PREHISTORIC ARCHAEOLOGY IN THE ZHUNGE’ER (JUNGGAR) BASIN, XINJIANG, CHINA

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Abstract

Xinjiang is a vast area of mountains and desert basins that formed the main route for contact between early China and the West. The southern Talimu Basin is well known for the remarkable organic preservation there of burials and abandoned settlements. Lesser known is the northern Zhunge’er Basin that lay across the route out to the Eurasian steppes. From at least as early as the Bronze Age it witnessed important transmissions of technologies and cultural influence, but at present the nature and timing of these is poorly understood. This paper is a review of research to date on the prehistoric periods in the Zhunge’er Basin and the areas immediately surrounding it. The paper also provides a review of the problems that need to be addressed in the archaeology, and particularly the chronology, of the region.

INTRODUCTION

The Zhunge’er (Junggar)\(^1\) Basin, together with the Talimu (Tarim) Basin to the south, make up the territory of Xinjiang, at the far western end of China. These vast arid inland basins have an extraordinarily rich cultural history that has so far only been documented in a very fragmentary and tantalizing manner. Archaeological work began in Xinjiang in the early 20\(^{th}\) century but, until a few decades ago, much of this related to basic exploration and not to systematic research and excavation. Of the two basins, the Talimu has been more extensively investigated. Its dry climate has permitted the most exceptional preservation of organic material and from here researchers have recovered a wealth of manuscripts, wooden artefacts, fabrics and mummified human bodies. The Zhunge’er Basin to the north has a slightly moister climate and does not experience the same conditions of preservation. The main trade routes of the Silk Roads passed through the southern Talimu Basin. Because of this important historical focus and also possibly because of the unusual preservation, most archaeological work has been concentrated here. Yet, of the two basins, for the prehistoric periods, the Zhunge’er is arguably the more important, at least in the Bronze and Iron Ages.

In this paper the authors seek to bring to a wider, and particularly a Western, audience a detailed review of what is known to date of the later prehistory of the Zhunge’er Basin, incorporating recently published Chinese research\(^2\). From the late 1980s onwards, several summaries of the available evidence for the later prehistory of Xinjiang have been published, each one refining that of previous works\(^3\). However, our knowledge of this important region is still very sketchy, based largely on relative ceramic chronologies from widely dispersed funerary contexts. The aim here is to discuss in more detail the particular evidence for the northern part of Xinjiang, the Zhunge’er Basin. The paper also reviews the problems that need to be addressed in the archaeology, and particularly the chronology, of the re-
gion, as the starting point to a new field study that aims to focus on some of these issues. Key concerns with regard to the ancient history of the region are the origins and movements of populations and the transmission of cultural traits and innovations. The question of the origins of the Xinjiang populations is a vexed and complex one. The most recent arguments are summarized to provide a background for interpretation of the archaeological data. The specific question of the spread of metallurgical technologies is also addressed as this is a fundamental component of the patterns of technology transfer between Eurasia and China.

**GEOGRAPHICAL CONTEXT**

Xinjiang is a large region covering 165,000 square kilometers of deserts, mountains, grasslands and oases. It has a sparse, scattered and ethnically mixed population of nomads and oasis dwellers. The largest groups are the Turkeic speaking Uighur and Kazakhs, Mongols, and the Mandarin speaking Hui and Han Chinese. Nomadic or semi-nomadic pastoralism – sheep, goat, cattle and horse herding – forms the main economy for most Kazakhs and Mongols. The Uighur economy is based on oasis agriculture combined with stock raising. The Hui and Han have been migrating here from neighboring areas to the south-east such as Qinghai (Köknor) and Gansu since the Qing Dynasty around three hundred years ago, bringing with them a tradition of village based agriculture.

Xinjiang is made up of two large desert basins surrounded by high mountains. In the south is the larger and more arid Talimu Basin; in the north is the Zhunge’er Basin, which has a very slightly milder climate. The two are separated by the high ridges of the Tianshan (Tängri Tagh), a steep range of young, glacier-capped, fold mountains. To the west, the way to the Eurasian steppe is blocked by a string of mountains stretching from the Pamier (Pamir) range in the south up to the Aletai (Altay) in the north. The main routes
linking East with West run from the Ferghana valley up over the difficult Terekdavan pass across the Pamir range into the Talimu Basin at Kashi (Kashgar), up the Yili (Ilı) River valley through passes across the Tianshan into the Tulufan (Turfan) Depression and the Zhunge’er Basin, and more easily into the Zhunge’er Basin at two points, across some lowlands at Tacheng-Kelamayi (Qöqek – Karamay), and up the E’erqisi (Irish) river valley. To the east, narrow corridors lead out between the mountains into the Gobi Desert and Inner Mongolia, providing the route into mainland China. This special geographical location has placed Xinjiang in a unique position, not only as a key node on the Silk Road in historical times, but also as a critical point for the meeting of cultures and the transmission of ideas and innovations in the prehistoric periods.

The Zhunge’er Basin is a land of sharp contrasts (Fig. 1). The central Ku’erbantonggute (Gurbantunggut) Desert is low-lying, around 200 meters above sea level, while the surrounding mountains rise rapidly to around 3000–4000 meters. The climate is hot and dry in the summer but cold in winter. Ice caps form during winter snowfall, and melt down into the streams and rivers in spring, feeding the valleys and the oases. Ancient settlements and burials are usually distributed along the rivers and streams on the lower mountain slopes and in the oases created as the rivers run out into the desert. Vertical transhumance is the most common pattern of nomadic movement today, as it almost certainly was also in the past (Frachetti, 2004: 146 ff.). Permanent settlement is only feasible in the small oases where limited agriculture is possible if supported by irrigation, and in the far west where rainfall in certain areas rises up to 600 mm. The annual average temperature today is around 5–8°C in the lowlands, valleys and desert, but 0–2°C in mountainous areas. There is about 40°C difference between summer and winter. Precipitation is quite low, less than 100 mm in the desert but around 300 mm in the mountains, rising as high as 500 mm on the peaks. A forest belt of Siberian pines is well established on the upper slopes of the mountains. Below this is open grassland vegetation, gradually decreasing in density towards the foothills. Stands of elm can be found in the middle reaches of many of the river valleys.

**HISTORY OF RESEARCH**

Interest in the archaeology of Xinjiang first began around the mid-nineteenth century, with a series of European traveler-explorers, among the most famous of whom are Marc Aurel Stein, Sven Hedin and Albert von Le Coq (Stein, 1907, 1912, 1921, 1928; Hedin, 1899, 1903, 1931, 1933, 1940, 1943; von Le Coq, 1928). These early explorers concentrated mainly on the Talimu Basin in southern Xinjiang. They explored the desert ghost towns such as Loulan (Krorainia) and searched for Buddhist manuscripts among the caves and temples on the desert rim. The Zhunge’er Basin was almost left untouched, except for some interest in temples and later walled cities (Chen Xingcan, 1997a: 46–48). Since that time, archaeological research in Zhunge’er has been carried out by Chinese archaeologists on a limited scale. Work has been mainly restricted to regional surveys and rescue excavations (Fig. 2).

Study of the prehistory of Xinjiang began in the early twentieth century, but serious analysis of cultural contexts and chronology did not emerge until the 1980s. In 1987 An Zhimin published an analysis of evidence for the Neolithic periods, including a basic typological sequence for the microlithic stone tool traditions of the region, working mainly from surface collections (An Zhimin, 1987, see also 1992a). In his 1992 paper on the Bronze Age (An Zhimin, 1992b) he identified two distinct cultures within Xinjiang, one associated with painted pottery, the other with pebble tools and coarse-ware pottery, sometimes with incised or impressed decoration. By this time an increase in the number of excavations provided a broader data base for the archaeology of the region, and C14 dates linked to stratigraphic sequences became available.

