999, pl. 42.3); 3. Bit from IM22 Beijing Liulihe (after Beijing 1995: fig. 133.1); 4. Bit held in the Tokyo National Museum, Inv. no. TJ-2080 (drawing by the author); 5. Bit from

M86 Yingguo cemetery (drawing by the author); 6. Bits from M156 Chongxin Yujiawan (after Gansu 2009: fig. 78.6-7); 7. Bits from M2001 Guoguo cemetery (after Henan 1999: fig. 89); 8. Bit with cheek-pieces from M28 Hancheng Liangdaicun (after Shaanxi 2010: fig. 139.2); 9. Bit from Huixian Liulige (photo by the author)

2009). The opening of part A, placed at the end of the inner ring in the Early Western Zhou period, moves to the middle of the teardrop-shaped inner ring.

Then, in the Late Western Zhou through early Spring and Autumn period, horse bits on the whole become larger as seen in bits from Guoguo cemetery and Liangdaicun (Henan 1999, Shaanxi 2010) (Fig. 2.7–8), with the outer ring also becoming larger, into which the cheek pieces are inserted, as seen in bits from Liangdaicun 梁带村, Hancheng 韩城, Shaanxi (Fig. 2.8). This innovation in the horse harness is important and lasted long thereafter.

The method of casting horse bits stated above probably continued in use until later in the Spring and Autumn period, for we can observe casting seams from this method on the horse bits excavated from the Jia 甲 and Yi 乙 tombs at Liulige 琉璃阁, Huixian 辉县, Henan (Henan 2003: 143), which are exhibited in National Museum of History in Taipei (Fig. 2.9) and the Henan Provincial Museum.

However, as we research many examples, it becomes clear that there was another method of casting horse bits in early China (Fig. 3.1–2). In this method, part A is cast without an opening. Part B is considered cast with a two-piece mold also, however, a casting seam is not seen at the end of the inner ring, and sometimes the wall inside the ring is formed straight, instead of being arc-shaped, and is a little thick. A kind of mold seam is seen on the surface of the inner ring. It is a trace

that suggests that some device was used to combine the A and B parts by casting. In the Houma 侯马 bronze foundry site, Shanxi, there are found molds for horse bits for casting part A (Fig. 3.3). They were used for casting the horse bits by the second method, for they are not made for the inner ring to have an opening. These date to the early Warring States period, making clear that this method was in use already by that period in the Central Plain area. Traces of this method are also observed on horse bits from Tomb No. 1 at Shanbiaozhen 山彪镇, Henan, exhibited at the museum of the Institute of History and Philology at Academia Sinica in Taiwan, again testifying that the method was in use in the Warring States period.

These two technological traditions existed in early China, with one earlier than the other. When and how did the change in these traditions take place?

The earlier tradition is probably invented and developed in China. The type of horse bit that appeared first is a rod-shaped bit with loops at both ends, which came into existence through influence from the West. Then appeared the chain type horse bit, composed of two or three 8-shaped parts, and this type continued to develop as mentioned above. These developments in China are considered independent, without influences from outside. Worthy of note is that some of the outer rings of those bits, mainly of Western Zhou date, are shaped triangular, resembling early types of the Steppe area.



Fig 3 Horse bits of the Spring and Autumn – Warring States periods and casting mold. 1. Bit held in the Aizu Museum, Waseda University (drawing by the author); 2. Bit held in the Yokohama Museum of

EurAsian Cultures (photo by the author). 3. Casting mold for a bit excavated in the Houma foundry (after Shanxi 1993: fig. 80.3)

