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Social dynamics in early Bronze Age China: A multi-isotope approach

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A B S T R A C T

This paper uses a multi-isotope approach (C, N, S) to explore the social dynamics of early Bronze Age China, focusing on communities within the Central China Plain. Building upon recent research on *Yinxu*, the last capital of the Shang Dynasty (Cheung et al., 2017a, 2017b), we obtained 49 samples from six contemporaneous sites both within and outside of *Yinxu*, including sites from the Gansu, Shaanxi, and Henan Provinces. Stable carbon and nitrogen isotopic ratios of an additional 419 individuals, and stable sulfur isotopic ratios of 118 individuals from seven other sites taken from published reports are also included to expand the geographic scope of this study. By including sites outside of *Yinxu*, this study is able to investigate the cultural contacts and exchanges between *Yinxu* and other communities, and provide novel insights into the geographic origins of the sacrificial victims found at *Yinxu*. Our findings are consistent with other scholars' observations that during the late Shang period, *Yinxu* was one of several cultural centers of Bronze Age China, where goods, ideas, technologies, and people from different cultural groups were gathered and exchanged.

1. Introduction

Yinxu 殷墟, the last capital of China's Shang Dynasty, has long been the center of attention for scholars who are interested in understanding the nature and processes of state formation in early Bronze Age China (Campbell, 2009; Chang, 1980; Keightley, 1983; Liu and Chen, 2012; Trigger, 2003; Yates, 1994). Traditionally, historical texts have led us to believe that the Shang was the only civilized power in the Central Plains region 中原地區 during the Bronze Age (Bagley, 1999; Campbell, 2009; Chang, 1980; Wheatley, 1971). Accordingly, *Yinxu* was long-regarded as the capital of an extensive and powerful empire. However, this view is now being criticized as being too "Anyang-centered" (Thorp, 2006:214). After all, the only surviving written records from this period, inscriptions on oracle bones and bronze vessels, were composed or commissioned by the ruling house of the Shang Dynasty. As such, these inscriptions were likely affected, or even motivated by various political agendas (Allan, 1991; Bagley, 1999, 2004; Fiskesjö, 2001). Also, more and more complex archaeological sites contemporary with and distinct from the Shang culture have been discovered in the last few decades, e.g. *Sanxingdui* 三星堆 in the west and *Wucheng* 吳城 in the south. The rich collections of stylistically distinct artifacts found in these sites indicate the existence of a complex social organization as well as a high level of technological knowledge comparable with the Shang culture (Bagley, 1999; Chang, 1980; Liu and Chen, 2012; Maisels, 2010; Thorp, 1985; Thorp, 2006). Thus, instead of assuming the Shang had maintained absolute political and military supremacy over its neighbouring polities, a more realistic interpretation is that of a "multiple-centers view", where the Shang's relationship with its neighbours was a two-way exchange system as goods, natural resources, labour, and knowledge travelled both into and out of *Yinxu* (Bagley, 1999; Keightley, 1983; Thorp, 1985, 2006).

Using a multi-isotope approach (carbon, nitrogen, and sulfur), this study reconstructed and compared the dietary practices of 22 individuals from four localities at *Yinxu*, with those of 27 individuals from six late Neolithic to early Bronze Age sites across northern and northwest China (Fig. 1: ②–⑤, ⑧–⑨). In addition, published carbon and nitrogen measurements of a total of 419 individuals from an additional seven contemporaneous sites, and sulfur measurements of 118 individuals from two sites (Cheung et al., 2017a, 2017b; Liu et al., 2014; Ma et al., 2015, 2016) are included to widen the geographical scope of this analysis (Fig. 1: ①, ⑥–⑦, ⑩–⑬). This study has three main aims and objectives. First, building upon the existing literature (Cheung et al., 2017a; Ma et al., 2016), this study aims to test whether the sulfur isotopic variation across northern and northwest China is great enough to examine mobility patterns within these regions. Secondly, by including sites outside of *Yinxu*, we offer new evidence to reconsider the possible origins of sacrificial victims at *Yinxu*. Finally, this study will explore the relationship between subsistence strategies and

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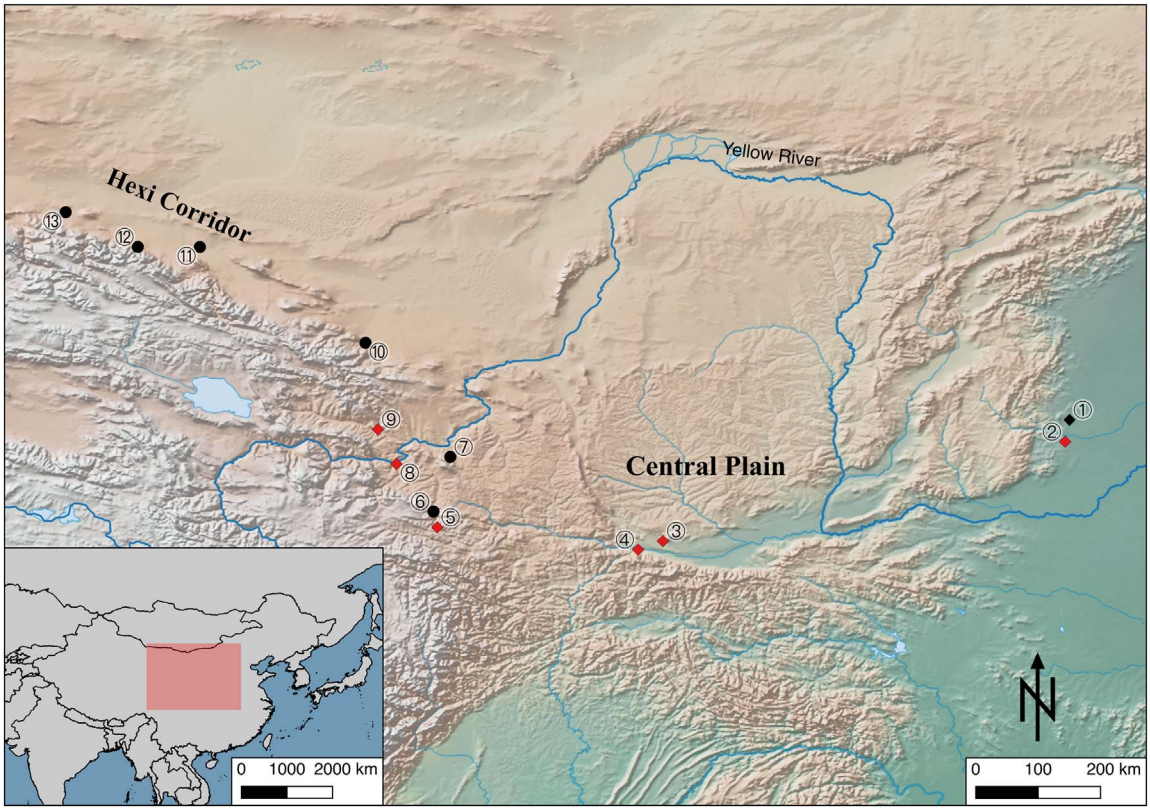