Most of the work up to this time was based on evidence from the Talimu Basin, and sites in and along the foothills of the Tianshan Mountains. Still very little attention had been paid to the Zhunge’er Basin. A few sites were excavated there before the 1970s, most of them cemeteries. Based on the limited data available, archaeologists attempted to make further analysis of their cultural contexts. Chen Kwang-tzuu and Hiebert (1995) noted similarities between material from the Qiemu’erqieke (Shamirshak cemetery) and
the Afanasievo/Okunevo cultures of the Aletai and south Siberia. Based on some random collections of Andronovo style bronze artefacts from this area, Mei Jianjun and Shell also discussed the possible cultural connections between the Zhunge’er region and the Eurasian steppe (Mei Jianjun and Shell, 1999). As study of the archaeology has continued over the past decade, a clearer picture of the prehistory of Xinjiang has begun to emerge. Shui Tao identified eight cultural sub-regions, three of which, Aletai-Tacheng, Balikun (Barköl) and Ulumuqi (Ürümqi) are within the Zhunge’er area (Shui Tao, 1993). In a later analysis, An Zhimin divided Xinjiang into ten cultural zones, among them three, the mountain valleys of the middle Tianshan and the Balikun and Aletai grasslands, which are in or on the margins of the Zhunge’er basin (An Zhimin, 1996, 1998).

In the early 21st century, study of prehistoric archaeology in Xinjiang has progressively developed. There are now more reliable field data and research results published in Chinese journals, associated with a significant number of professional excavations such as Xiaohe (Kiqik Müran) (Xinjiang Institute of Archaeology, 2003) and Chawuhugou cemeteries (Xinjiang Institute of Archaeology, 1999). Comprehensive publication of the Chawuhu burial grounds has provided systematic studies of typology and chronology based on reliable stratigraphic evidence covering all five cemeteries. This is the first time that a basic chronology of cultural contexts has been established in one excavation site in Xinjiang. More research articles have been published discussing new methods and perspectives. A case in point is the work of Mei Jianjun who has reworked earlier typological analyses of often unstratified metal artefacts by studying bronzes through chemical component analysis (Mei Jianjun, 2000).

Using the Chawuhu chronology, archaeologists have attempted to revise the sequence of archaeological cultures in Xinjiang. Building on the work of An Zhimin, Zhang Yuzhong (2002) has created a framework for Xinjiang prehistoric archaeology. He has placed the start of the Bronze Age around 2000 B.C. and the beginning of the Early Iron Age around 1000 B.C. While this may be broadly accurate, given the size and diversity of the region there is undoubtedly localized vari-

![Fig. 2. Map: Archaeological sites in the Zhunge’er Basin](image)
ability. Guo Wu (2005) has undertaken doctoral research on prehistoric cultures in the Tianshan in the first millennium B.C., establishing a basic chronology and investigating cultural interactions between Xinjiang and the outside world. His work is based on a large number of excavations in Xinjiang in recent years. Another scholar, Han Jianye (2005), has also followed on the work of An Zhimin, redefining the distinct cultural regions of Xinjiang. His divisions are almost the same as An Zhimin’s, except that he defined one new region in western Zhunge’er and combined An Zhimin’s distinct regions of Balikun and Hami (Kumul) into one.11 Han Jianye’s cultural divisions include six sub-regions in or bordering on Zhunge’er. The two in the north, Aletai and Tacheng (VIII, X), are not discussed in detail due to a lack of archaeological data. There is much more information on those in the south, Tulufan and the mid-northern Tianshan slopes (II), the Hami basin and the Balikun grassland (III), the Yili Valley (IV) and the Shihzei-Wusu (Xiho) area (VI).

Today, our understanding of the archaeology of the Zhunge’er Basin is still at a very basic stage. Evidence is based on a limited number of excavations and surveys, most of them in the south. There is very little in the way of reliable stratigraphic data or ceramic typologies linked to absolute dates. The cultural groups identified so far are based in part on the distribution of archaeological fieldwork. Further and more comprehensive field research is likely to refine the current picture significantly. Based on very limited data, and using some parallels from neighboring areas, the aim of this paper is to review the current state of knowledge and interpretations of regional cultures and chronology with a special focus on the Bronze and Early Iron Ages from the second to the late first millennia B.C. As a starting point this study is focused on ceramic evidence as this has been the primary basis on which regional ‘cultures’ have been identified.

ZHUNGE’ER BEFORE THE BRONZE AGE

Very little is known about Xinjiang as a whole prior to the Bronze Age. Almost all available evidence comes from surface collections of chipped stone artefacts.12 The Zhunge’er Basin, with even more limited archaeological investigation, offers very little evidence for the early prehistoric periods.

Pre-Holocene sites

While little evidence exists for sites in Xinjiang in periods prior to the Holocene, finds from surrounding areas suggest that in time more finds will be made in Xinjiang also.13 In China, Siberia and parts of western Central Asia there have been finds of stone tools dating back into the Lower Paleolithic. These appear to represent two distinct traditions, a pebble tool culture and a bifacial industry (Derev’anko, 1998: 336). In southern Mongolia there have been several finds of Lower Paleolithic quartzite pebble tools. All are from surface collections, occurring on ancient river terraces (Ranov et al., 1992: 57), while Okladnikov found a bifacial industry in the foothills of the Yarkh Mountains.14 An early pebble tool complex has been found at the site of Kul’daro in southern Tadjikistan; others are known from Kazakhstan (Derev’anko, 1998: 338).

Middle Paleolithic sites characterised as Mousterian occur widely across Eurasia but they are very varied in their tool typology and technology. Use of the Levallois technique occurs at some sites (Ranov and Davis, 1979: 249). In Uzbekistan the cave site of Teshik-Tash yielded a Neanderthal burial in association with a Levallois-Mousterian assemblage of a specific local type that includes more formal tools such as scrapers and points (Allchin, 1992: 83).15 Some sites of Mousterian tradition have been found in the Zhunge’er Basin. Bifaces have been found in the E’erqisi Valley (Abdurrassul and Zhang Chuan, 1997: figs 2.13, 3.5), and scrapers found in Qichengzi may exhibit a form of Levallois technology (Fig. 3; Wang Bo et al., 1997: fig. 6.3, 4). A recent surface survey identified a large quarry-workshop with Levallois-like nuclei, large blades and flake blades at Nongqishi in Tacheng district and surface scatters of large flakes on the higher terraces of the E’erqisi River near Fuyun (Olsen, 2004: 3–4).

The Upper Paleolithic in Central Asia is less well represented that the Middle Paleolithic and appears to develop largely out of the preceding
Mousterian industries (Derev’anko and Lü Zun-E, 1992). Tool kits are characterized by blade technology. Tools include a variety of scrapers and points. Sites have been located across western Central Asia from Afghanistan up into Uzbekistan and Kazakhstan (Derev’anko and Lü Zun-E, 1992; Derev’anko, 1998; Davis and Ranov, 1999). In the east a number of sites have been found in Mongolia (Derev’anko, 2000) and in China to the east of Xinjiang (Wang Bo et al., 1997; An Zhi min, 1992b; Xinjiang Institute of Archaeology, 1995, 1989).

Early to Mid-Holocene sites

The period corresponding to the Mesolithic, Neolithic and Eneolithic of Eurasia and Siberia is very ill-defined in Xinjiang and cannot readily be discussed in terms of specific periods. Microlithic stone tool assemblages have been found in the Zhunge’er Basin but their exact chronology is uncertain. In the north, six sites in Hababe County with micro-blade technology were found during survey in the upper E’erqisi valley. Another site was found at Kelamayi in the west (Xinjiang Institute of Archaeology and Kelamayi Bureau of Cultural Relics, 1997) and two at Takeerbasitao and Qichengzi in the east (Wang Bo et al., 1997). The sites of Xihonggou 1 and 2 (Xinjiang Institute of Archaeology and Shihezishi Museum, 1998) and Yì’erkabake (Xinjiang Institute of Archaeology, 1995) in Mulei (Mori) are located at the south-east corner of the Zhunge’er Basin. Finds from these sites consist mainly of stone artefacts. There are rare occurrences of very coarse red sherds and even rarer finds of metal fragments. The sites along the E’erqisi River occur as extensive shallow deposits below sand dunes immediately on the river banks. It is likely that the sites consist of palimpsests of deflated occupation deposits dating over long periods of time and representing frequent short-term use. Geometrics collected from the E’erqisi valley may be paralleled in Mesolithic assemblages elsewhere in Central Asia and Siberia (Abdurrassul and Zhang Chuan, 1997: fig. 3-15). Leaf-shaped arrowheads with semi-invasive bifacial retouch found on the same sites also occur widely across northern China, Siberia and the Russian Far East, where they are dated to the early Holocene (Abdurrassul and Zhang Chuan, 1997: fig. 3-3, 4). Later arrowheads are more elongated with extensive invasive retouch covering both dorsal and ventral surfaces. Arrowheads of this type have been found at Yierkabake (Xinjiang Institute of Archaeology, 1997: fig. 6-3) and in the Russian Aletai (Fig. 4; Markin, 2000: fig. 3; Kungurova, 2003: fig. 8).