3 Development of cheek-pieces in China

Yang and Linduff (2008) published the idea that so-called spoon-shaped objects with loops found in the Chinese Northern Zone (Jixian wen wu gong zuo zhan 1985) are used as cheek-pieces, similarly to cheek-pieces of the pre-Scythian Novoчеркассk type found in the Black Sea region (Iessen 1953) (Fig. 4). They also think that the long S-curved objects with loops are cheek-pieces, as well. It is true that one end of the Novoчеркассk type cheek-pieces is extended in length and shaped a little like a paddle or spoon. However, the spoon-shaped objects found in the Chinese Northern Zone come in many varieties of size and shape, and those furnished with loops are just one of these varieties. I think they are basically spoons or ornaments developed from spoons, and agree with Hwang (2015), who denies a connection between horse cheek-pieces and these spoon-shaped objects. As for the S-curved objects with an animal head from Xiaoheishigou 小黑石沟, there is not any evidence to consider them cheek-pieces. I accept the view that forms of metallic cheek-pieces in the Steppes originated from horn or bone pieces with holes, and I think that the Novoчеркассk cheek-pieces are also one of those varieties. It is also difficult for me to assume a connection between the Novoчеркассk type cheek-pieces and spoon-shaped objects, for the Novoчеркассk type horse harness is found in a rather

limited area around the Black Sea, meaning they are a rather local varieties, unlike the preceding Chernogorovka type, whose horse bits and early cheek-pieces are found also in Siberia.

In early China, three kinds of metallic cheek-pieces are known: rectangular, circular, and horn-shaped. Rectangular cheek-pieces are the earliest, being in use in the Shang and early Western Zhou periods. Circular ones are mainly of the Middle Western Zhou period, and they are furnished with loops at the back and sometimes cast with chain-shaped horse bits (Fig. 5). Horn-shaped cheek-pieces are employed from the Early Western Zhou period onward, continuing in use through the Eastern Zhou period. Several scholars point out that they originally go back to animal horns. For example, Sun (2008: 133) mentions that there are two similar Chinese characters meaning cheek-piece, with the difference being the inclusion of the horn or metal radical.

There are many horn cheek-pieces found in China before the Han 汉 dynasty, with the majority of them from the Eastern Zhou period and furnished with two holes. However, horn cheek-pieces are known already from the Western Zhou period. Examples excavated from Western Zhou period sites are equipped with three holes, with the center hole opened at right angles to the other two holes.

Almost five decades ago, Karl Jettmar (1972) already pointed out the connection between similar horn cheek-pieces found in Europe and Zabaikal'e, and the Chinese bronze cheek-piece from Xincun 辛村 in Xunxian 濬县, in relation to the "Pontic Migration" raised by R. Heine-Geldern. When this kind of cheek-piece was first excavated from Changping Baifu 昌平白

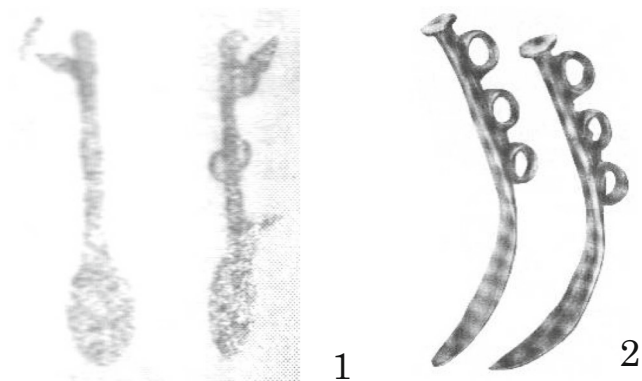


Fig. 4 Spoon-shaped object and cheek-pieces of the Novoчеркассk type. 1. Spoonshaped object from Jixian, Shanxi (after Jixian wen wu gong zuo zhan 1985: Fig. 3.3); 2. Cheek-pieces from Obruivskii (after Iessen 1953: Fig. 10)

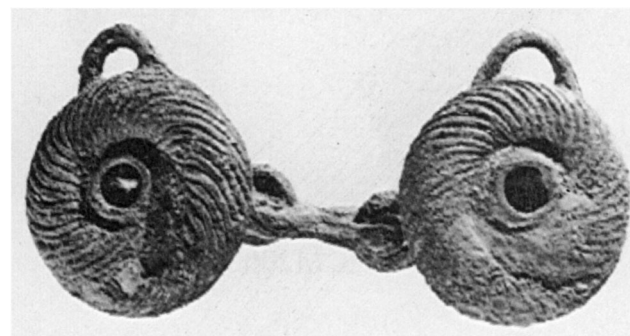


Fig. 5 Circular cheek-pieces with bit From M22 Chang'an Zhangjiapo (after Kaoguyanjiusuo 1999: pl.147.2)

