From western Asia to the Tianshan Mountains: on the early iron artefacts found in Xinjiang

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ABSTRACT This paper discusses the dates and origins of early iron artefacts found in Xinjiang, and proposes some hypotheses regarding the origin of iron metallurgy in ancient China. Having examined early iron finds excavated to this date in Xinjiang, it is argued that iron came into use in Xinjiang during the 9th–8th century BC, a date later than the first appearance of iron in western Asia. Several pieces of archaeological evidence are presented to demonstrate that some cultural connections existed between Xinjiang and western Asia during the beginning of the 1st millennium BC. Considering that iron appeared in western Iran around the 10th–8th century BC, it is then suggested that the appearance of iron in Xinjiang around the 9th–8th century BC could have resulted from cultural interaction between Xinjiang and western Asia. As for the origin of iron in central China, it is suggested that iron might have been introduced into central China during the 9th century BC from Xinjiang and other frontier regions by the steppe people, although no decisive archaeological evidence supporting this hypothesis has been found.

Introduction

What is the origin of the early iron artefacts discovered in ancient cemeteries in the Xinjiang region, such as those at Yanbulaq, Yanghai, Charwighul, Chong Bagh, and so on? Was the technique of iron-making invented in ancient China itself or was it transmitted from the outside world through Xinjiang? Some scholars insist that the technology is an indigenous Chinese invention (Kong and Feng 1988; Zhu 2001: 53; Bai 2003: 308), while the majority suggest that it was introduced from the West (Chen 1989; Tang 1993: 563–4; Zhao 1996: 289; An 1996; Mei 2000: 74–5; Wagner 2003; Liu 2004). In this paper, this question is revisited, focusing on the date of the iron items found in Xinjiang and the background of cultural exchanges between Xinjiang and western Asia, or the region of the Pontic steppes, in the early part of the 1st millennium BC. Some hypotheses are put forward regarding the origin of iron metallurgy in ancient China.

Date of the early iron artefacts unearthed in Xinjiang

Originally, scholars discussed this question based on the finds at the Yanbulaq cemetery in Hami county (XIA 1989a). There are two tombs in the cemetery (M75 and M31) from which some iron artefacts were unearthed (Fig. 1). Based on 14C calibrated dates, tomb M75 dates from around 1000 BC, or even earlier. The other tomb, M31, dates from around 1312–1127 BC (3240±135, calibrated). However, after analysis of the features of the structure of

![Figure 1](image-url)
the tombs, Li Wenying proposed that the tombs belonged to a later period, around the 7th century BC (Li 1997: 27). This conclusion forced scholars to reconsider the calibrated 14C dates and the original viewpoint.

Recently, there has been further important research on this question. Shao Huiqiu noticed that M75 can be divided into two stages, based on the relationship of the layers. The upper tomb, in which all the iron artefacts were found, belongs to a later stage, and the other burial objects, such as ceramic vessels, also differ from those in the lower layers (Shao 2006).

The M31 knife is typologically early, and, based on ceramic vessel types, according to Shao Huiqiu this tomb belongs to the early stage. However, the date of this tomb (c.1312–1127 BC) is too early to be believed, because it is earlier than the date of the iron excavated from the regions neighbouring Xinjiang, especially those found in Central Asia (Wagner 2003: 130). If only the characteristics of the painted pottery and the calibrated dates are considered, and ignoring the views of Li Wenying, the date of the iron knife excavated from this tomb might be around the 10th–9th century BC. This find is a very important piece of evidence, but it is the only one that has so far been discovered. If several examples like this are found, this would confirm the speculation that iron artefacts appeared in Xinjiang around the 10th–9th century BC. More detailed archaeological excavations focusing on this culture need to be done in the future.

In recent years, more materials have been found in the Yanghai cemetery in Shanshan county, Turfan (XIA and CROT 2004). A bimetallic (bronze and iron) artefact unearthed from tomb M5 at Yanghai cemetery may be a toggle used for connecting rope. This tomb has been dated to around the 10th–9th century BC based on the types of ceramic vessels found. Moreover, some items within the inventory, such as the bridle bits and the cheek-piece (in the shape of the primitive ones), can be dated to a time around the 9th–8th century BC, fixing the date of this tomb to this period (Fig. 2). Furthermore, there are obvious cultural relations between the Yanghai cemetery and the Yanbulaq culture in Hami county, in the Yanbulaq cemetery where perhaps the earliest iron artefact has been found in Xinjiang. Finally, there are similar finds in necropolis B of the Sialk site in Iran, which was dated to around the 10th–9th century BC (Ghirshman 1938–39: 220, pl. XXIX: 6, 7). Several similar artefacts were also unearthed from tomb 1 in Arzhan, in Tuva, which was dated to around the end of the 9th century BC. Therefore, this artefact is the most important evidence for seeking the origin of the early iron objects discovered in ancient cemeteries in the Xinjiang region.