In Eurasia and Mongolia, the Neolithic was characterised by hunter-gathers using microlithic technologies. China to the south-east of Xinjiang saw the rise of early sedentary agricultural and stock-breeding communities in the area around the Yellow River by at least 6000 B.C. (An Zhi min, 1992a). The principal crops were millet and rice; the main domesticate pig. The basic Near Eastern Neolithic package of sheep/goat/cattle and wheat/barley was introduced into China.
either from the north through the Eurasian steppes or from the west across the Pamir range. Cereal cultivation in Central Asia was not wholly limited to the Bactrian oases. The Bronze Age peoples of the Eurasian steppe practiced occasional agriculture and could have imported cereals into Xinjiang along with domesticated livestock. The earliest evidence so far for wheat in Xinjiang is dated as late as 2000 B.C. at the Bronze Age site of Xiahe in the Talimu basin where it occurs together with millet and domesticated sheep, goat and cattle (Xinjiang Institute of Archaeology, 2003). The economy of these Neolithic communities is unknown although denticulated blades that may have been used as sickles have been recovered from Asitana (Astana) in Tulufan. With the exception of areas such as the Yili river valley, Tacheng district and parts of the northern slopes of the Tianshan, Xinjiang lies outside the dry farming zone and early agriculture may have been based on simple irrigation. There is no evidence so far that this was practiced in the Neolithic period (An Zhimin, 1992a).

There is some evidence for the later pre-Bronze Age period around the Zhunge’er Basin. During excavations in the Yili Valley at the site of Jilintai, archaeologists found a deposit containing microlithic cores sealed by a layer associated with Andronovo material (Ruan Qiu-rong, 2004). This is the first time that stratigraphic evidence has demonstrated the presence of pre-Andronovo cultural remains in Xinjiang. More evidence of the people who created such stone tools may be seen from burials in the Siberian Aletai. Kamennaya Cave (Markin, 2000) is located in the Karakol valley, 1100 meters above sea level. An infant was buried together with an adult female in her

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**Fig. 4.** Chipped stone arrowheads: 1–5. Grave 1, Solonstsy-5 (Kungurova, 2003: fig. 8); 6. Aletai (Abdurassul and Zhang Chuan, 1997: fig. 3-3); 7. Yi’erkabake (Xinjiang Institute of Archaeology, 1995: fig. 6). *Not to scale*
mid-twenties. A large number of artefacts were recovered from the burial, including stone arrowheads, a composite knife made using microlithic flakes, many small shell rings possibly once embroidered on fabric, stone fish used as fishing lures and marmot incisors. Based on C14 analyses, the burial has been dated around 3400 B.C. A similar burial was discovered in the Solontsy-5 cemetery in the Upper Ob River valley on the northern slopes of the Aletai. Stone arrowheads, a composite knife, a stone axe, a grindstone, stone fish hooks and harpoons were found with Burial No 1 (Fig. 5), associated with an adult body. C14 analysis dates the cemetery to around 3700 B.C. The excavators suggest that the cemetery belongs to a transitional period when the local Aletai cultural complex merged with the Kitoi culture from Cis-Baikal, an event that probably took place during the mid-fourth millennium B.C. in the Aletai area (Kungurova, 2003).

Both sites are close to the northern part of the Zhunge’er Basin. More extensive research in Zhunge’er may well yield similar sites on the southern slopes of the Aletai range dating to around 4000 B.C. or slightly later. Although no sherds have been recovered from sites of this period, it is possible that ceramic production may have begun around this time. Ceramic remains occur very rarely in the Kitoi culture from around the early sixth millennium B.C. (Weber, 1995). In the southern part of the basin, arrowheads similar to those from the Kitoi-Aletai culture have been found at Yi’erkabake in Mulei (Fig. 4.7; Xinjiang Institute of Archaeology, 1997). Arrowheads found at Shihezishi in the mid-Tianshan area (Fig. 6) may date the site as early as 3000 B.C. (Xinjiang Institute of Archaeology and Shihezishi Museum, 1998). The unique asymmetric arrowhead (Fig. 6 extreme right) found with the more common arrowhead forms at Shihezi is of a type found all over the Eurasian steppe and east Siberia dated around 3000 B.C. or earlier. A metal form of this point continued its use into the Bronze and Iron ages.
These post-Paleolithic sites are not clearly dated but, based on parallels with finds from surrounding areas, they could belong to a period just before the Bronze Age proper, that is to some time before the third millennium B.C. Terms such as Mesolithic and Neolithic are difficult to apply to a range of ill-defined and poorly dated sites with mixed microlithic traditions that span a large body of time. This fragmentary evidence hints at a framework for understanding the prehistory of the Zhunge’er Basin as more evidence comes to light. The cultural remains from around the mid-Holocene to 3000 B.C. may prove similar to the discoveries from Aletai and Cis-Baikal. The Kitoi culture, and its local variant which may be blended with the Aletai Mesolithic/Neolithic, could also occur in the Zhunge’er Basin. This culture may be associated with very limited ceramic production, possibly represented by very coarse red sherds, but with quite advanced lithic technology, including microlithic composite tools and polished stone tools. Fishing may have played an important role in the subsistence economy, supplementing hunting and gathering activities.

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**THE BRONZE AGE**

It is likely that the transition from the Mesolithic/Neolithic to the Bronze Age in the Zhunge’er Basin, and in Xinjiang as a whole, is strongly influenced by neighboring areas (An Zhimin, 1992b; Mei Jianjun, 2003; Mei Jianjun and Shell, 1999; Chen and Hiebert, 1995). It appears that pre-Bronze Age cultures were replaced fairly rapidly by Bronze Age groups since a large number of Bronze, and later, Iron Age sites were found in this region. How this transition occurred and why it apparently happened abruptly is unknown. It is not clear as to whether it involved acculturation and assimilation, or competition and conflict. However, lack of evidence for pre-Bronze Age communities in the Zhunge’er Basin is not necessarily indicative of an empty space, a cultural void simply filled in the Bronze Age by outsiders. External cultural influence was indeed very important for the Bronze Age transition in Xinjiang but the possibility that the local population adopted new technologies should not be overlooked. The surrounding regions that ex-
erted the greatest influence on the Zhunge’er Basin were the Eurasian steppes and the Aletai/south Siberia. In the south-east there is evidence for contact with Gansu, while in the west some distant links to the oasis-based Bactrian-Margianan Bronze Age culture of south-western Central Asia cannot be ruled out.22

To date analyses of the Xinjiang Bronze Age have focused largely on identifying cultural complexes, primarily on the basis of ceramics, obtained mostly from burials rather than from stratified contexts. Up until recently, it has been difficult to tackle questions of chronology. Absolute chronology has been hampered by the lack of C14 dates; given the limited evidence and a wide date range, relative chronology can only provide a very general framework at best. The summary of the evidence for the Zhunge’er Basin below outlines a preliminary chronological framework and identifies the evidence for external contacts.