浮, Beijing 北京 (Beijing 1976) H.-G. Hüttel (1979) pointed out its connection with the West (Fig. 6.1). At present there are already many pieces found from Western Zhou sites, such as Liulihe 琉璃河, Beijing (Beijing 1995) (Fig. 6.2), Beiyao 北窑 in Luoyang 洛阳 (Luoyang 1999) (Fig. 6.3), Tianma-Qucun 天马—曲村, Shanxi, Pingdingshan, Henan, and Zhangjiapo 张家坡, Shaanxi (Kaoguanjiusuo 1999) (Fig. 6.4). In addition, they were found from cemeteries of the Upper Xiajiadian 夏家店 Culture, such as Xiaoheishigou (Fig. 6.5), and related cultures. Further still they are found in Warring States period sites in Shaanxi and Ningxia.

Similar cheek-pieces are distributed across a much wider area outside of China. They are known from sites of the Slab Grave Culture in Transbaikalia (Dikov 1958) (Fig. 6.6), a habitation site of the Karasuk Culture at Torgazhak in South Siberia (Savinov 1996) (Fig. 6.7), from the Urals (Chlenova 1994) (Fig. 6.8), a pre-Scythian site in the Ukraine (Terenzhkin 1976) (Fig. 6.9), and Bulgaria (Melyukova 1979) (Fig. 6.10). More than 30 pieces are also found in Europe, including Hungary (Fig. 6.11) and Switzerland, to as far as England (Fig. 6.12), with Switzerland considered as the possible distribution center (Hüttel 1981).

In Europe they are regarded as objects of the Late Bronze Age, and in the Steppe areas are considered likewise as objects of the Late Bronze Age preceding the Early Nomad period. However, in the Steppe area they are sometimes found together with horn cheek-pieces with three holes of the same direction, which is typical of the earliest type cheek-pieces of the Early Nomad period. The two types of cheek-pieces are found together

at Torgazhak, a Karasuk period site in South Siberia (Savinov 1996), and from the Dalverzin site of the early Iron Age Chust Culture in the Fergana valley (Terenzhkin 1971: 77, Fig. 4.6–7).

These two types of cheek-pieces also are found together from tomb 92NDXAIM11 at Xiaoheishigou, Inner Mongolia, a typical cemetery of the Upper Xiajiadian Culture (Neimenggu 2009: Figs. 285.1–2, 287.5–6, 8). It shows the same phenomenon as the western sites in the Steppes, which again confirms the same cultural position of those cheek-pieces in the East.

The date of these Bronze Age cheek-pieces is around 1000 B.C. everywhere, except the one from Hordeevka, which might be dated earlier, to about 1300 B.C. These cheek-pieces probably originated somewhere in Europe during the late Bronze Age, came eastward through the Steppes, Siberia, and Central Asia, and finally reached China during the Western Zhou period. Examples from the Upper Xiajiadian and related cultures could be understood through their strong connections with early Steppe cultures. As for similar cheek-pieces from the Warring States sites, I think they are probably descendants from the earlier period.

In the Western Zhou period, bronze imitations of those horn cheek-pieces were manufactured, as exemplified by the finds from Rujiazhuang BRM1 茹家庄 and Zhuyuangou BZM1 竹园沟 in Baoji 宝鸡, Shaanxi (Lu Liancheng et al. 1988) (Fig. 7.1–2) and from Fengxi 沔西 (Kaoguanjiusuo 1987) (Fig. 7.3). Afterwards their shape becomes flat, as Wu (2002: 225) points out, and the upper and lower two holes change into loops. This type of cheek-piece becomes the

