Chapter 3
Bioarchaeology of China: Bridging Biological and Archaeological Inquiries

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In China, anthropology (人类学 *renleixue,* literally "study of humanity") is primarily used to refer to physical anthropology. Biological or physical anthropology is firmly situated within the biological disciplines, whereas archaeology is traditionally hosted by history departments. Consequent differences in research interests and approaches between archaeologists and biological anthropologists have influenced the development of the field.

Research on archaeological human skeletons, and anthropology as a whole, in China can be divided into three historical phases: (1) the late 1800s to 1949, the formative period, when anthropology in China was practiced as a holistic discipline and biological anthropology research was dominated by comparative morphometrics, population history, and paleoanthropology; (2) 1949 to the early 1980s, when "anthropology" referred almost exclusively to physical anthropology, and morphometrics and paleoanthropology were independent of archaeology; and (3) the 1980s until today, when cultural anthropology has experienced a renewal and bioarchaeology has come to integrate the skeletal and archaeological records (Zhang 2012; Zhu 2004; Hu 2006; Guldin 1994).

In its early years (before 1949), Chinese anthropology was in close communication with American, British, and European scholarship. However, it also draws from a long tradition of Chinese historiography, antiquarianism, and medical studies and has undergone more than 100 years of development within China to become a discipline with its own research foci and disciplinary boundaries (Guldin 1994; Hu 2006).

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Pre-1949

A number of ancient Chinese texts contain writings related to physical anthropology. For instance, the ancient Chinese philosopher Xunzi (313–238 BCE) observed the physical similarities between humans and monkeys (Zichun Wang 1984). As in the West, ancient Chinese texts also contain descriptions of physical differences between human groups. Such texts include the *Zhouli*, *Shiji*, *Huangdi Neijing*, *Guanzi*, *Lingshu Jing*, *Shanhai Jing*, and *Lüshi Chunqiu*, which span from the third century BCE to around the twelfth century CE (Zhang 2012; Zichun Wang 1984; Wang 1996). The *Huangdi Neijing* could be said to be the world's oldest physical anthropology monograph, and contains information on anatomy and measurements of human bodies. From the *Shiji (Records of the Grand Historian)* onward, most historical texts from China contain some account of the physical aspects of frontier ethnic groups and minorities (Wang 1996).

These early sources, however, had limited influence on anthropology as practiced in the twentieth and twenty-first centuries. In the late nineteenth and early twentieth centuries, anthropology arrived in China through contact with the West and Japan (Guldin 1994; Zhu 2004). This arrival took two main forms: foreign scientists conducting research in China, and Chinese scholars and students going abroad to learn the research methods and theoretical underpinnings of the field and returning home to conduct their own work.

Foreign anthropological research in China began after the first Opium War (1839–1842), during a period of rapid modernization and opening, when missionaries and explorers began recording folk traditions and other anthropological data (Du 2008). British Army officer Thomas Blakiston was one of the earliest, traveling up the Yangzi River in 1860 and reporting not only ethnographic details of the people he encountered but also their physical characteristics (Wang 1996). In the early twentieth century, many foreign anthropology texts were translated, and foreign scholars came to do fieldwork, including Japanese anthropologist Torii Ryuzo between 1895 and 1928, Russian anthropologist S. M. Shirokogoroff in the 1910s and 1920s, and German anthropologist H. Stubel in the 1930s (Wang 1996; Du 2008). These early anthropologists' research consisted mainly of field surveys that included ethnography, physical anthropology, linguistics, and even some archaeology, supported in the 1920s and 1930s by the Academia Sinica (Du 2008; Zhang 2012; Wang 1996).

A major force in Chinese anthropology in the first half of the twentieth century was the movement of Chinese students abroad (Guldin 1994; Du 2008). In 1907, Cai Yuanpei went to study in Germany, and in 1916 returned to China to serve as the president of Peking University (1917–1927). During this time, he promoted the study of anthropology, and is considered a founder of both ethnology and physical anthropology in China. In 1914, Ding Wenjiang returned from studying in England and was the earliest to do scientific measurements of Chinese people, in the form of a survey of minority peoples in Yunnan and Sichuan (Du 2008; Zhang 2012).

