

**Turquoise-Inlaid Bronze Plaques from the Erlitou Culture:
Origin and Transmission**

By

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Abstract

This paper focuses on turquoise-inlaid plaques excavated at the Erlitou site in order to understand their origin, function, the technology used in their manufacture, and their transmission. The turquoise-inlaid plaque, a ritual object probably worn on the arm, was an innovation of Erlitou elites made to serve a ritual purpose. They combined an existing technique from the lower Yellow River region of producing neatly trimmed turquoise inlay with a tradition from the Hami Basin region of making attachable bronze plaques of various shapes. Symbolic of a more advanced society, these plaques were transmitted to the Qijia and Sanxingdui societies, indicating the spread of the elite culture of Erlitou society.

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Introduction: Connecting Erlitou, Qijia, and Sanxingdui Cultures

Since 1981, three rectangular turquoise-inlaid bronze plaques have been excavated at the Erlitou 二里头 site. They are considered to be the most representative artifacts of the elite culture of the Erlitou society. Similar plaques have also been found at the Qijia 齐家 and Sanxingdui 三星堆 sites. The discoveries of these plaques shed light on the interactions among Erlitou, Qijia, and Sanxingdui cultures in the first half of the second millennium BCE and help us understand the transmission of representative artifacts of the elite culture of Erlitou society to less complex societies, and the formative stage of state-level society at Erlitou.

1. Turquoise-inlaid Bronze Plaques Connecting the Erlitou, Qijia, and Sanxingdui Cultures

In 1951, with the guidance of historical texts, Xu Xusheng took on the task of searching for the “ruins of Xia” and discovered the site of Erlitou.¹ Test excavations of the site that year had revealed a rich cultural deposit representing occupations spanning from the late Longshan period to the early Shang period, and had recovered an abundance of cultural materials.² On the basis of the spatial distribution of the cultural deposit and richness of its contents as revealed by subsequent excavations, Xia Nai officially named this archaeological culture the “Erlitou culture” after the site in 1962.³

¹ Xu Xusheng 徐旭生, “1959 nian xia yuxi diaocha xiaxu de chubu baogao” 1959 年夏豫西调查夏墟的初步报告 [Preliminary report on the investigation of “ruins of Xia” in western Henan region], *Kaogu* 考古 11 (1959): 592-596.

² Zhongguo kexuyuan kaogu yanjiusuo Luoyang fajuedui 中国科学院考古研究所洛阳发掘队, “1959 nian Henan Yanshi Erlitou shijue jianbao” 1959 年河南偃师二里头试掘简报 [A brief report on the text excavation of the Erlitou site in Yanshi, Henan], *Kaogu* 考古 2 (1961): 81-85.

³ Zhongguo shehui kexueyuan kaogu yanjiusuo 中国社会科学院考古研究所, *Yanshi Erlitou: 1959 nian-1978 nian kaog fajue baogao* 偃师二里头: 1959 年-1978 年考古发掘报告 [The Erlitou site in Yanshi: Excavations in 1959-1978] (Beijing: Zhongguo dabaikequanshu chubanshe, 1999), 1.

Erlitou is located in the Yanshi 偃师 city in western Henan province, south of the modern-day Luo River that flows to the Yellow River (Map 1). It covers an area of more than 300 ha and its occupation is divided into four phases that span from 1900 to 1500 B.C.E.⁴ Since the initial excavation, many important discoveries have been made, including a palace-like area with paved roads, rammed earth foundations, turquoise and bronze workshops, and elite burials. From the elite burials come some of the most remarkable artifacts of the Erlitou culture, including jade objects, bronze vessels and bells, turquoise products, and turquoise-inlay bronze plaques. Three turquoise-inlaid plaques were separately discovered from tombs M4, M11, and M57, and they are considered as the most representative artifacts of the elite culture of the Erlitou society. Each is a small rectangle with recessed zoomorphic design, turquoise inlay, and four loops. Similar turquoise-inlaid bronze plaques were also found at the Qijia and Sanxingdui culture sites.

Qijia culture was first discovered by the Swedish geologist Johann Gunnar Andersson in 1924 during his survey at the Qijiaping 齐家坪 site in Guanghe 广河 County, Gansu province. There, he noted a ceramic type that was different from those found in other ceramic traditions and named it after the site⁵ (Map 1). Chinese archaeologists adopted the name “Qijia culture,” now recognized from over a thousand Qijia culture sites, for an early Bronze Age culture dated 2200-1600 BCE.⁶ These are distributed over a broad region along the upper Yellow River and its many tributaries, covering much of Gansu, Ningxia, eastern Qinghai, and southern Mongolia.⁷ Two bronze plaques have been found at Qijia culture sites. They were collected separately from

⁴ Li Liu and Xingcan Chen, *The Archaeology of China: From the Late Paleolithic to the Early Bronze Age* (Cambridge: Cambridge University Press), 262-266.