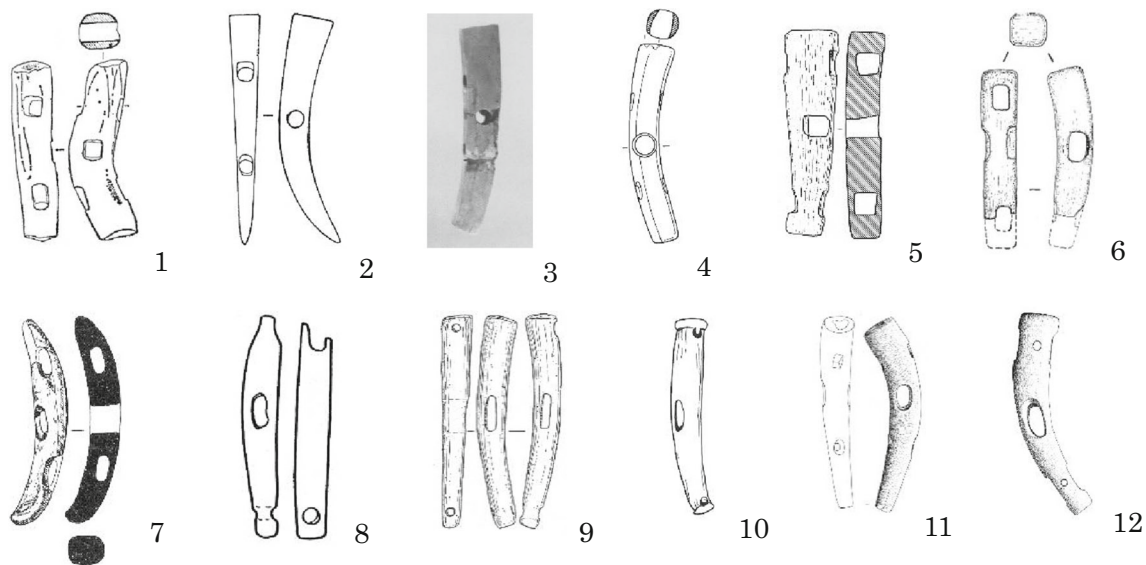


Fig. 6 Horn-bone cheek-pieces with three holes of different directions. 1. Cheek-piece from Changping Baifu (after Beijing 1976: fig. 18.4); 2. Cheek-piece from IM105, Liulihe (after Beijing 1995: fig. 146.1); 3. Cheek-piece from M6 Luoyang Beiyao (after Luoyang 1999: pl. 60.3); 4. Cheek-piece from M284 Zhangjiapo (after Kaoguanjiusuo 1999: fig. 247.2); 5. Cheek-piece from 92DXAIM11 Xiaoheishigou (after Neimenggu 2009: fig. 247.2); 6. Cheek-piece from Taphar (after Dikov

1958: pl.10.23); 7. Cheek-piece from Torgazhak (after Savinov 1996: Fig. 3.5); 8. Cheek-piece from Elokha (after Chlenova 1994: Fig. 4.11); 9. Cheek-piece from Subbotovo (after Terenzhkin 1976: fig. 85.5); 10. Cheek-piece from Asenovets (after Melyukova 1979: Fig. 4.1); 11. Cheek-piece from Saghegy (after Hüttel 1981, No.164); 12. Cheek-piece from Heathery Burn Cave (after Hüttel 1981: no. 135)