From the 8th century BC, the quantity and types of burial goods made of iron increased rapidly in some regions in Xinjiang, especially in the Tianshan Mountains region. Many iron objects were found at Chong Bagh cemetery (Fig. 3), the date of which has typologically been placed around the 8th–7th century BC (Tang 1993: 561); this is also confirmed by the 14C calibrated dates (IA and CROB 1987, 1991).

Some iron artefacts, including several knives and a sword shard, were excavated from the Qiongkeke cemetery in Nileke county in 2001 and 2002 (XIA 2002). The excavators suggested that these iron artefacts could be dated to around 1000 BC. The iron knife from 2002YNQM03 grave was even dated to a period around the 12th century BC (Liu 2004). However, Lü Enguo argued that this cemetery may not be as early as the 14C calibrated date suggested (Lü 1999). According to Chen Jianli who did the 14C dating measurement at Peking University, the reliable dates for these iron objects from Yili should also be placed around the 8th–7th century BC. In any case, the discovery of the Qiongkeke cemetery and the whole region of the Yili River valley require further research, considering that the region links Xinjiang with Central and western Asia.

In summary, on the basis of archaeological evidence available so far, especially the bimetallic artefact from M5 in the Yanghai cemetery, iron artefacts would certainly seem to appear in Xinjiang around the 9th–8th century BC. Only
the iron knife unearthed from tomb M31 in the Yanbulaq cemetery might be dated to the 10th–9th century BC, a date that still needs to be confirmed by future discoveries.

**Relationships between western Asia and Xinjiang from the late 2nd to early 1st millennium BC**

Iron appeared in western Asia earlier than it did in Xinjiang. A large amount of data concerning iron metallurgy exists for the region of western Iran, where iron appeared towards the end of the 2nd millennium BC (Iron I), c.1450/1350–1100 BC. Many iron artefacts dating from the period between 1100 and 800 BC (Iron II) have been found at several sites, such as the Sialk B necropolis and many sites in the Luristan region (Cuyler Young 1965, 1967; Pigott 1980: 417–52; Fleming et al. 2005: 41–2). Some of these discoveries indicate that there were relations between western Asia and Xinjiang during the period between the end of the 2nd and the early stage of the 1st millennium BC.

**The face-to-face horse motif**

Comparing the face-to-face horse motif decorating a pottery jug from the Sialk B necropolis in ancient Iran with the same motif on a rock in Hutubi near Urumqi in Xinjiang, the possibility that the respective people in these locations had...
some interaction appears convincing. The date of this motif can be confirmed by some clan emblems of the late Shang dynasty, cast on the surface of ritual bronze vessels dated to the 13th–11th century BC (Su 1994: 559). The painted jug from the Sialk B necropolis has been dated to the 10th–9th century BC (Ghirshman 1964: 16, fig. 14), while the date of the bronze statue found in Luristan in western Iran is around the 8th–7th century BC. Thus, the date of the Hutubi petroglyph should be around the 13th–9th century BC, possibly closer to the 10th–9th century BC (Wang 1993). In particular, images with the same crown and posture, both on the Hutubi petroglyph and the bronze sculpture from Iran, and the same feature of a head drawn in a man’s chest, both on the Hutubi petroglyph and the silver plaque from Luristan, would suggest that there were contacts between the two regions (Fig. 4).

The cult of the twin brothers in the form of two horses was widespread (Kuzmina 2003). Hutubi was a clan religious centre in this period. Furthermore, this religious dancing might have influenced the last emperor of Yin (the late Shang dynasty) (Lin 1998a,b). Hutubi was also very important geographically, located in the centre of the Tianshan Mountains at a time when cultures were shifting from the Bronze Age to the early Iron Age in Xinjiang. An indication of a relationship with western Iran in this period would be very useful for our understanding of the origin of iron metallurgy in Xinjiang. This location and chronology may offer an opportunity to explain the appearance of iron artefacts in the cemeteries of Yanbulaq and Yanghai.