During this time, ethnographic, anthropometric, and archaeological research began to flourish in China. Scientific archaeology was adopted and rapidly developed by scholars such as Li Ji, Xia Nai, and Su Bingqi, who worked to reconstruct the sequence of ancient cultures that gave rise to Chinese civilization (Liu and Chen 2012). The development of an indigenous tradition of biological anthropology, on the other hand, is tightly linked with the name of Wu Dingliang (earlier transliterated as Woo Ting Liang) (Wang 1996; Hu 2006). Wu studied at Columbia University during the 1920s. He later trained in statistics under Karl Pearson in London, and his work was strongly influenced by Sir Arthur Keith and Ernest Hooton (Guldin 1994). During his early research, Wu devised mathematical schemes for classifying human groups based on measurements of both archaeological human remains and living people (Woo and Morant 1932, 1934; Wu and Mo 1932; Woo 1937), and his measure of facial flatness became standard in craniometric programs in the Soviet Union (Alekseev and Debets 1964). In 1935, Wu became a full-time researcher and division director at the Institute of History and Anthropology of the Academia Sinica (Wu 2005; Zhang 2012; Du 2008) and continued to study morphological variation in human crania and living populations (Wu 1940, 1957a, b, 1960; Dingliang Wu 1956; Woo 1941, 1942). Beginning in 1946, Wu directed the Physical Anthropology Group at Zhejiang University and the next year became the chair of the newly formed Department of Anthropology (Du 2008; Guldin 1994).

Before World War II, a number of Chinese universities had established anthropology departments, museums, or sections, including Qinghua, Jinan, Zhejiang, Xiamen, Zhongshan, and Yunnan Universities, as well as the Academia Sinica (Du 2008; Guldin 1994; Zhang 2012; Wang 1996). The war had a profound impact on Chinese academia, as most universities relocated to the west and southwest for the duration of the war. The indigenous peoples in these regions therefore became the object of study for much anthropological work in China between 1937 and 1945.

Though Chinese anthropology was relatively holistic before 1949, physical anthropology remained a fairly marginal part of the field. With a few exceptions (e.g., the program administered by Wu Dingliang at Zhejiang University), anthropology degree programs included little instruction in physical anthropology. Rather, physical anthropology was mostly located within the study of biology and paleoanthropology, as well as among researchers interested in the relationships between the morphology of archaeological and modern peoples (Guldin 1994).

Throughout this time, a question of great interest to the international scholarly community was reconstructing the movement of human populations across East Asia and their genetic contribution to populations in other parts of the world (e.g., Schetelig 1869; Brinton 1888). Before advances in ancient DNA technology, interest in population history and movements developed into a focus on comparative craniometry, among both Chinese and foreign scholars (e.g. Black 1928; Arthur Keith 1929; Wu 1940; Yan et al. 1960; Han and Pan 1979, 1987; Pan 1986, 1975; Zhu 1991; Shao et al. 1988). The legacy of this research includes substantial collections of crania curated at Jilin University, the Banpo Museum in Xi'an, the Institute for Vertebrate Paleontology and Paleoanthropology (IVPP) of the Chinese Academy of Sciences, and the Archaeology Institute of the Chinese Academy of Social Sciences in Beijing.

A similar focus on comparative craniometry can be seen in biological anthropology studies conducted in other parts of the world (e.g., Howells 1973). However, there are three factors that make the Chinese craniometric studies particularly interesting. First, China has a uniquely wealthy paleontological record. The relation of early *Homo* in China to later human populations in China and elsewhere has been a focus of paleontological debate since Franz Weidenreich proposed the multiregional continuity model (Weidenreich 1943, 1947), still highly influential in Chinese paleoanthropology (Rukang Wu 1956; Zhang 1998; Wu 1998, 2006; Liu and Yang 1999; Zhu 1996). Second, because of its geographic location, early populations of China likely contributed to the indigenous populations of Taiwan and Oceania (Schetelig 1869; Turner 1990), the Japanese archipelago (Pietrusewsky 2013; Nakahashi et al. 2002), and the Americas (ten Kate 1888; Brinton 1888; Turner 1985). Third, the tumultuous history of interactions between the steppe populations and the farmers of China, as well as the ethnic politics of imperial China, resulted in complex population movements (Yao et al. 2002; Yao and Zhang 2002; Haijing Wang et al. 2007; Ge et al. 1997), making biological distances between populations of great interpretive interest to archaeologists and historians of the region (Dashtseveg 2013). These early craniometric studies remain salient today, though research techniques have evolved. Following the 1980s, metric and nonmetric approaches to studying dental and postcranial morphology were adopted (Turner 1990; Matsumura 1994; Lee 2013), and eventually, aDNA techniques permitted the testing of older models of population history (Oota et al. 1999; Wang et al. 2000; Xie et al. 2005; Gao et al. 2015; Yuan et al. 2013).