Fig. 1. Locations of all sites discussed in this study: ① *Nancheng*; ② *Yinxu*; ③ *Zhouyuan*; ④ *Shigushan*; ⑤ *Zhanqi*; ⑥ *Mogou*; ⑦ *Qijiaping*; ⑧ *Lianhuatai*; ⑨ *Xiahaishi*; ⑩ *Mozuizi*; ⑪ *Wuba*; ⑫ *Ganguya*; ⑫ *Huoshaogou*. ♦ corresponds to sites with carbon, nitrogen and sulfur measurements, ● corresponds to sites with only carbon and nitrogen measurements; ◆ corresponds to sites with original data. The map was created using QGIS Version 2.12.0 for OSX (www.qgis.org).
All maps used are in the public domain, sourced from Natural Earth (www.naturalearthdata.com).

archaeological cultures. We hope to demonstrate that, when analyzed within the full historical and geographical context, palaeodietary reconstruction can allow archaeologists to gain further insights into many broader aspects of past societies, such as population dynamics and political geography.

2. Archaeological background

2.1. Political geography of early Bronze Age China

Most of our current knowledge about the neighbouring societies of the Shang comes from oracle bone inscriptions, along with a few inventory records inscribed on imported goods (Bagley, 1999; Jung, 1989; Thorp, 2006). Over 500 place names (Keightley, 1983; Wheatley, 1971), and 158 names of *fang guo* 方國, or polities, have been mentioned in Shang oracle bones and bronze inscriptions (Sun and Lin, 2010:239). Divination topics on oracle bones discussing Shang's neighbours varied greatly, from asking for services from certain groups, praying for an ally's safekeeping, to wishing harm to enemy groups (Keightley, 1983). These suggest that relationships between Shang and its neighbouring polities were not stable, but fluctuating "according to shifting political, economic and military interests" (Maisels, 2010:225). Though it is difficult to establish and verify the actual number of polities that the Shang had ties with, the written sources have nonetheless illustrated the dynamism of diplomatic traffic surrounding the late Shang capital.

Archaeologically, an ever-growing body of both direct and indirect evidence also suggests that during the late Shang period, *Yinxu* had frequent and substantial interactions with its neighbouring groups, and even hosted a highly diverse population. For example, an early craniometric study of 319 decapitated sacrificial victims found at the royal cemetery at *Xibeigang* 西北岡 revealed a highly heterogeneous group, thus suggesting that the group of sacrificial victims consisted of people from multiple sources (Li, 1977). The hypothesis that many sacrificial victims found in the royal cemetery had non-Shang origins has been recently confirmed by stable isotope evidence (Cheung et al., 2017a). The sudden appearance of fully developed horse-drawn chariots at *Yinxu* also suggests that the Shang must had a close relationship with their northern neighbours, as chariotry is a technological complex that originated from the Eurasian Steppe, and required "special skills and resources for its construction, use, and maintenance" (Bagley, 1999:207). Furthermore, analysis of the form, style, and composition of artifacts found at *Yinxu* revealed that the trading network in early Bronze Age China was extensive, both in terms of geography and the volume of traded resources. Shang-style artifacts were abundant in many sites such as *Taiqing Gong*太清宮in Henan province, *Panlongcheng* 盤龍城in Hubei province, and *Daxinzhuang* 大辛莊, *Sufutun* 蘇埠屯, and *Qianzhangda* 前掌大in Shandong province (Bagley, 1999; Thorp, 2006; Xu, 2003). Similarly, assorted natural resources and goods were imported from various regions. For example, cowry shells (*Monetaria moneta*) used as currency, were brought in from as far away as the South China Sea (IA CASS, 1994:403), and other imports included nephrites from Xinjiang, salt from Shandong, and weaponry and bronze mirrors from the Northern zone (Hwang, 2010; Keightley, 1983; Liu and Chen, 2012; Thorp, 2006). More recently, Campbell et al. (2011) examined the production scale of a bone workshop at *Tiesanlu* 鐵三路 at *Yinxu*. They estimated that the scale of production in just this site alone had already exceeded the need for local and elite consumption by approximately 300%, suggesting goods produced here were traded with groups outside of *Yinxu*. These examples all suggest that during the Shang Dynasty, *Yinxu* was part of, if not the center of, an active exchange network where natural resources, goods, labour, and knowledge