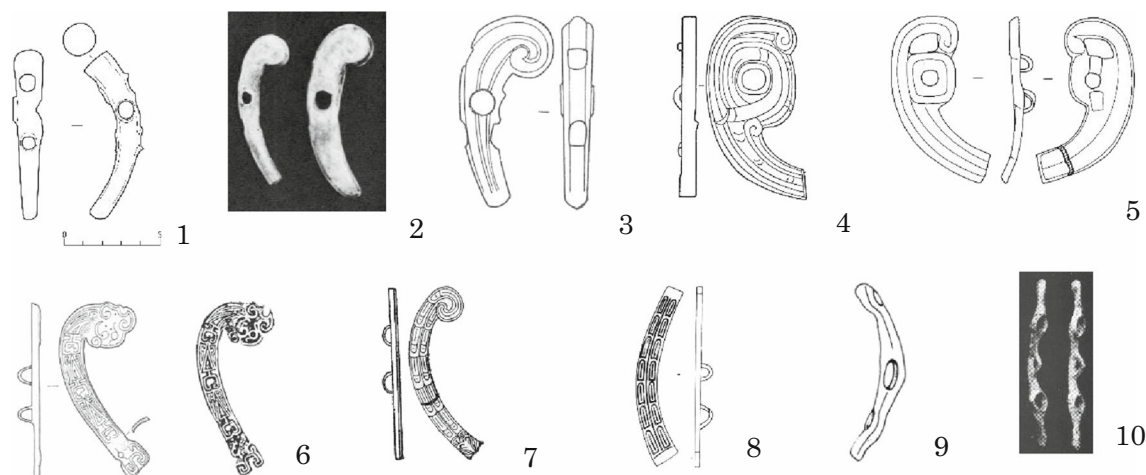


Fig. 7 Metallic cheek-pieces with holes of different directions and cheek-pieces with loops. 1. Cheek-piece from BRM1, Rujiazhuang (drawing by the author); 2. Cheek-pieces from BZM1 Zhuyuangou (after Lu Liancheng et al. 1988: pl. 68.1); 3. Cheek-piece from M28, Fengxi (after Kaoguyanjiusuo 1987: fig. 16.3); 4. Cheek-piece from IIM205, Liulihe (after Beijing 1995: fig. 133.2); 5. Cheek-piece from M104,

Chongxin Yujiawan (after Gansu 2009: fig. 78.2); 6. Cheek-piece from M2001, Guoguo cemetery, Sanmenxia (after Henan 1999: fig. 90.2-3); 7. Cheek-piece from C5M906, Luoyang Dongjiao (after Luoyang 1995: Fig. 3.3); 8. Cheek-piece from M1, Tianma-Qucun (after Beijing 1993: fig. 16.5); 9. Cheek-piece from Uvs aimak (after Volkov 1967: fig. 15.11); 10. Cheek-pieces from Shiertaizi (after Zhu Gui 1960: pl. 3.27-28)

mainstream of Chinese bronze cheek-pieces in the later periods. During the Middle Western Zhou period, it becomes flat and ornamented with a Chinese design, and the two holes are altered into two or sometimes three loops on the reverse as seen in cheek-pieces from Liulihe (Beijing 1995) and Yujiawan (Gansu 2009) (Fig. 7.4–5). In the Late Western Zhou through the early Spring and Autumn period, their shape undergoes further changes: the overall shape becomes slender, the central hole disappears, and there are always two loops on the reverse as seen in cheek-pieces from Sanmenxia (Henan 1999), Luoyang (Luoyang 1995) and Tianma-Qucun (Beijing 1993) (Fig. 7.6–8). Several different shapes are distinguished amongst them, including those with a dragon's head on one end, those with a circle on one end, and those that are a simple arc shape, etc. They are inserted into the outer ring of the horse-bit, which is a big innovation in horse-harnesses.

Bronze imitations of horn cheek-pieces with three holes of different directions are not limited to China. Such cheek-pieces are also found in Mongolia (Volkov 1967) (Fig. 7.9), and other examples are found at Shiertai Yingzi 十二台营子M1 (Fig. 7.10) in Liaoning, and the object from Wujintang 乌金塘 in Liaoning (Zhu Gui 1960) probably belong to this kind (Jin zhou shi bow wu guan 1960, Fig. 2–10). They are considered to be typologically at the same position as Chinese Early Western Zhou examples.

4 Relationship between the earliest metal horse bits in the western steppes and Chinese bits

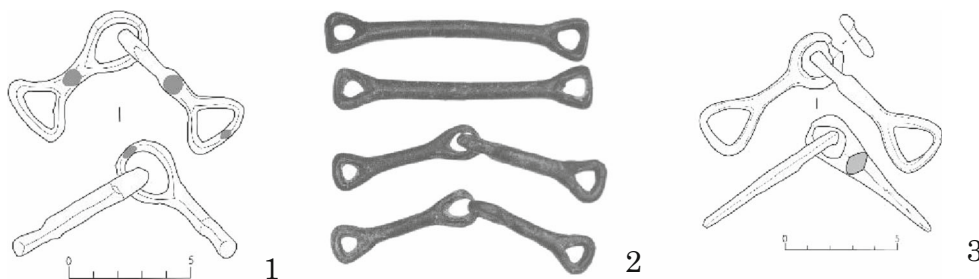
In the western Steppe area, horse bits of the Chernogorovka type of the pre-Scythian period had been considered to be the

earliest metal horse bits. Recently however, Berezanskaja and Klochko excavated the Hordeevka tumuli in the Ukraine and found a horse bit from kurgan No. 34 that belongs to the third period of the tumuli, dated 1200–900 B.C. (Berezanskaja and Klochko 1998:Pl.67–4) (Fig. 8.1). Klochko dates the bit to the Belozerka period, the latest Bronze Age period before the pre-Scythian period. He also added bronze horse bits from a demolished kurgan in Vinnytsia (Fig. 8.2), grouping them as the earliest metal bits in the Ukraine (Klochko et al. 2011: 166–167, Yukishima 2014).