Some early physical anthropology in China did integrate skeletal and archaeological data. Among the earliest to do this was the Canadian palaeoanthropologist Davidson Black (1928), who identified significant morphological differences between crania from the Yangshao site in Henan and those from later Chinese sites, and proposed that large-scale population replacement had occurred in northern China sometime following the Neolithic. He also taught at Beijing Union Medical College and analyzed skulls from several Chinese provinces, including a group from prehistoric Gansu in western China, whom he identified as having "Oriental" features and which he therefore labeled "Proto-Chinese" (Zhu 1996). A year later, Sir Arthur Keith published his observations on skulls from the seventh and eighth centuries that were recovered by Sir Aurel Stein in the Tarim Basin during his expedition of 1913–1915 (Keith 1929), including both detailed morphometric descriptions and an individual biography for each skull based on cranial and oral pathology.

It should be noted that Chinese researchers draw an explicit distinction between the racial typological studies of the West in the early days of anthropology and their own research on race. The aim of Chinese racial research is stated as being not to establish the superiority of one group over another or the behavioral correlates of race, but to establish the equality of all groups, the effects of their interaction with their environment, their origins and migrations, etc. (Wang 1996, 2011;

Pechenkina 2012). In that sense, the term “race” (*renzhong*) in Chinese carries different connotations than in English and has been defined differently almost from the beginning of the field.

1949–1980

After the Chinese Communist Party rose to power in 1949, it reorganized the academy and certain disciplines fell out of favor. Among these was anthropology, which was considered irredeemably linked to imperialism. After 1949, a number of anthropologists fled mainland China with the Nationalist Party to Taiwan, where they established new academic departments and research programs (Du 2008; Guldin 1994). In the mainland, anthropology departments were disbanded, and the work of linguistics and cultural anthropology only continued under the rubric of “nationalities research” (the study of minority groups for the purpose of helping their development). On the other hand, archaeology continued to flourish. Physical anthropology also continued, mainly emphasizing paleoanthropology, anatomy, and morphometrics, but was relocated to other departments. Due to these changes, many physical anthropologists who stayed in the mainland switched their focus to biology, archaeology, or geology (Du 2008). In the 1950s, China began to follow the Soviet convention wherein “anthropology” referred solely to physical anthropology (Du 2008; Guldin 1994; Zhang 2012; Zhu 2004; Hu 2006).

In 1952, Wu Dingliang and his Oxford-trained colleague Liu Xian moved from Zhejiang University to the biology department of Fudan University, where Wu was made director of the new anthropology research and teaching group (Guldin 1994; Du 2008). Here he trained Wu Rukang, Han Kangxin, and other influential physical anthropologists of the mid-twentieth century, many of whom went on to work at the IVPP. This anthropology section was for a time the only place in Chinese academia where anthropology was explicitly taught under that label, and the program ended with the beginning of the Cultural Revolution in 1966 (Guldin 1994).

The influence of Soviet scientists and experts was felt in many areas after 1949. However, archaeologists in China had their own rich academic tradition to draw on in this area, so the influence of Soviet science on archaeology, as well as on paleoanthropology, was small. The overall influence of the USSR declined after the Sino-Soviet split of the 1960s, after which China charted its own course following Mao Zedong thought (Guldin 1994). Until the 1980s, anthropologists in China had limited contact with the international scholarly community.