Searching for the Bronze Age

There are Bronze Age remains around the periphery of the Zhunge’er Basin. These sites include the Tianshanbeilu cemetery in Hami city, the type site for a Bronze Age culture found along the Balikun grasslands in the southeast corner of the Zhunge’er Basin (Lu Engguo et al., 2001), the Qiemu’erqieke cemetery in the southern Aletai along the north-west lowlands of the E’erqisi Valley (Xinjiang Institute of Archaeology, 1981a), Saizicun at Tacheng (Xinjiang Institute of Archaeology and Tacheng Cultural Relics Bureau, 1996) and Adunjiaolu in Boertala Mongolian Autonomous Region in the Tacheng-Kelamayi lowlands (Li Jinguo and Lu Engguo, 2003), Xikanerzi in Qitai in the northern Tianshan (Qitai Wenhuaguan, 1982), Shuinichang at Shihezishi, also in the western part of the northern Tianshan (Xinjiang Institute of Archaeology and Shihezishi Museum, 1998; Xinjiang Institute of Archaeology et al., 1999), and the Banjiegou settlement sites on the mid–northern Tianshan slopes (Xinjiang Institute of Archaeology, 1981b). The location of these sites and their cultural characteristics may be connected to the three main routes into and out of the Zhunge’er Basin: the E’erqisi valley, the Tacheng–Kelamayi lowlands and the Hami–Balikun corridor. The best studied region is the southern Hami–Balikun area where more extensive work has been carried out at Tianshanbeilu and Nanwan. One key aspect of the Bronze Age remains from Xinjiang is that the great majority of them are derived from tombs. Very few settlement sites have been excavated, none of them extensively.

The South-East

Tianshanbeilu and Nanwan23

Tianshanbeilu is a cemetery located inside Hami City. More than 700 burials were excavated there from 1988 to 1997 (Lu Engguo et al., 2001). Hand-made, painted red-ware vessels were placed in the graves. The designs were mainly executed in black with some use of a purplish-red paint. Globular jars with double handles are among the most common forms. There are also taller cylindrical jars, again with double handles and painted decoration (Fig. 7). The cylindrical jars suggest links between the eastern Siba culture found in Gansu and the western steppic ceramic traditions (Shui Tao, 1993).

The Nanwan cemetery in the Balikun grasslands is believed to belong to the same cultural complex as Tianshanbeilu. Nanwan was excavated in 1981. As with Tianshanbeilu, a full report has not yet been published, although a number of preliminary reports have appeared (Chang Enxi, 1985; He Xin, 1987; Lu Engguo et al., 2001). Carbon dates have been obtained from both sites, seventeen from Nanwan and six from Tianshanbeilu (Table 1). Chronological analysis of material from both sites has been based mainly on the dates obtained from the Nanwan cemetery. Carbon dates from Tianshanbeilu are regarded as less reliable as there are some anomalous results and the mean date range is apparently inconsistent with the typological evidence. Dates derived from the Nanwan burials range from 1685–838 cal B.C. The more consistent Tianshanbeilu dates range between 1111 and 200 cal B.C. with outliers at earlier than 6000 cal B.C. and as late as 200 cal A.D. The Nanwan dates were all obtained from wood, while those from Tianshanbeilu were from human bone. Employing relative chronology, archaeologists have dated the Tianshanbeilu culture to around the early second millennium B.C., based on typological comparison with east-
ern parallels. These include the cylindrical jars mentioned above with parallels in the Siba culture of Gansu, while certain bronze artefacts such as mirrors can be compared with examples from Shang burials in central China (Lu Enguo et al., 2001).

It is conceivable that both the Tianshanbeiul and Nawon cemeteries were used for a long period. Based on stratigraphic data, Lu Enguo et al. (2001) have categorized the artefacts found in these two sites into four phases. All four are represented at Tianshanbeiul, while the Nawon sequence has only three, the first one coinciding with the second phase at Tianshanbeiul. On the basis of ceramic parallels, the third phase of Nanwan is equivalent to the early phase of the Sidaogou culture, a second early painted pottery tradition found at sites on the north-eastern flanks of the Tianshan range. The painted, double-handled, round-bodied jars from Tianshanbeiul (Lu Enguo et al., 2001: 180, fig. 11-3, 4) paralleled in the early Siba culture find their best analogies in vessels from the site of Huoshaogou (Shui Tao, 2001: 245, fig. 23-M153: 3 or M208: 1) and Donghuishan (Fig. 8; Jilin University, 1998: fig. 53). Shui has suggested that the early Siba culture dates to around 1900 B.C. This would equate the earliest Tianshanbeiul phase with the second phase at Huoshaogou, around or earlier than 1900 B.C. (Shui Tao, 2001: 245).

However, still earlier dates have been proposed. Sites of the Tianshanbeiul culture occur in the south-east corner of the Zhunge’er Basin, the north-west end of the corridor connecting central China and Eurasia. Han Jianye has noted apparent parallels between pottery from Tianshanbeiul and that of the Machang culture found in Gansu.24 Machang is an Êneolithic culture dating to around 3800–2000 B.C., considerably earlier than the Siba culture. He has suggested that the earliest phase at Tianshanbeiul should be dated to earlier than 2000 B.C. (Han Jianye, 2005: 81). This would push back the earliest evidence for contact between northwest China and Xinjiang into the third millennium B.C. Based on current evidence the earliest dated Bronze Age sites from around the Zhunge’er Basin are those in the southeast corner, represented by the earliest phase at

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24. For a detailed discussion on the Machang culture, see Han Jianye, 2005.
Tianshanbeilu, at around 2000 B.C. More precise dating awaits further evidence, in particular absolute rather than relative dating.

**Banjieguo and Sidaogou**

A second early painted pottery tradition has been found at Banjieguo in Qitai county (Fig. 9) and Sidaogou (early phase) in Mulei county (Fig. 10: 2). These two sites are both located at the southern end of the Zhunge’er Basin, on the northern slopes of the Tianshan (Guo Wu, 2005: 106–107; Han Jianye, 2005). The ceramics from Banjieguo include red ware vessels with sandy inclusions, found together with polished stone hoes, hammers, mortars and pestles. The vessels are

<table>
<thead>
<tr>
<th>Site Name (Pinyin)</th>
<th>Laboratory code</th>
<th>Determination (5568 B.P.)</th>
<th>Calibrated Date BC</th>
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commonly round-bottomed with two small handles, decorated with dark red or purple paint on pink or yellow slip. Inverted triangles and net patterns are the most common motifs (Xinjiang Institute of Archaeology, 1981b). Based on ceramic parallels Han Jianye has suggested that Banjiegou should be placed around 1500 B.C. (Han Jianye, 2005). C14 samples from Sidaogou date the earliest phase to around 1000 cal B.C., while the later phase has been dated at around 500 cal B.C. (Guo Wu, 2005: 108; Xinjiang Institute of Archaeology, 1982). Pottery found in the early phase at Sidaogou is similar to that from the third phase of Nanwan (Fig. 10: 1; Lu Engguo et al., 2001: 186, fig. 22), which has been dated to around 1100 cal B.C. (Han Jianye, 2005). Pottery similar to that from Banjiegou was found at Xintala on the southern slopes of the Tianshan, dated by C14 analysis to around 1500 B.C. (Xinjiang Institute of Archaeology, 1988). Taken together the Banjiegou sites and Sidaogou could span a period from around 1500–500 B.C. and may represent a local development of Bronze Age culture.

The West and South-West

Sazicun and Adunjiaolou cemeteries

The sites of Sazicun and Adunjiaolou are located in the Tacheng–Kalamayi lowlands on the west side of the Zhunge’er Basin, near the Kazakhstan border. Sazicun (Xinjiang Institute of Archaeology and Tacheng Cultural Relics Bureau, 1996) and Adunjiaolou (Li Jinguo and Lu Engguo, 2003) cemeteries contain no painted pottery at all.
The vessels are wide mouthed jars with incised decoration that find their best parallels in the Fedorovo, a late phase of the eastern Andronovo culture of the Eurasian steppes (Figs 11, 12; Xinjiang Institute of Archaeology and Tacheng Cultural Relics Bureau, 1996; Li Jinguo and Lu Engguo, 2003; Han Jianye, 2005). This Andronovo sub-group is centered around the Aletai and the upper Yenisei valley and is dated around 1500–800 B.C. (Koryakova, 1996; Kuzmina, 1985). Some iron objects have been discovered in the late Fedorovo phase in Kazakhstan, placing the late phase of the Fedorovo culture in the early Iron Age (Kuzmina, 1985). Qiongkeke, a Bronze and early Iron Age cemetery in the Yili valley, was cut into the top of an Andronovo (Fedorovo) settlement site (Ruan Qiurong, 2004; Xinjiang Institute of Archaeology, 2002). C14 analysis dates the cemetery to as early as 1000 B.C. This suggests that Sazicun and Adunqiaolu may fall in the time range of around 1500–1000 B.C., or possibly slightly earlier based on the evidence from calibrated C14 dates for the Andronovo culture.26