Bits from Vinnytsia consist of a rod type and a chain type. It is very meaningful that both types are found in the Shang and Early Western Zhou periods in China. In addition, their outer rings are triangular-shaped, a similar characteristic observed in some early Western Zhou horse bits. These represent a direct transformation from the 8-shaped bits of the Shang period. In particular, the shape of the bit from Hordeevka resembles the bit from tomb M210 at Pingdingshan (Fig. 8.3). In addition, the chain type bit from Hordeevka and Vynnytsa are very small, with the one from Hordeevka 11.4 cm long, and the bits from Vynnytsa 12.0 cm and 13.0 cm. Their small size is also a common trait inherent in early horse-bits of the Ukraine and China. Also, when Prof. Klochko showed me those examples, I noticed the inner ring of part A of the Hordeevka bit was not cast whole in one casting but appears to be formed as the result of an additional cast: this is a common trait also found in Western Zhou horse bits.

Thus, those horse-bits before the Chernogorovka type can be compared with Early or Middle Western Zhou period examples. Tomb M210 of Pingdingshan dates to the King Mu wang 穆王 period of the Western Zhou, considered to be somewhere in the tenth century B.C. This date does not contradict the date of the Hordeevka horse bit. Similarities described

Fig. 8 Early metallic horse bits of the Black Sea region and a bit of the Western Zhou period. 1. Bit excavated from k.34, Hordeevka (drawing by the author); 2. Bits found from a kurgan in Vinnytsia (after Klochko et al. 2011: fig. 121); 3. Bit from M210, Pingdingshan cemetery (drawing by the author)



above mean that they are in some way connected despite the great distance, which is not impossible considering the distribution of horn cheek-pieces of the Late Bronze Age, discussed above, and the reported finds of Karasuk daggers in the Ukraine (Terenozhkin 1976: 104–108), both of which are roughly of the same period. And, in the case of this horse bit, the influence would have been from the East to the West.

5 Innovation in the methods of connecting horse bits and cheek-pieces

In China, the outer rings of horse bits and cheek-pieces were tied together with leather straps at first, but in the Late Western Zhou period, as horse bits became larger, the outer rings accordingly became larger, and the cheek-pieces became inserted in them, as seen in the horse harness from Liangdaicun (Shaanxi 2010) (Fig. 9.1). Cheek-pieces also changed: a central hole disappeared, and they became slender, with the loops on the reverse always appearing as two.

Similar changes in horse harnesses occurred in Siberia. In the earliest period, the outer rings of the horse bit and cheek-pieces are tied together with straps, which sometimes still are found preserved, as seen in the horse harness from Arzhan I (Gryaznov 1980, figs.12.1, 14, 16, 20.3, 23, 27). Cheek-pieces of that period have three holes of the same direction, which changed afterwards into Y-shaped cheek-pieces or as having T-shaped projections, especially in the Altai. Then next came cheek-pieces with two holes, which were inserted through outer rings on the horse bit. This type of horse harness spread very widely and continued to be used long thereafter.

In Siberia, the appearance of this type of harness was considered to date to the late sixth or about the fifth century B.C.

However, at present the horse harness from Aldy Bel' in Tuva (Grach 1980) (Fig. 9.2), which can be dated to about the second half of the seventh century or the beginning of the sixth century B.C, is considered the earliest example of such a horse harness (Marsadolov 1998: 11–12).

These two kinds of horse harnesses, from the Steppes and China, are very similar in construction. The only differences are in the cheek-pieces, which differ by having holes or loops. They are considered in some way to be connected to and influenced by one another. At present, the Chinese examples appear to be earlier than those of the Steppes by about 150–200 years.