By the 1950s through the 1970s, physical anthropology in China was represented by only a few institutions, among them the anthropology research teams of the Beijing and Shanghai Natural History Museums, the aforementioned research group in the biology department of Fudan University, and the Anthropology Museum at Xiamen University (Zhang 2012). The IVPP, which took on its current name in 1960, was the largest and most important institution in the field during these years (Guldin 1994).

An influential anthropologist of this time was Yan Yan, who was a medical doctor before he became an anthropologist. Yan Yan, along with his student Pan Qifeng and Wu Dingliang's student Han Kangxin, was very influential in the study of archaeological human remains from the 1960s onward. This includes the approach, still predominant in the field today, that uses studies of biological ancestry and ancient migrations to shed light on the origins and development of material culture complexes.

During this time, though research in certain areas was somewhat curtailed, archaeological and paleontological excavation continued, and the resultant accumulation of skeletal collections and data laid the groundwork for the syntheses and regional, systematic studies that would be conducted beginning in the 1990s (Wang 2011).

Paleopathology research was sporadic during this time and somewhat anecdotal. For instance, the presence of trauma on a Paleolithic cranium from Zhoukoudian was described in the 1951 report by Jia Lanpo. Wu Rukang diagnosed an alveolar abscess in a maxilla from the Paleolithic Ziyang locality in a report from 1957, and carious lesions were described in the 1973 brief report on the Neolithic site of Jiangzhai (Huifang Wang 1984; Jia 1951; Pei and Wu 1957; Xi'an and Lintong 1973). This began to change in the 1980s and 1990s, with the integration of anthropological and archaeological work.

Post-1980

The sense of "anthropology" as referring only to physical anthropology persists into the present in China (Zhu 2004), but after the Reform and Opening policy of 1979, there were calls from within the social sciences in China to bring back cultural anthropology as a recognized field (Guldin 1994). Anthropology departments and degree programs were revived: Zhongshan University established an anthropology department in 1981, Xiamen University formed a department and museum in 1984, and Yunnan University offered a major from 1988 with a department following in 1997. Ethnography and physical anthropology are both emphasized in these departments, while archaeology continues in its own departments, some of which maintain physical anthropology programs as well (Zhang 2012). Importantly, the China Anthropological Association was formed in 1981, putting the discipline on solid footing for future developments (Zhu 1996).

Research that integrates skeletal and archaeological data has flourished in China over the last four decades. The turning point seems to have been the founding of *Acta Anthropologica Sinica* (*Renleixue Xuebao*) in 1982 by the IVPP. Until 1982, skeletal analyses were often published as appendices in archaeological reports or as monographs. Such publication formats favored detailed descriptions of excavated bones, but limited opportunities for comparative analyses, particularly the testing of hypotheses related to human biology. From the date of the journal's founding, there was a surge in hypothesis-driven studies of the human skeleton (Zhang 2012).

Multiple papers published in this journal during the 1980s and 1990s introduced and refined methods of skeletal age and sex assessment for East Asian populations (Zhang 1986, 1982; Zhang and Ji 1988; Zhang and Han 1994; Zhang et al. 1996), as well as paleopathology research (Zhang 1993, 1994, 1995). Older periodicals, including *Kaogu* and *Acta Archaeologica Sinica* (*Kaogu Xuebao*), also began publishing comparative physical anthropology studies, including Han Kangxin's analyses of cranial modification (Han and Pan 1980), tooth ablation (Han and Pan 1981), and trephination (Han and Chen 1999). In subsequent years, studies of human behavior, health, and diet using archaeological skeletons increased dramatically (Li 2004; Zhang 2003; Smith 2005; Han et al. 2005; Eng 2007; Chen 2000; Li 2006; Shang and Han 2001; Liu et al. 2006; Zhang and Zhu 2006).