⁵ Johann Gunnar Andersson, *Researches Into the Prehistory of the Chinese* (Stockholm: Museum of Far Eastern Antiquities, 1943), 78-82.

⁶ Liu and Chen, *The Archaeology of China*, 323.

⁷ Ibid.

local residents at Guanghe and Tianshui, and are now held in the Tianshui Museum. One plaque shows remarkable similarities in the shape of the plaque and the technique by which the turquoise pieces were inlaid with the one excavated from Tomb 11 at the Erlitou site. The other plaque only has the bronze frame left, but the shape and openwork design resemble those of the one found in Tomb 56 at Erlitou. Even though there are no excavated examples from Qijia sites, neatly trimmed rectangular turquoise pieces similar to those on the plaques excavated at Erlitou have been excavated at Qijiaping.

Plaques of similar style have also been excavated from deposit pits at Sanxingdui in the Sichuan basin in Southwest China, a region surrounded by high plateaus and mountains, which limited its contact with the outside to some degree⁸ (Map 1) The site is well known for the discoveries in 1986 of two sacrificial pits, in which life-size standing bronze figures, bronze heads and masks, and a tall bronze tree that show local features distinct from late Shang bronzes, were discovered. This distinctive culture was named the Sanxingdui culture and was divided into four phases spanning from Longshan to the late Shang period, 2800-1000 BCE. Four bronze plaques that resemble the Erlitou-type plaque have been discovered at Cangbaobao 仓包包 and Gaopian 高骈. Two of the four plaques are inlaid with turquoise, while the other two take a rather crude form with no turquoise inlays.

Another site that has yielded comparable bronze plaques is Tianshanbeilu 天山北路, located in the Hami Basin close to Hami 哈密 in Xinjiang (Map 1). The site was first excavated in 1988 and has since revealed hundreds of graves.⁹ The site may date to 1950 to 1550 BCE on

⁸ Ibid., 372.

⁹ Li Shuicheng, "The Interaction between Northwest China and Central Asia during the Second Millennium BC: An Archaeological Perspective," in *Ancient Interactions: East and West in Eurasia*, eds. Katie Boyle, Colin Renfrew and Marsha Levine (Cambridge, UK: McDonald Institute for Archaeological Research, 2002), 175-178.

the basis of ceramic comparisons. Grave goods include pottery vessels and small bronze implements and ornaments, such as knives, buttons, mirrors, and plaques.¹⁰ Two rectangular bronze plaques show similarities to the Erlitou-type plaques, especially the ones found at Sanxingdui.

In addition to these excavated examples, a small number of turquoise-inlaid bronze plaques from museums outside China are known. Turquoise-inlaid bronze plaques suggest connections among the Erlitou, Qijia, and Sanxingdui cultures which were contemporaneous in the first half of the second millennium BCE. The connections among these turquoise-inlaid bronze plaques have drawn a flurry of scholarly attention to study long-distance interactions among early Bronze Age cultures.



Map 1. Tianshanbeilu, Qijia, Erlitou, and Sanxingdui sites and bronze plaques excavated at these sites.

¹⁰ Li Shuicheng, “The Interaction between Northwest China and Central Asia,” 176-177.

2. Past Studies on Connections through Turquoise-Inlaid Plaques

Li Xueqin was the first scholar to catalogue both excavated and collected examples of Erlitou-type plaques, and studied them together. He noted similarities in the nose and eyes between the turquoise-inlaid plaque collected at the Miho Museum in Japan and the turquoise-inlaid plaque excavated at Cangbaobao within the Sanxingdui site. Li proclaimed that the plaque at Miho Museum served as a link between the plaques from the Erlitou and Sanxingdui sites.¹¹ Du Jinpeng argued that the source of the zoomorphic designs on the Erlitou plaques was from Shandong province, but such evidence was lacking in local traditions in Sichuan, indicating that the origin of the plaques was the Erlitou site, and that the plaques found at Sanxingdui were probably made by Erlitou people who escaped to the Sanxingdui site after the fall of the Erlitou state.¹² Zhao Dianzeng also proposed that the plaques were spread from the Erlitou site to the Sanxingdui site in Sichuan. He argued that, along with the transmission of these plaques, the beliefs, rituals, and religions of the Erlitou people embodied by the plaques were also spread to Sanxingdui.¹³ Zhang Tian'en was the first to describe the turquoise-inlaid plaque at the Tianshui Museum. Based on the apparent interaction between the Qijia and Erlitou cultures reflected by the style and other details of the plaques, and other comparable objects found at the two sites, Zhang proposed that the Qijia culture could have functioned as an important link through which

¹¹ Li Xueqin 李学勤, "Cong yijian xin cailiao kan Guanghan tongpaishi" 从一件新材料看广汉铜牌饰 [Observation on the bronze plaques excavated at Guanghan through a new material], *Zhongguo wenwu bao* 中国文物报 November 30 (1997): n.p.