6 Steppe bit casting technology and later technology in China

Before the find of the horse bit from Hordeevka, horse bits of the Chernogorovka type of the pre-Scythian period were considered to be the earliest metal bits of the Steppe zone. The horse harness from Arzhan I, Tuva, is equated to those of Chernogorovka type (Gryaznov 1980: 50–61), and the kurgan is now dated to the ninth–eighth centuries B.C. Some horse bits from Arzhan I show traces of the manufacturing method that resembles the later method of Chinese horse bit casting and not the earlier method. That is, part A is entirely surrounded by a casting seam without a trace of an opening, while on the end of the inner ring of part B there appears some trace of a device for joining part A with part B when casting (Fig. 10.1).

Many horse bits of the Tagar Culture also resemble bits from Arzhan I, having similar traces (Fig. 10.2–3). Yu. S. Grishin stated on the casting of bits, citing the reconstructions by V. V. Radlov and M. P. Gryaznov (Grishin 1960) (Fig. 10.5). In both reconstructions, the end of part A is



Fig. 9 Horse harness with which cheek-pieces inserted in the outer ring of the horse bit. 1. Bit with cheek-pieces from M502, Liangdaicun (after Shaanxi 2010: pl. 35.2, fig. 23.3); 2. Bit with cheek-pieces from Aldy Bel' (after Grach 1980: Chronological table I.40)

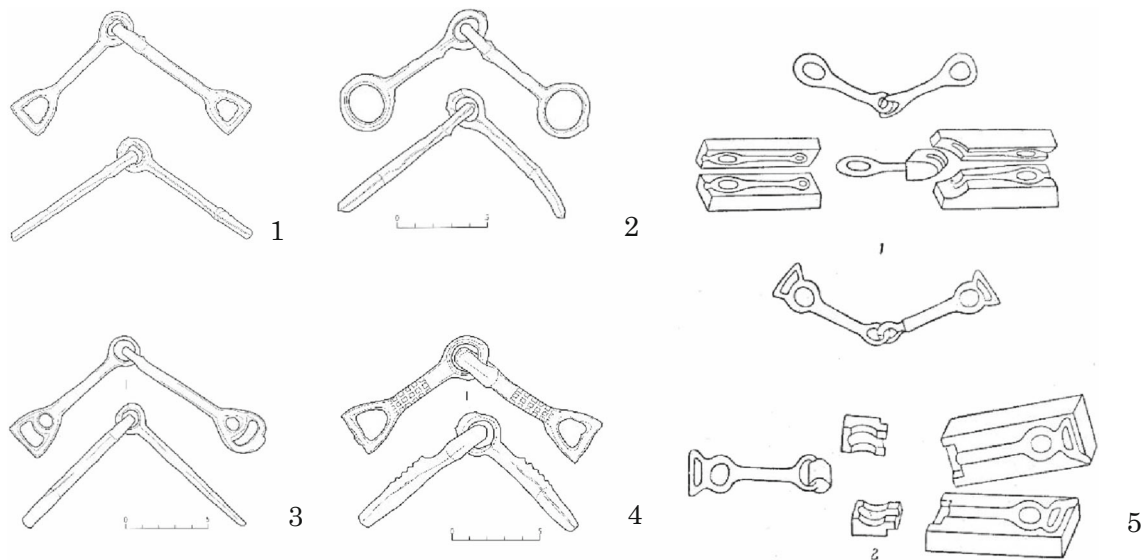


Fig. 10 Siberian and Central Asian horse bits and two versions of the reconstruction of a casting mold. 1. Bit from Arzhan I held in Tuva National Museum in Kyzyl (drawing after author's sketch); 2. Bit of the Tagar Culture held in Ermitazh (drawing by the author); 3. Bit of the

Tagar Culture held in Ermitazh (drawing by the author); 4. Bit from k 47, Uigarak, held in the Moscow Historical Museum (drawing by the author); 5. Reconstruction of a casting mold for a bit (after Grishin1960: fig. 12)

wrapped with clay and incorporated into the mold assemblage for casting part B.