Changes in the political climate since Reform and Opening have allowed a livelier exchange of ideas and an increase in collaboration between Chinese and foreign scholars. As a consequence, both the IVPP and the Research Center for Chinese Frontier Archaeology (RCCFA) at Jilin University have become centers for international cooperative research. For instance, since 2014, Jilin University and Simon Fraser University in Canada have run a Joint Centre for Bioarchaeology, which includes the regular exchange of faculty and students and an occasional undergraduate summer training program held at Jilin. The archaeology departments of Jilin, Renmin University, and others have hired foreign professors for short- or long-term appointments. In addition, a number of North American and European bioarchaeologists have completed doctoral dissertations and other research at Jilin University, Northwest University in Xi'an, Shandong University, the IVPP, Archaeology Institute field stations, and provincial institutes in Henan, Gansu, and elsewhere (e.g., Pechenkina et al. 2002, 2005, 2007, 2013a; Berger and Wang 2017; Dong et al. 2017; Lee 2013; Lee and Zhang 2013; Zhang et al. 2016a, b; Joseph 2016; Hernandez 2014; Eng and Zhang 2013; Eng 2016; Gresky et al. 2016; Wagner et al. 2011).

In population history research, regional and comparative analyses, rather than studies of individual sites, have become more common since the 1980s. This includes studies of the relationship between peoples of the Eurasian grassland and Xinjiang and those of central China, and of the archaeological correlates of groups attested in the historical record (Wang 2011). The aim of this research continues to be the integration of the archaeological and biological records, though in an increasingly systematic way that takes advantage of the latest analytical techniques (e.g., computer technology, aDNA) and contributes to their development (Chunxiang Li et al. 2010; Cui et al. 2009; Wang et al. 2012; Zhao et al. 2015).

Since the 1990s, paleopathology has also increasingly moved from descriptive to comparative work (Chen 2000; Li 2002; Pechenkina et al. 2002; Liu et al. 2006; Zhang 2003; Shang and Han 2001; Zhang and Zhu 2006; Smith and Lee 2008; Eng and Zhang 2013; Eng 2016; Meng 2011; Merrett et al. 2016; Zhang et al. 2016a; Wei et al. 2012). Oral pathology has received particular attention, as it touches on the health, economy, diet, and environment of ancient groups. Occlusal wear has long been used for skeletal age estimation in China (Zhu 2004). Studies of metric and nonmetric traits of the teeth, and the morphology of the masticatory apparatus, are common in Chinese paleontology and, beginning in the 1980s, were joined by studies of oral pathology in archaeological skeletons. Some studies have focused on masticatory stress, parafunctional use of the teeth, and cultural modification (Li 2012; Pechenkina et al. 2002; Zeng et al. 1986; Wei et al. 2009; Sun 2011; Liu et al. 2010). Most oral health research, though, is concerned with dietary reconstruction through direct or indirect means, especially comparative studies between subsistence systems, regions, time periods, or age and sex groups (Li et al. 1991; Liu et al. 2005, 2010; Okazaki et al. 2013, 2016; Wei et al. 2013; Quanchao Zhang 2010; He 2007; Pechenkina et al. 2007, 2013b; Yuan and Zhu 2012; Zhang 2003; Meng et al. 2007; Linhu Zhang 2010; Mingqi Li et al. 2010; Chen and Li 2013; Sun 2011; Wei Wang et al. 2007; Meng et al. 2011; Zhang et al. 2016b; Zhao et al. 2014; Zhu and Lu 1997; Merrett et al. 2016).

Most dissertations produced in Chinese archaeology graduate programs that focus on physical anthropology now include some attention to paleopathology. Some of this research is still done by scholars with medical rather than anthropological training (Wang 2011), e.g., students of dental medical researcher Shao Jinling at the Fourth Military Medical University in Xi'an (Bu 2012; Jiang 2007; Li 2008; Meng 2008, 2011; Han 2005). The RCCFA of Jilin University has also produced many physical anthropology graduate theses, recently under the direction of Zhu Hong, who trained at Jilin University in the 1980s (Li 2004; Sun 2013; Zhang et al. 2010; Chen 2009; Zhang 2008, 2015; Zhou 2014; Xiao 2014; Linhu Zhang 2010).