**Shuinichang**

The Shuinichang cemetery is at Shihezishi in the south-west corner of the Zhunge’er Basin. The pottery vessels are short and full bodied with flat bases, made of red or grey ware with sandy inclusions. They are decorated with incised geometric triangular and net pattern designs. The shapes have been compared with Karasuk ceramics (Guo Wu, 2005: 127; Han Jianye, 2005), but they are shorter and wider than classic Karasuk vessels (Fig. 13). The Karasuk culture followed the Andronovo (Fedorovo) in the eastern steppes, the Aletai and the upper Yenisei valley and dates from c. 1500–800 cal B.C. (Frachetti, 2004: 192, fig. 5.1). Han Jianye has suggested that there may be a local variant of the Karasuk culture in the Zhunge’er Basin (Han Jianye, 2005). Based on the general similarities between the Shuinichang assemblage and Karasuk vessels, the Shuinichang cemetery has been regarded as contemporary with the Karasuk culture, around 1500–800 cal B.C. (Guo Wu, 2005), but the lack of direct parallels suggest that this dating should be viewed with caution until more reliable evidence is available.

**Xiakalanggu’er**

Xiakalanggu’er is a settlement site spread along the bank of the Kalanggu’er River, at Ergongxiang in Tacheng Township. The site has not been excavated but finds from the surface included chipped stone tools, ground stone artefacts and impressed and incised pottery. Similar sites have been reported at other locations along the banks of the same river (Yu Zhiyong, 1998). The
Fig. 10. Ceramics from 1. Late Nanwan (Xinjiang Institute of Archaeology 1982, figs 7, 8); 2. Early Sidaogou (Lu Enguo et al., 2001: fig. 22). Not to scale
pottery from these sites has quite distinct characteristics which do not find clear parallels in other regional assemblages. A particular feature is the application of a decorated band of clay along the rim of some vessels. While the unique forms of the ceramics from the site makes it difficult to assign a date, the relatively significant presence of chipped stone artefacts suggests that it may be fairly early.

The North-West

Qiemu’erqieke cemeteries

Finds from the Qiemu’erqieke cemeteries (Xinjiang Institute of Archaeology, 1981a) are important for the archaeology of the Zhunge’er Basin but are also problematic. The sites are multi-period with a variety of grave types including pit burials and burials in stone cists, some surrounded by stone enclosures and occasionally ornamented with anthropomorphic monoliths. Stone anthropomorphic statues are widely considered to be Turkic, dated around the 6th century A.D., but the basic form in Mongolia and the Aletai has its origins in older traditions (see, for example, Wang Bo and Xiao-Shan Qi, 1995). The examples in the Qiemu’erqieke cemeteries lack the typical cup held in the right hand that characterizes the later forms. In Eurasia, earlier stone statues in a similar tradition are associated with the Saka/Scythians and have been found around the Aral Sea and as far west as the shores of the Black Sea (Olkhovskii and Evdokimov, 1994).27 The pottery (Fig. 14) and methods of burial practice are similar to those of the Afanasievo culture found in the Aletai region of southern Siberia around 3500–2500 cal B.C. (Frachetti, 2004: 192, fig. 5.1; pl. 198 ff.).28 These similarities have led to speculation that there are connections between the Afanasievo culture, Qiemu’erqieke and also, much less plausibly, Xiaohe.29

In discussing the relationship between the Afanasievo culture and the Qiemu’erqieke cemetery, Han Jianye has suggested that what is generally recognized as “Qiemu’erqieke” is represented only by the earliest graves from the sites and also those from another site, the extensive settlement of Xikan’erzi in Qitai County at the southern end of the Zhunge’er Basin (Han Jianye, 2005; Xinjiang Bureau of Cultural Relics, 1999: 298). He argued that there are some similarities between the Qiemu’erqieke burials and the Afanasievo culture but some Qiemu’erqieke pot-

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Fig. 11. Ceramics from the Adunqiaolu cemetery (Li Jinguo and Lu Enguo 2003: figs 6, 7). Not to scale
tery, specifically flat-based jars with punctuate incisions on the rim, may indicate that the Qiemu’erqiike graves postdate the Afanasiyev culture but are earlier than Karasuk, that is late third to early second millennium B.C. This fits with other evidence as parallels have also been noted between Qiemu’erqiike tomb types and those of the Okunevo culture found in the Yenisei valley (c. 2600–2000 cal B.C.) (Chen and Hiebert, 1995: 269; Frachetti, 2004: 200). Han Jianye’s dating of the Qiemu’erqiike cemetery is earlier than that of previous scholars such as Shui Tao (Shui Tao, 2001) who suggested that the Qiemu’erqiike remains dated from around 1000 B.C. because he felt that the Qiemu’erqiike vessels found closer parallels in the Karasuk culture (Fig. 15). Recently available C14 dates now date the Karasuk culture slightly earlier, at between 1500 and 800 cal B.C. (Frachetti, 2004: 192, fig. 5.1).

Fig. 13. Sazicun: Fedorovo burial and pottery (Xinjiang Institute of Archaeology et al., 1996: figs 7, 8). Pottery not to scale

Fig. 12. Ceramics from Shuinichang cemetery, Shihezishi (Guo Wu, 2005: fig. 3-1-5). Not to scale
If the ceramics from all three groups, Afanasievo, Qiemu’erqieke and Karasuk, are compared it can be seen that some vessels, such as those with whole body decoration found at Qiemu’erqieke (Fig. 15: 3a, b) have general Afanasievo parallels, but plain or less decorated round or flat-bottomed jars are closer to Karasuk examples. One jar from the Qiemu’erqieke cemetery (Fig. 16) may belong to the Iron Age. This suggests that the Qiemu’erqieke cemeteries were in use over a long period of time, and that their cultural affinities are varied. The early graves may be connected with the Afanasievo culture, but there are also some parallels with the first phase of the Tianshanbeiulu culture. The cylindrical jars found at Tianshanbeiulu reflect the decorated round-bottomed jars found at Qiemu’erqieke (Li Shuchieng, 2002). Some Qiemu’erqieke vessels might be late as the Karasuk culture and some burials may belong to the Iron Age or even later. These questions cannot be resolved without further fieldwork. The pottery similar to the vessels of Afanasievo affinity found at Qiemu’erqieke that has been recovered from Xikan’erzi (Fig. 14: 3c) has caused archaeologists to assume that Qiemu’erqieke remains are distributed across the Zhunge’er Basin (Han Jianye, 2005; Lin Meicun, 2002).

The Bronze Age: summary

The Bronze Age in the Zhunge’er Basin in the period from around 2000–1000 B.C. is varied and reflects a variety of different influences. The earliest is the Tianshanbeiulu culture at the south-east corner of the basin, which shows connections with the east through the Siba culture in Gansu. The earliest Qiemu’erqieke sites in the north-west corner of the basin may also date from the early 2nd millennium B.C. A little later in the south-west, on the northern slopes of the Tianshan, are the Banjiegou and early Sidaogou sites, starting at around 1500 B.C. Dated to about the same period are the Sazicun and Adunqiaolu sites in the west and Shuinichang in the south-west. The last two, together with the later Qiemu’erqieke, imply the possible expansion of steppe cultures into the Zhunge’er Basin from Eurasia through the natural lowlands to the west and perhaps through patterns of nomadic movement across the Aletai. Pottery found at Shuinichang suggests that adaptation by incomers to the local environment and interaction with local groups may have resulted in new cultural variants of the steppic Bronze Age in Xinjiang.