Horse bits from Uigarak, an early cemetery of the Saka Culture in Central Asia (Vishnevskaya 1973), also show similar characteristics: part A has no trace of an opening, and then inner end of part B has a trace of some device (Fig. 10.4).

The manufacturing technology of Siberian and Central Asian horse bits is considered basically similar to that of the period of Arzhan I, and stands in contrast to early Chinese technology from the Shang through early Spring and Autumn periods. The Siberian and Central Asian technology resembles later Chinese technology, of the Warring States period.

In northern China, the culture contemporaneous with Arzhan I is the Upper Xiajiadian Culture, which spread across eastern Inner Mongolia. Horse bits from graves of this culture, from Xiaoheishigou and Nanshangen 南山根 e.g., are of several types (Neimenggu 2009, Kaoguyanjiusuo 1981, Liu 2007) (Fig. 11.1–3). These, however, include the chain type consisting of two parts and having stirrup-shaped outer rings (Fig. 11.1). They are similar to early horse bits of the Steppe area, suggesting connections with Siberia.

The Yuhuangmiao 玉皇庙 Culture is a nomadic culture that succeeded the Upper Xiajiadian Culture in northern China and spread to Beijing and Hebei province. Several horse bits are found in graves of this culture (Beijing 2007) (Fig. 11.4–5).

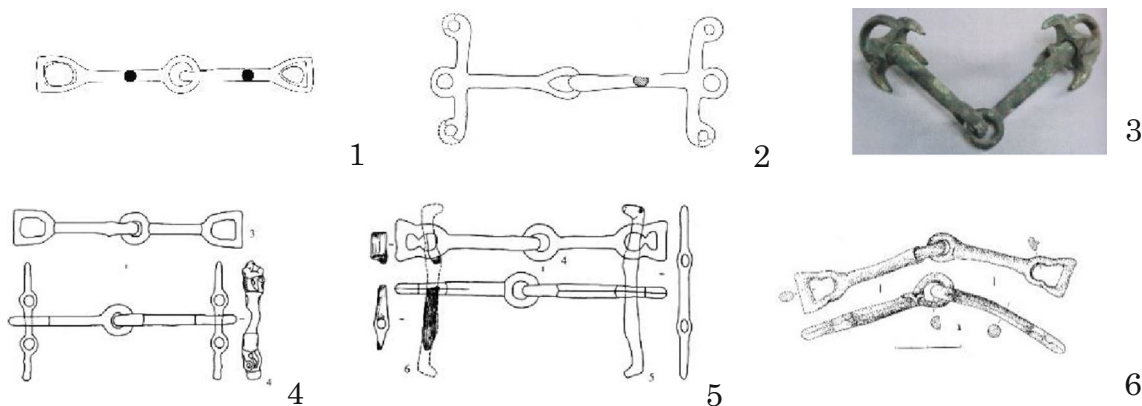


Fig. 11 Bits of the Upper Xiajiadian Culture, Yanshan Culture, and the Altai. 1. Bit from Xiaoheishigou (after Neimenggu 2009: fig. 321.6); 2. Bit from M102, Nanshangen (after Kaoguyanjiusuo 1981: Fig. 4.6); 3. Bit with cheek-pieces from M101, Nanshangen (after Liu 2007: 045); 4.

Bit with cheek-pieces from YYM18, Yuhuangmiao (after Beijing 2007: fig. 674.3-4); 5. Bit with cheek-pieces from YYM250, Yuhuangmiao (after Beijing 2007: fig. 675.4-6); 6. Bit from Gilevskii most (after Kilyushin et al.1997: fig. 45.1)

Shul'ga (2008) points out common features between the Yuhuangmiao Culture and the nomadic culture of the Altai, including horse harnesses and other ornaments. Horse bits of the Yuhuangmiao Culture (Beijing 2007) and the Altai (Kilyushin et al. 1997) resemble each other by having key-hole shaped outer rings (Fig. 11.5–6).

Their resemblance testifies to strong connections between cultures of the Altai and northern China. The author presumes that Siberian and Central Asian technology for casting horse bits affected the Yuhuangmiao Culture, and then Yuhuangmiao Culture in its turn influenced Chinese technology for horse bit manufacture in the Central Plains, eventually replacing earlier casting technology.

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