Introduction of Neo-Assyrian culture elements into Central Asia

The New Assyrian Empire (935–612 BC) began to expand around the 9th century BC. There are some objects indicating that some Assyrian elements may have been introduced into Central Asia indirectly, such as konghou (horizontal angular harp), gold blossom ornaments, sticks and the half-stepped lozenge, all found in the Subeixi culture in Xinjiang. The harp from tomb 90 of cemetery I in Yanghai is very similar in shape to the seven-string Assyrian instruments carved on the wall relief at Nimrud (Lawergren and Gurney 1987; Lawergren 2003: 89–91) (Fig. 5). The gold blossom ornaments found in the cemeteries at Aidinghu, Yanghai and Goubei in Turfan are similar to those of the New Assyrian Empire (Fig. 6). There are many sticks made of wood in the cemeteries at Yanbulaq in Hami and Subeixi in Turfan. These discoveries suggest that the sticks found in Xinjiang may have something in common with those from the culture of the New Assyrian Empire (Fig. 7). The half-stepped lozenge appeared on Persepolis painted pottery, probably as a symbol of the lower heavens (Pope 1981: 833–4). The Assyrians used this motif to crown their buildings, and even painted it on their pottery (Namio 1963: 109, fig. 261). There is one type of ceramic vessel excavated from the cemetery at Yanghai in Shanshan county the erect handle of which is in the shape of just such a half-stepped lozenge. This is a unique phenomenon during the early stage

Figure 5 Konghou/cank (horizontal angular harp) of the New Assyrian Empire and Xinjiang: (a) wall relief of an Assyrian harp at Nimrud, 860 BC (Shanghai Museum 2006: plate 7); (b and c) harp found in tomb 90 of Yanghai cemetery I (after XIA and CROT 2004: fig. 39).
of the Subeixi culture, based on all the finds of the whole Xinjiang region to date. It is conceivable that this design of handle could have imitated the battlements of western Asia.

Iron artefacts prevailed in the Neo-Assyrian Empire, Sialk B and Luristan around the 10th–8th century BC. For example, many iron artefacts were unearthed from the Luristan region, including a set of harness from the site of War Kabud Pusht-i Kuh, which was dated to the 9th–8th century BC (Haerinck and Overlaet 2004: 55; Stöllner et al. 2004, I: 310–37, II: 693–9). A few pieces of archaeological evidence suggest that people living in this area had some connection with the inhabitants of Xinjiang at that time, and that the iron knife from Yabulaq tomb 31 and the bimetallic artefact from Yanghai tomb 5 could possibly be dated to about the 10th–8th century BC. Therefore, it would seem that there were some connections between these places through the region of the north of Iran, the Oxus and Jaxartes rivers and the northern region of the Tianshan Mountains. The sites of Sialk and Luristan are considered to be the ruins of the civilisation of the early nomads who migrated to western Iran in the early 1st millennium BC.

Not only did these peoples have opportunities for contact with those living in Central Asia and the steppes, but also with the Neo-Assyrian Empire. Thus, these nomads may have played a role in the spread of iron metallurgy between the West and the East.

Figments of an iron sickle, excavated from the southern mound at Anau which belongs to the Yaz I culture, are perhaps pieces of the most ancient iron artefact known so far in western Central Asia (Masson and Sarianidi 1972: 160). If the decoration of the ceramics found in western Central Asia is compared with those from sites in Xinjiang, such as Banjiegou in Qitai county and Charwighul cemetery in Hejin county, many similarities can be noted. In fact, the
cultures in which the handmade painted pottery prevailed in Central Asia may have been influenced by the cultures in Xinjiang (Francfort 2001; Mei 2000: 74–5). If the Anau sickle is earlier than those found in Xinjiang, it could be used to indicate a suitable point of the route for the spread of iron metallurgy.