Fig. 14. Ceramics from Qiemu’erqieke (Xinjiang Institute of Archaeology, 1981: figs 3, 4). Not to scale
Fig. 15. Qiemu’erqieke and related ceramics compared with Afanasievo and Karasuk vessels: 1. Afanasievo: a, b (Artamanov, 1974: fig. 20); 2. Karasuk: a, c, e, f, g (Jettmar, 1950: 127, pl. 1: nos. 7–11), b, d (Artamanov, 1974: figs 31, 32); 3. Qiemu’erqieke: a, d, f, g, (Xinjiang Institute of Archaeology, 1985: figs. 68, 73–75), b (Xinjiang Bureau of Cultural Relics et al., 1999: fig. 0950), Xikanerzi: c (Xinjiang Bureau of Cultural Relics et al., 1999: fig. 0811), Alepabulake, Aletai: e (Wang Bo et al., 2005: fig. 1). Not to scale
THE EARLY IRON AGE

Only a small number of early Iron Age sites have been found in the Zhunge’er Basin, primarily due to a lack of archaeological fieldwork. These include the Dalongkou cemetery at Jimusar (Xinjiang Kaosuo, 1997) and Sidaogou (late phase) sites at Mulei (Xinjiang Institute of Archaeology, 1982) located on the mid-northern Tianshan slopes, as well as Jijiandui (Yu Zhiyong and Yan Luncang, 1995). Another cemetery has been discovered at Nashan in Shihezishi in the western Tianshan (Xinjiang Institute of Archaeology et al., 1999).

Dalongkou, Sidaogou (late phase) and Jijiandui

Han Jianye (2005) has placed Dalongkou, Upper Sidaogou and Jijiandui in the same cultural tradition, but this may need to be re-examined in the future as more evidence becomes available. Grave goods from Dalongkou cemetery included ceramics, bronze, iron and silver objects. The pottery is made of a red paste with sand inclusions. A few pieces are painted. The vessels are short, full-bodied jugs and double-handled jars with round or small flat bases (Fig. 17). They may derive out of the Sidaogou (early phase) and Banjiegou tradition, and possibly also Tianshanbeilu (Guo Wu, 2005: 108–114). A C14 date from Sidaogou (late phase) dates this material to around 300 B.C. (Han Jianye, 2005).

Shihezishi Nanshan

Nanshan cemetery (Xinjiang Institute of Archaeology, 1999) located in the western Tianshan, naturally has cultural connections to the Yili Valley (Guo Wu, 2005: 118). The graves contained ceramic vessels, mostly tall jugs with small handles. The fabric of the vessels is red with sandy inclusions, and some are painted with red, most commonly net patterns (Fig. 18). Small iron knives are also found in most burials. No C14 dates are available but, based on parallels from nearby areas, Guo Wu (2005: 118) has suggested a date around 400 B.C.

Other sites

Due to the lack of fieldwork, there are no Iron Age sites known from other regions of the Zhunge’er Basin, but some Qiemu’erqieke burials such as No. 4 may be representative of the Iron Age in the Aletai area. Artefacts found in this grave include one pot, some sherds and an unidentified iron object (Xinjiang Institute of Archaeology, 1981a). The shape of the jar with its round body and long, thin neck is quite different from the types of vessels found in the early graves dated around 1500 B.C. or earlier (Fig. 18). The jar has no obvious parallels elsewhere in this period but compares well with ceramics from much later Saka burials. This would date burial No. 4 to a period around 300 B.C. or even later (Mei Jianjun, 2000: 171, figs 32, 33). It is likely that other sites of this period remain to be found in the north of the basin.

The Iron Age: summary

During the early Iron Age, around 500 B.C., ceramics related to those of the late phase at Sidaogou spread along the east and middle slopes of the Tianshan. At the same time the Tianshan slopes to the west of Ulumuqi were occupied by people using vessels typical of those from Nanshan. The late graves of Qiemu’erqieke ceme-
tery such as burial No. 4 may represent the late Iron Age culture in the Aletai area. However, consideration of the overall evidence raises several key questions. Firstly, during the Bronze Age, the slopes of the Tianshan west of Ulumuqi were populated by people with a material culture typified by Shuinichan (so-called Local Karasuk). How this was replaced by the Nanshan material culture is unknown. Secondly, early painted pottery and double handled jars were found at Tianshanbeilu around 2000 B.C. Later in the Bronze Age this tradition spread westwards and northwards, replacing cultures with steppic affinities like Qiemu’erqieke, Fedorovo and Karasuk. How this occurred is also unknown. Thirdly, there is a gap between the late Bronze Age / early Iron Age c. 1000 B.C. and the late Iron Age c. 500 B.C. Whether this apparent gap relates to lack of fieldwork, poor chronological interpretation or an actual reduction in occupation is unknown. These are all questions that need to be addressed in future research.

DISCUSSION

Key to further progress in reconstructing the later prehistory of the Dzung’er Basin is a better understanding of chronology, transmission of cultural traits and innovations, and the movements of peoples themselves.

Chronology

Table 2 summarizes in basic form the chronology outlined above. Three major regions have been identified: West Tianshan (the north-western slopes of the Tianshan); East Tianshan (the north-eastern slopes of the Tianshan, the Balikun

![Fig. 17. Late Sidaogou ceramics from Jijiandui cemetery (Guo Wu, 2005: fig. 2-4-13). Not to scale](image)
grasslands and the Hami Basin); northern Zhunge’er (the Aletai Mountains and the E’erqisi Valley). The first three periods, before 10,000 B.P., around 10,000 and 5000 B.P., are very hypothetical with no stratigraphical evidence at all. Dating is based solely on comparison with similar discoveries elsewhere in surrounding regions. The diagnostic elements illustrated are only broadly representative of a much more complex cultural reality. This summary is presented simply as a starting point for construction of a more robust chronological framework for the region.
This hypothetical table implies certain important possibilities. Firstly, Tianshanbeilu and early Qiemu’erqieke might be the earliest Bronze Age cultures in the Zhunge’er Basin at around 2000 B.C., and could be representative of either influence or actual movement of peoples from east and west respectively. Qiemu’erqieke is apparently influenced by the later period of Afanasievo, and Tianshanbeilu connects to the Siba culture to the east. At the same period, the western part of the basin might still be occupied by local groups with microlithic stone tool technology of the Mesolithic/Neolithic tradition.

Secondly, Shuini chang probably does not represent the direct expansion of Karasuk from the far north, but seems more likely to inherit the late Qiemu’erqieke from within the basin itself, possibly also influenced by the Fedorovo tradition.
in west Zhunge’er as well. Fedorovo remains discovered in western Zhunge’er around 1500 B.C. may indicate the eastward expansion of the Late Andronovo. However, this expansion seems not as extensive as the wide distribution of Andronovo bronze artefacts, since the expansion marked by ceramic production is limited to western Zhunge’er. According to evidence from the Yili River region, the Fedorovo was quickly replaced by the Qiongkeke before 1000 B.C. (Han Jianye, 2005).

Finally, the Tianshanbeilu culture representing the eastern tradition played a significant role in developing local cultural traditions of ceramic design and production during the Bronze and Iron Age period. This tradition, represented particularly by painted vessels and double handled jars, is readily identifiable in early Iron Age cultures in the Zhunge’er Basin.

Clearly, one of the key issues is the problem of dating. Available dates range from relative dating on the basis of ceramic parallels through uncalibrated C14 dates to calibrated dates. The formula used in calibration is not always published, although this is of lesser significance, given the broad timescale and general nature of the chronology at present. There is a marked discrepancy between uncalibrated and calibrated dates, with the latter pushing back the timescale by several centuries, but there is not such a great difference between the results of the various calibration formulae used over the past few years. In dealing with relative dating, most of the ceramics derive from graves. This is advantageous in that there is a good supply of whole vessels, but while the cemeteries may have been in use for extended periods of time, there is often little evidence to identify the sequence of burial. The region was used primarily by nomadic or transhumant pastoralists but there are settlement sites in more favored locations. Examination of these sites to provide ceramic sequences tied to absolute dating is critical to furthering our understanding of the archaeology of the region. Finally, relative dating is dependent on available data, and in and around the Zhunge’er Basin little systematic archaeological fieldwork has been carried out. As more results become available, the spread of regional styles will become easier to pin down with greater accuracy.