¹² Du Jinpeng 杜金鹏, "Guanghan Sanxingdui chutu shangdai tongpai qianshuo" 广汉三星堆出土商代铜牌浅说 [Brief discussion on the bronze plaques of the Shang dynasty excavated at the Sanxingdui site in Guanghan], *Zhongguo wenwu bao* 中国文物报 April 9 (1995): n.p.

¹³ Zhao Dianzeng 赵殿增, "Sanxingdui yu Erlitou tongpaishi yanjiu" 三星堆与二里头铜牌饰研究 [Research on the bronze plaques from Sanxingdui and Erlitou] in *Yinshang wenming ji jinian Sanxingdui yizhi faxian qishi zhounian guoji xueshu yantaohui lunwenji* 殷商文明暨纪念三星堆遗址发现七十周年国际学术研讨会论文集及 [Collected essays presented at the international conference commemorating the 70th anniversary of the discovery of the Sanxingdui site], eds. Song Zhenhao 宋镇豪 and Xiao Xianjin 肖先进 (Beijing: Shehui kexue chubanshe 社会科学出版社, 2003), 126.

the Erlitou-type plaques were spread to Sanxingdui.¹⁴ Liu Xuetao and Li Wenying first pointed out the possibility that these bronze plaques might have been the prototypes for the turquoise-inlaid bronze plaques of the Erlitou site.¹⁵ Chen Xiaosan further pointed out the similarities between the plaques found at the Tianshanbeilu and Sanxingdui sites, and suggested that turquoise-inlaid plaques might have first emerged in Qijia culture in the Hexi Corridor region.¹⁶

3. Research Questions

The overarching research issue in this thesis concerns the mechanism of interregional interaction among the Erlitou, Qijia, and Sanxingdui cultures, and the significance of this interaction in the spread of the elite culture of the Erlitou society. In order to answer the question “What was the nature of interregional interaction, and how did it contribute to the spread of the elite culture of Erlitou society?” this thesis considers three correlated questions in three separate chapters: 1) What was the function of the turquoise-inlaid bronze plaques? 2) What was the origin of the turquoise inlay techniques, and how did these change from the Neolithic period to the Erlitou period? And 3) How were turquoise-inlaid bronze plaques exchanged among different cultures?

The first chapter serves as a catalogue of both scientifically excavated and poorly provenanced examples of turquoise-inlaid bronze plaques. It explains the function of these

¹⁴ Zhang Tian'en 张天恩, “Tianshui chutu de shoumian tongpaishi ji youguan wenti” 天水出土的兽面铜牌及有关问题 [Bronze plaque with animal mask unearthed at Tianshui and relevant questions], *Zhongyuan wenwu* 中原文物 1 (2002): 45-46.

¹⁵ Liu Xuetao 刘学堂 and Li Wenying 李文瑛, “Zhongguo zaoqi qingtong wenhua de qiyan jiqi xiangguan wenti xintan” 中国早期青铜文化的起源及其相关问题新探 [A new investigation on the origins of early bronze cultures in China and relevant issues] in *Zangxue xuekan* (di san ji) 藏学学刊 (第3辑) [Journal of Tibetology (volume 3)], ed. Sichuan daxue zhongguo zangxue yanjiusuo 四川大学中国藏学研究所 (Chengdu: Sichuan daxue chubanshe 四川大学出版社, 2007), 60.

¹⁶ Chen Xiaosan 陈小三, “Shi lun xiangqian lusongshi paishi de qiyan” 试论镶嵌绿松石牌饰的起源 [Discussion on the origin of turquoise-inlaid plaques], *Kaogu yu wenwu* 考古与文物 5 (2013): 96-98.

plaques as important ritual objects worn only by certain elites when performing ritual ceremonies. The second chapter surveys turquoise inlay traditions in different regions of prehistoric China. It presents and evaluates the hypothesis that people of the Erlitou culture adopted the neatly trimmed turquoise inlay technique from the lower Yellow River Valley region, while people of the Qijia culture adopted the technique of using untrimmed turquoise chips from the middle Yellow River Valley region. The last chapter discusses the likelihood of various sites as places of origin for the turquoise-inlaid plaques, and asserts that the prototypes for the Erlitou plaques most likely came from the Tianshanbeilu site through the link with Qijia culture.