Relationships between Xinjiang and the Pontic Caspian-Aral Sea steppes

When considering the route by which iron may have been transmitted to Xinjiang, the Eurasia steppe is another obvious focus of attention. Is there any evidence to show that iron metallurgy was taken to Xinjiang across the steppes? According to archaeological finds known so far, it seems that some relationship existed between the Pontic steppes and Xinjiang. An Olenniye kamni, dated to the 8th–7th century BC, was found in a Cimmerian tomb in northern Bulgaria. In another example, the weapon was carved on a Crimean stele from the village of Tselinniy (Belozor and Korpusova 1980). Several such objects were also found in the Pontic steppes and are considered to be Cimmerian (Chlenova 1975; Terenozhkin 1976). This type of Olenniye kamni was brought from the East, especially the region of the Altai Mountains in Xinjiang (Wang and Wang 1996: fig. 49). Other finds, such as harnesses, arrowheads with a barb at one side of the end of the socket, and cauldrons with a short knob on the top of each erect handle, may also have been the results of transfer to the northern Caucasus from the East (Fig. 8). The bronze cauldrons in particular had their origins in the northern region of China (Iessen 1954). Several such cauldrons have been found in the northern foothills of the Tianshan Mountains, suggesting that the people of this area had contact with those of the northern Caucasus (Guo 1999, 2002). Even though a sudden increase in iron can be observed around 750 BC, iron was used infrequently before 1100 BC in eastern Europe. The first iron artefacts appeared in Transcaucasia in the 12th–11th century BC, and by the 10th century BC a fairly appreciable range of iron objects came into being, including some in the northern Caucasus (Gzelishvili 1964: 9–19; Vosnesenskaya and Tekhov 1973). However, the initial appearance of iron had practically no effect on the volume of non-ferrous metallurgical production in the Caucasus, and a noticeable decline in the production of bronze only took place in the 8th–7th century BC (Chernykh 1992: 295). The Cimmerians might have learned iron metallurgy against this background, and many elements indicate relationships between the Pontic steppes and Xinjiang before the 8th century BC, so the possibility cannot be ignored that iron metallurgy might have been transmitted to Xinjiang from the region of the Eurasian steppes located to the north of the Caspian and Aral seas. However, it should be pointed out that the first appearance of iron in the region of the eastern Urals and southern Siberia did not happen very early, and so further evidence is needed to clarify this issue (Koriakova and Epimakhov 2007).

**Figure 8** The relationship between the Pontic steppes and Xinjiang before the Scythian period: (a) stele from the Pontic steppes; (b) arrowhead from the Pontic steppes; (c) bronze cauldron from the northern Caucasus; (d) stele found in Xinjiang; (e) bronze arrowhead found in Xinjiang; (f) bronze cauldron found in Xinjiang (after Wang and Wang 1996: fig. 49; XIA 1989a: fig. 24:2; Chi 1993).

**Conclusions**

The earliest iron object found so far in Xinjiang is the bimetallic toggle excavated in tomb M5 at the Yanghai cemetery in Shanshan county, Turfan, which can be dated to the
9th century BC (XIA and CROT 2004). It seems that iron was introduced to Xinjiang from north-west Iran during the 10th–9th century BC. Based on the iron artefacts found to date, a preliminary hypothesis may be put forward regarding the origin of iron technology in the Central Plains of China. The earliest iron artefact discovered there to date is a sword unearthed from tomb 2001 of the king of the Guo state in Henan province (Han 1998; Han et al. 1999), which has been dated to the early part of the 8th century BC (IA 1999: 126–8, 530; Peng 2006). Thus, iron metallurgy may have spread to the Central Plains of China around the end of the 9th century BC. The people living in oases along what was to become the Silk Road or in the steppe region may have played an important role in this rapid transmission of iron technology (Fig. 9). It has been noted that it was not common for iron articles to be buried in graves in the early period, and so the iron artefacts of the 10th–9th century BC may have not been found in Xinjiang for this reason. We can only hope for new discoveries in the future.

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References

Cuyler Young, T. Jr. (1967) 'The Iranian migration into the Zagros’, Iran 5: 11–34.


Lin, Meicun (林梅村) (1998b) 西方影响及其与中原文化的关系研究 (Study on the relation between single occupancy graves and graves with two or more corpses), 新疆文物 (Xinjiang Cultural Relics) 2: 26–7.


XIA (Xinjiang Institute of Archaeology) (新疆文物考古研究所) (1989b) 鄯善县洋海、达浪坎儿古墓群清理简报 (‘Brief report of the examination of cemeteries in Yanghai and Dalangkanger’), 新疆文物 (Xinjiang Cultural Relics) 3/4: 13–53.

Zhao, Huacheng (赵化成) (1996) 公元前5世纪中叶以前中国人工铁器的发现及其相关问题 (‘On the discoveries of iron artefacts before the middle of the fifth century BC’), 考古文物研究 (Research on Archaeology and Relics) 289–300. Xi’an: Sanqin Press.


XIA and CROT (Xinjiang Institute of Archaeology, Culture Relics Office of Turfan Region) (新疆文物考古研究所,吐鲁番地区文物局) (2004) 鄯善县洋海一号墓地发掘简报 (‘Brief report of the examination of cemetery I in Yanghai in Shanshan county’), 新疆文物 (Xinjiang Cultural Relics) 1: 1–27.
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