**Metallurgy**

Despite the importance of questions relating to early metallurgy in western China, almost no analytical work was carried out on metals from early archaeological contexts in Xinjiang before the 1990s. Studies of bronze artefacts were limited to typological classification. Although typological study is useful and forms the basis of chronological and regional frameworks, metallurgical analysis provides a greater depth of interpretation, particularly in relation to regionalism. In the past decade this situation has changed markedly, particularly due to the work of Mei Jianjun who has undertaken elemental analysis of a substantial group of copper and bronze samples derived mostly from the Zhunge’er Basin and surrounding areas (Mei Jianjun, 2000: 37–49). He has also examined ore, slag and ingot samples collected from the Nulasai (Nurasay) copper mining site in Nileke county, Yili Valley in western Xinjiang (Mei Jianjun, 2000: 50–57).

Mei concluded that both copper and tin bronze were in use in Xinjiang by the early 2nd millennium B.C. Arsenical copper appeared in the later 2nd millennium B.C. Tin-bronze, as in the Eurasian steppe, was the main alloy used in both the Bronze and Iron Age. Use of tin-bronze at Tacheng in the western Zhunge’er Basin suggests that the site has connections with the Andronovo complex in the 2nd millennium B.C. This is backed up by typological parallels among the artefacts themselves. Tin bronze also dominated samples from Tianshanbeilu, suggesting that steppic influence spread eastwards at least as far as Hami by quite an early date. Copper appears more frequently in the Zhunge’er Basin from early in the 1st millennium B.C., probably as a result of the opening up of local copper mines in and around Ulumuqi (Mei Jianjun, 2000: 48, 72–3).

Following Mei’s study of nineteen samples from Tianshanbeilu, a team including staff from Beijing Science and Technology University, Xinjiang Institute of Archaeology and Hami Cultural Relics Bureau (Beijing Science and Technology University, Xinjiang Institute of Archaeology and Hami Cultural Relics Bureau, 2001) examined an additional eighty-nine copper and bronze samples from Tianshanbeilu cemetery, producing similar results to that of Mei. However,
the authors concluded that the evidence suggested that the Tianshanbeiul bronze technology was not the result of the eastward expansion of the Andronovo culture from the Eurasian steppe, but was derived from tin-bronze-using Bronze Age cultures in Gansu to the east. This conclusion has been disputed by Mei Jianjun and Gao Binxiu (Mei Jianjun and Gao Binxiu, 2003) who firmly believe that most bronze artefacts found in Tian Shanbeiul, Hami, and even Gansu are similar to metals from the Eurasian steppe. They argue that the connection between north-west China and the steppe must have passed through the “Hexi Corridor” and Xinjiang. However, they conceded that the origins of bronze technology in north-west China are still unclear. Further metallurgical analysis is required and the results may vary in different periods and areas.

The availability of natural resources may be one of the reasons for differences in compositional analysis from different areas. Northern China has limited access to tin ore deposits but is rich in lead, which might be one of the reasons for the use of tin-lead copper alloys in the early Bronze Age in central China (Liu Li and Chen Xingcan, 2003: 37–44). Chase and Douglas have examined 156 steppic style bronze artefacts collected from northern China, southern Mongolia and southern Siberia, covering the period from the Bronze Age to the Han Dynasty (Chase and Douglas, 1997: 313, table 2). The results of this analysis vary for different periods and areas. Tin generally occurs in high percentages during the Bronze Age in north-west China but the percentage falls during the Xiongnu (Hun) period around 200 B.C.

Searching for copper mining sites is an important step in finding an answer to the question of metallurgical origins. The copper mines of Nulasai in the western Tianshan were used for the production of copper and bronze in the early to mid first millennium B.C. (Mei Jianjun, 2001: 50–57). The results from Mei’s compositional analysis indicate that the bronze produced here was arsenic copper alloy rather than tin copper alloy, in contrast to the dominance of tin bronze artefacts in the region at this time.32 The results of these two studies suggest that compositional analysis alone may be insufficient to identify the sources of metal artefacts found in Xinjiang.

Studies of the origins of metallurgy and metal artefacts in Xinjiang are naturally related to the same topic in central China. The answer to the question as to whether Chinese metallurgy “was an indigenous affair, or was one that was sparked by impetus from beyond the great wall and/or perhaps much further west” (Linduff, 2000: 1) requires results from studies in neighboring areas. Western China, particularly Gansu and Qinghai, and further west into Xinjiang and the Eurasian steppe, are critical areas for this question. Arguments about the origins of Chinese metallurgy based on limited samples of metal artefacts from Banpo and Jiangzhai (Linduff, 2000) are similar to the discussion of the origins of metallurgy in Xinjiang. All these arguments are based on the same results of compositional analysis. Conventional compositional analysis provides important information, making it possible to differentiate types of metals, and adding an extra dimension to typological studies of metal artefacts. However, so far, it has proved insufficient in answering the larger questions relating to the development of metallurgy in China. One path forward might be the use of lead isotope analysis which can identify the original ore source for individual artefacts. Each ore source presents a unique lead isotope signature which is not altered by smelting or casting processes (Meyers, 1988: 293). This technique requires testing of sources, which are quite plentiful in the steppe, but it offers a more precise methodology for identifying the provenance of Xinjiang bronzes.33

In summary, current research into early metals and metal production in China is still in a preliminary stage. The data available so far indicate changes in composition both regionally and chronologically, but, according to current research, Bronze Age metal artefacts found in and immediately around the Zhunge’er Basin are dominated by tin-bronzes. Tin bronze was widely used across the Eurasian steppe and its dominance in the Zhunge’er Basin suggests that the technology spread into northern Xinjiang from the west. The adoption of bronze technology may have involved some local modifications within Xinjiang, perhaps due to variability in the locally available natural resources.
Models for the origins of Xinjiang populations

It is clear from an extremely wide variety of evidence including metals, fabrics, botanical and faunal data, burial customs, physical anthropology and linguistic analysis, that the early populations of Xinjiang migrated into western China from outside and/or received a large amount of cultural influence from beyond the region. A certain amount came from contact with the east, but by far the greatest impact came from the west; from the Aletai, the Eurasian steppes and the south Central Asian oases. While there are many hypotheses concerning the populating of Xinjiang, they generally fall into two specific groups, those concerning migrations from the steppe and those concerning influence from the southern oases. The ‘Steppe Hypothesis’ suggests a movement of Afanasievo-related steppic peoples southwards into Xinjiang, possibly in the early 2nd millennium B.C. Later, around the late 2nd millennium B.C., innovations in material culture have been interpreted as signaling a second wave of migrations, this time from the Eurasian steppe, concerning peoples related to the Andronovo culture. Proponents of the ‘Bactrian Oasis Hypothesis’ note the similarity in environmental conditions between the oases of the Talimu Basin and those of Bactria and Margia, and suggest that irrigation agriculture, trade and the western ‘Neolithic package’ of domesticated sheep/goat and wheat cultivation may have been imported through contact with Bactrian populations, although there is no evidence of BMAC settlements in Xinjiang.

The material culture may indicate either the spread of ideas and trade networks or wholesale migrations of peoples. This question might be best resolved by physical anthropologists. A craniometric study by Hemphill and Mallory (2004) has come up with data that offers a quite new picture of the populating of Xinjiang in the prehistoric periods. They find little support for migration from either the steppe or the Bactrian oases. It should be noted, however, that their samples were taken only from Talimu Basin sites. Their findings suggest the presence of a population of unknown origin in the Talimu Basin during the early Bronze Age. By the late 1st millennium B.C., there was an influx or genetic mingling with highland groups from the Pamir and Ferghana regions. This should prompt archaeologists to pay greater attention to understanding the elusive Neolithic of Xinjiang. It may, however, not hold true for the Zhunge’er Basin which has closer connections to the Eurasian steppe and whose landscape is a more natural extension of the environment familiar to Afanasievo and Andronovo populations. It is feasible to suggest that there was some migration into the northern half of Xinjiang, allowing a spread of ideas and artefacts into the south.