I argue that a combining of the neatly trimmed turquoise-inlaid technique from the Lower Yellow River Valley region with the attachable bronze plaque-making tradition from the Tianshanbeilu region resulted in the initial innovation of turquoise-inlaid plaques in the Erlitou culture for ritual purposes. After their innovation and incorporation into a ritual system at the Erlitou site, turquoise-inlaid plaques were imported and imitated by elite members of the Qijia society to enhance their status and prestige. In addition to the turquoise-inlaid plaques, Erlitou ceramic *he* 盃 ritual vessels in the Sanxingdui and Qijia cultures, and widely dispersed Erlitou-type forked jade tablets mark a formative stage for shared beliefs and for the spread of the elite culture of Erlitou society.

4. Methodology

The study of trade and exchange is one sub-area in the field of archaeology, and it allows archaeologists to tackle questions such as the production and distribution of exchanged goods,

the mechanism of the exchange system, and the social change caused by trade and exchange.¹⁷ Several models have been proposed to study trade and exchange at the regional level. The World-system model was proposed by Immanuel Wallerstein as an explanatory model for the emergence of capitalism in sixteenth century Europe. He defines a world-system as one based on extensive division of labor, uneven distribution of economic tasks, and a process of integration, that legitimates and maintains some groups' exploitation of other groups.¹⁸ He also divides the world-economy system into three hierarchical areas: the core, the semi-periphery, and the periphery. The core is the center that contains advanced technology, human capital, and economic capital, which provides advanced technology and various expertise to the periphery. The periphery is under-developed and exploited by the core area for its cheap labor and raw material. The semi-periphery shares characteristics of both the core and the periphery, and serves as a buffer zone between the core and the periphery.¹⁹ Since the introduction of the world-system theory, this model, particularly the concept of core and periphery, has been adapted and applied to prehistoric societies in different parts of the world. In applying this model to the Erlitou, Qijia, and Sanxingdui interaction system, certain components of the model, such as differences in the development of social complexity, can indeed be observed in the interaction system. However, the lack of other components, such as economic exploitation, technological supremacy, and division of labor, reduces the value of the model for describing the interaction system among the Erlitou, Qijia, and Sanxingdui cultures.

¹⁷ Colin Renfrew and Paul Bahn, *Archaeology: Theories, Methods, and Practice*, (New York: Thames and Hudson, 2008), 357.

¹⁸ Immanuel Wallerstein, *The Modern World-System: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century* (New York and London: Academic Press, 1974), 349.

¹⁹ Immanuel Wallerstein, *The Modern World System*, 349-350.

The peer-polity model, proposed by Colin Renfrew, suggests that the interaction among peer polities of equivalent power, scale, and level of complexity most often leads to profound change to a society, and this interregional interaction should be studied in terms of flow of information between polities, such as ideas, symbolic objects, and goods for trade.²⁰ Renfrew suggests a focus on the nature of exchange and identifies different types of interactions, such as “warfare, competitive emulation, symbolic entrainment, and transmission of innovation.”²¹ The peer polity model distinguishes itself by not assuming unequal relations and exploitation of one region by another. However, the model limits its application to polities of equal status, and might not fit well to the exchange system between the Erlitou, Qijia, and Sanxingdui cultures in which Erlitou exhibits a much higher level of social complexity than that of Qijia and Sanxingdui. However, his arguments concerning interaction and social change, and his identification of different types of interactions are definitely relevant to the research at hand.

The interaction sphere model, proposed by Caldwell in his study of the Hopewell culture, argues that the interaction sphere is associated with increases in the rate of innovation.²² He also suggests that innovation results from rearrangement of existing forms and there must be a way to bring them together. For Caldwell, regional or “little traditions” are hotbeds of distinctiveness, while interaction spheres and “great traditions” serve as mechanisms for keeping little traditions in communication over significant periods of time.²³ Joseph Caldwell’s interactional sphere model was adopted by Kwang-Chih Chang and applied to his studies of Chinese civilization. Chang argues that the widely distributed cultures and the intensified interaction between them

²⁰ Colin Renfrew, “Introduction: Peer Polity Interaction and Socio-political Change,” in *Peer Polity Interaction and Socio-political Change*, eds. Colin Renfrew and John Cherry (New York: Cambridge University Press, 1986), 1.