Molecular archaeology has become widespread in China, especially the use of stable isotope analysis for dietary reconstruction and aDNA for studying population history. Stable isotope research in China is aided by the natural and historical division in Chinese agriculture, namely, the divide between millet, wheat, and barley in northern China and wet-land rice in southern China (Fang et al. 1998). Serendipitously, the staple cereals of Neolithic northern China were two species of millets, *Setaria italica* and *Panicum miliaceum*, drought-resistant plants that utilize the C4 pathway of photosynthesis. C4 plants incorporate a greater proportion of ^{13}C—the heavier stable isotope of carbon—into plant tissues, and their isotopic values are distinct from those of C3 plants (Pechenkina et al. 2005; An et al. 2010; van der Merwe 1982; Schoeninger and Moore 1992; Ambrose 1993). Since C3 plants dominate the wild vegetation of northern China, the dietary contribution of millets can be assessed using carbon stable isotope values of bone samples. However, rice is a C3 plant, so it is impossible to assess its dietary contribution using the same method.

The earliest stable isotope research in China was carried out in 1984 (Cai and Qiu 1984) and concluded that carbon isotopic values of human samples indicated a strong contribution of millet to the human diet during the middle and late Neolithic. Despite the considerable interest of these findings, very few stable isotope studies were published on Chinese materials until the early twenty-first century (Wang 2011). Now, with the development of technology making stable isotope analysis more accessible, Chinese anthropologists have begun to deploy this technique intensively for dietary reconstruction (Pechenkina et al. 2005; Hu et al. 2006, 2007, 2008; Barton et al. 2009; Atahan et al. 2011; Guo et al. 2011; Dong et al. 2015, 2017; Zhang 2006; Ma et al. 2013; Zhang et al. 2003, 2010, 2011, 2015).

The first use of genetic data in archaeology in China took place in 1981, when scholars isolated and identified nucleic acids from the mummy found in the Mawangdui Tomb in Changsha, Hunan (Wang and Lu 1981). Modern aDNA research began relatively early in China and was conducted throughout the 1990s, with systematic and regional research beginning in the early 2000s. This work has focused both on human origins (e.g., Fu et al. 2013) and on the origins of archaeological and modern populations, especially in the so-called border regions of China (Wang 2011).

Finally, China represents a key territory for understanding global paleoepidemiology. Pathogens that followed human populations into Southeast Asia, Japan, Oceania, Australia, and the Americas must have passed through East Asia (Buckley and Oxenham 2016; Suzuki 2013). Nevertheless, paleoepidemiology of this region remains sketchy, with only a few isolated skeletally documented cases of chronic infectious diseases, such as treponematosis, leprosy, and tuberculosis (Hunan 1980; Fusegawa et al. 2003; Suzuki et al. 2005; Zhang 1994; Pechenkina et al. 2007).

Conclusions

Through much of the twentieth century, craniometric reconstruction of population histories was the principal shared interest of scholars in archaeology and physical anthropology. A second shared interest arose from reconstructing early subsistence strategies (Yuan and Flad 2002; Lee et al. 2007; Zhao and He 2006; Zhao and Piperno 2000; Chen et al. 1995). Here, biological anthropology became recognized as indispensable for providing direct evidence of changes in human diet and health. Recent work by young scholars is consequently more holistic, contributing to communication among anthropological subfields within China and to greater discourse between Chinese bioarchaeology and the international field.

As Han Kangxin and Pan Qifeng wrote in 1984: “In the last three decades, with the development of archaeological undertakings in China, many ancient human fossils and unearthed remains have been protected and collected, and a number of valuable research results have been published. But in general, research in this area is still focused on the accumulation of materials and filling in temporal gaps.” More than 30 years later, many areas of bioarchaeology in China have begun undertaking systematic and comparative research using advanced analytical techniques (Wang 2011).

The growing pace of bioarchaeological training and research in China and the greater contact between Chinese and foreign scholars (through multilingual publications, educational exchanges, and attendance at international conferences) will be important for bioarchaeology as a global field in the twenty-first century. The vast archaeological and skeletal record of China will no doubt play a critical role as we continually refine our understanding of human health and behavior in the past and develop new techniques to carry out this research. The models developed in other places should be tested on Chinese data within Chinese archaeological contexts, in collaboration with Chinese researchers, who will continue to make critical contributions to the development of the field.

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