SUMMARY

Archaeological research in western China has progressed a long way in recent years, but our understanding of the cultural and chronological framework for the Zhunge’er Basin in prehistoric times is still based largely on isolated regional ceramic assemblages, obtained primarily from mortuary contexts, and dated only through broad and sometimes generalized typological comparisons. Information about the Neolithic is remarkable by its absence, although the existing fragmentary evidence for a probably semi-nomadic population in this period and the presence of pockets of environmentally attractive landscapes suggest that more sites may be found if research is specifically directed towards this problem. A key question in regard to the wider region is that of the introduction of cultivated plants and domesticated animals from both east and west. The West Asian ‘Neolithic package’ may have been unpacked in its journey eastwards. It is possible that some items may have been introduced into the Talimu Basin from Bronze Age Bactria, perhaps via the Ferghana valley. However, it is important to address this question with regard to the Zhunge’er Basin also. Here the answers may be sought in sites in the far west, perhaps most likely around Tacheng. Analysis of the existing ceramic record shows that, overall, external cultural influences on the Zhunge’er basin in the Bronze Age are as might be expected. In the west, links with the Andronovo of the Eurasian steppes is apparent while in the north, links with the Aletai, Yenisei and southern Siberia can be identified. In the south-east the appearance of painted pottery and parallels with Gansu show easterly connections.
However, within this picture there are subtleties which are hard to detect on the limited evidence available. Movements of ideas and cultural influences appear to follow the rim of the basin, respecting the dry interior of the hostile Kuergangtu desert. Yet Kazakh nomads in the Aletai report that they occasionally take their flocks across the eastern part of the desert to graze in the Balikun grasslands when grazing is poor in the north. Balikun is also regularly visited by nomads from Hami. There is modern transhumance from both the northern Tianshan and the Yili Valley into the high pastures of the western Tianshan. A more detailed understanding of the spread of ideas into and out of the Zhunge’er Basin must be based at least in part on the practicalities of landscape and economic need.

Answers to the vexed question of the origins of the peoples of the Zhunge’er Basin must take into account the likelihood of a small but significant indigenous population from earlier prehistoric times, whose genetic stock would have blended with that of incomers. All research in this area to date has involved study of Bronze Age and later populations. These individuals most probably do not represent first generation migrants but rather peoples who have already blended into the pre-existing genetic mix of the region. To help in untangling this complex issue, further research is needed into the Pre-Bronze Age periods. It is likely that sites, and probably burials, of the Neolithic and Eneolithic can be identified through targeted survey programs.

Another aspect of the prehistory of the Zhunge’er Basin is also reflected in modern subsistence strategies. The present non-industrial economy is based on a mixture of nomadic pastoralism and agriculture, mainly irrigation, but also dry farming. The distribution of nomadic populations is best documented through excavation of numerous cemeteries, but despite the likelihood of settlement sites, very little is known about this other part of the economic and cultural system. Some Bronze Age settlements have been found along river banks in the west, and some have been located in the south-eastern oases. These sites represent the remains of small villages and are marked only by surface scatters of sherds and grinding stones. A focus on rescue excavation of threatened cemeteries and a lack of problem based archaeological research in the Zhunge’er basin means that almost none of these sites have been examined, yet they have the potential to provide the best and most cost effective method of establishing reliable chronological sequences, environmental data, faunal and botanical remains and detailed ceramic sequences.

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Notes
1. Place names within the People’s Republic of China are given in Chinese Pinyin with the common Turkic or Mongol spelling in brackets at the first occurrence. Spelling of local names is not consistent throughout English language publications and the names here may vary from those provided elsewhere.
2. The primary research for this paper was undertaken during two visits to Xinjiang by Betts and Jia. The first, in 2006, was made possible by a Seed Funding grant from the School of Philosophical and Historical Inquiry, University of Sydney and a University of Sydney Research and Development Grant. The 2007 visit took place as part of a major research project funded by the Australian Research Council (Grant No. 0770997) The authors are grateful to an anonymous reviewer for helpful advice and comments on the first draft of this article.
4. Only a small number of C14 dates have been obtained for Xinjiang and most are published in uncalibrated form without standard deviations. Where calibrated dates are available these are designated cal B.C. in the text.
6. The rainfall in the Yili Valley and around the town of Tacheng reaches 600mm. In both areas dry farming is possible although irrigation agriculture is practiced extensively today. Both areas also open directly onto the Eurasian steppe and are only separated from it by the accident of modern political boundaries. The western margins of the Zhunge’er Basin east of the hills enjoy relatively high rainfall where dry farming is possible, but irrigation is most common with modern agricultural practices. See Frachetti (2004: 146 ff.) for a discussion of agricultural potential on the western slopes of the hills in Kazakhstan.
7. The first general surveys began around the 1950’s under the direction of Mu Shunying. The region was divided into three research zones under the responsibility of Wang Mingzhe (west), Wang Binghua (east) and Hou Can (central) (Debane-Francfort, 1989: 6).
8. See also Mu Shunying 1992 who categorised painted pottery into four groups.
9. The Afanasievo and the Okunevo are broadly dated from the 3rd and the early 2nd millennium B.C. respectively (Savinov, 1997: 9; Vadetskaya, 1986: 15). These dates are based on relative rather than absolute chronology. For a useful summary of relative chronology see also Sokolova 2007. Calibrated dates give an earlier range of 3500–2500 cal B.C. and 2600–2000 cal B.C. respectively (Frachetti, 2004: 192, fig. 5.1; P.198 ff.)
10. See also Mei Jianjun 2002.
11. Han Jianye 2005, fig.1. Balikun and Hami are nos. VI and II respectively in An’s analysis.
12. For a list of early sites in Xinjiang see also Debane-Francfort 1988: 9.
13. See for example Derev’an’ko 1998, Derev’an’ko et al. 2000a, b.
14. Okladnikov 1978. Okladnikov linked these finds to Acheulian industries in Europe, but this has not been widely accepted. See for example Yi and Clarke 1983: 183; Ranov et al.1992: 59.
15. See also Krause et al. 2007.
16. Sites 93AHE1, 2, 3 4, 5 6. Abdurassul and Zhang
Chuan 1997; Abdurrassul et al. 1998.
17. For a brief summary of the rather limited evidence for agriculture in the Andronovo, see Frachetti 2004: 242.
18. See also Li Xiaqiang et al. 2007 for identification of cultivated wheat in Xishanping in mid-north west China by 4650 Cal. yr. BP; Li Pan 1989, Gansu and Jilin 1998, Li Shuicheng and Mo Duowen 2004 for 4000 year old wheat seeds found in Donghuishan site, western Gansu; Crawford et al. 2005 for the discovery of wheat in Liangchengzhen site, Shandong, east China dated to 2000 B.C. These suggest an earlier, as yet unidentified, passage through Xinjiang.
19. For the Xinjiang Neolithic, see also Debaine-Francfort 1988: 7ff, but note that the sites described there as Neolithic include some, such as Gumugou, which have now been recognised as being Bronze Age in date.
20. Chipped stone artefacts from Asitana are on display in the Ulumuqi Museum.
21. Based on C14 analysis, the Andronovo complex in this region has been dated to around 1500 B.C.
22. In excavations in the Koksu valley on the western flanks of the Zhunge’er Mountains (Kazakhstan), Frachetti identified a sherd from a wheel-made vessel that could be paralleled in BMAC forms. Frachetti: 2004: 370.
23. The cemetery of Yanbulake is one of the best known sites in Hami district. It has not been included here as the ceramic styles are found only south of the Tianshan and not in the north on the edge of the Zhunge’er Basin. Chen and Hiebert (1995) suggest the painted designs of Yanbulake are similar to the pottery in the later Chust culture which indicates possible influence from east Xinjiang into the Fergana Valley in late prehistory.
24. But see Chen and Hiebert (1995: 288) who see no convincing parallels between Xinjiang painted pottery and that from Gansu, and specifically the Machang culture.
25. Frachetti (2004: 205, fig. 5.7) provides cal B.C. dates pushing back the eastern Andronovo date range to c. 1800 – 1400 B.C.
26. See note 25.
27. Some, in the Pontic region, have been assigned to the Bronze Age (Telegin and Mallory, 1994).
28. This date range is based on calibrated C14 dates; the earlier relative dating placed the Afanasievo around 3000 to 2000 B.C. (Koryakova, 1996). The classic Afanasievo is characterised as Énèolithic rather than Bronze Age.
29. Xiaohe is an aceramic cemetery in the Taklamakan. It has been dated by C14 to around 2000 B.C. The connections with the Afanasievo and Qiemu’er-