²¹ Colin Renfrew, “Peer Polity Interaction and Socio-political Change,” 8-10.

²² Joseph Caldwell, “Interaction Spheres in Prehistory” in *Hopewellian Studies*, eds. Joseph Caldwell and Robert Hall (Springfield: Illinois State Museum, 1964), 135-136.

²³ Joseph Caldwell, “Interaction Spheres in Prehistory,” 141-143.

resulted in an interaction sphere that laid the foundation for the first historical Chinese civilization to emerge. He also argues that interaction among, the increasingly complex, diversified, and socially stratified, regional Neolithic cultures led to the origins of distinct local civilizations.²⁴

Another model is the cultural hegemony model proposed by Sarah Allan in which she argues that an elite culture first emerged at Erlitou and had established a cultural hegemony over other regions by the end of the Shang dynasty.²⁵ In her study, she uses bronze ritual vessels as cultural representatives of the elite culture first established at Erlitou, and argues that although regional variations existed, most bronzes found in other regions conform to the shapes and decorations of bronzes found in the Central Plains. She argues that, by doing so, people of other regions could effectively emulate the elite culture of the Central Plain even though they may not have shared the same belief system.²⁶

My approach will undertake a combination of Caldwell's interaction sphere model and Allan's cultural hegemony model. It will consider interaction between the Erlitou culture and other cultures as an "Erlitou interaction sphere" that enabled people of the Erlitou culture to draw knowledge from people of other cultures and to develop innovations to serve their ritual system. It will use the cultural hegemony model to explain the emulation of Erlitou-type plaques by other cultures.

²⁴ Kwang-chih Chang, *The Archaeology of Ancient China*, (New Haven and London: Yale University Press, 1986), 234.

²⁵ Sarah Allan, "Erlitou and the Formation of Chinese Civilization: Toward a New Paradigm," *The Journal of Asian Studies* 66:2 (2007), 461-465.

²⁶ Sarah Allan, "Erlitou and the Formation of Chinese Civilization," 466-471.

Chapter 1: Turquoise-Inlaid Bronze Plaques and Their Function

1. Excavated Turquoise-inlaid Bronze Plaques

So far, five examples of turquoise-inlaid bronze plaques have been excavated from burials at the Erlitou site and deposit pits at the Sanxingdui site. A group of small neatly trimmed turquoise tesserae has also been excavated, and two Erlitou-type plaques have been collected at the Qijia culture sites. These excavated turquoise-inlaid bronze plaques and turquoise tesserae not only help us understand the function of these plaques, but also their distribution, the interaction among the Erlitou, Qijia, and Sanxingdui cultures, and the mechanism and nature of the interaction. In addition to these excavated examples, more than ten Erlitou-type turquoise plaques have been identified in museums or private collections both in China and overseas. Thus this paper will distinguish excavated and collected examples and mainly use excavated examples to build arguments, along with collected examples for comparison.

1.1 Excavated turquoise-inlaid bronze plaques from the Erlitou culture

Three turquoise-inlaid bronze plaques have been scientifically excavated at Erlitou, one from Tomb 4, one from Tomb 11, and another one from Tomb 57. The earliest plaque, M4:5, was recovered in 1981 from a late second-phase tomb, Tomb 4 in Sector VI (Figure 1.1.1).²⁷ The plaque measures 14.2 cm long and 9.8 cm wide.²⁸ It is broadly rectangular in shape with convex ends, concave sides, and rounded corners. The top end is slightly wider than the bottom end, and each side has a pair of small loops. The front surface is slightly bowed. The plaque is constructed from a bronze backing with cast channels that create recessed décor which is filled with small

²⁷ Zhongguo shehui kexueyuan kaogu yanjiusuo Erlitou gongzuodui 中国社会科学院考古研究所二里头工作队, “1981 nian Henan Yanshi Erlitou muzang fajue jianbao” 1981 年河南偃师二里头墓葬发掘简报 [A brief report on the excavation of tombs at Erlitou in Yanshi, Henan in 1981], *Kaogu* 考古 1 (1984): 37.

²⁸ Zhongguo, 1981, 37.

pieces of turquoise. The recessed décor takes a zoomorphic design that has two round eyes at the bottom and a pair of ear-like features echoing each other at the top.

Three years later, in 1984, a second plaque, M11:7, was uncovered from Tomb 11, a fourth-phase tomb in Sector VII (Figure 1.1.2).²⁹ It is slightly bigger than the first one, measuring 16.5 cm long and 8 to 11 cm wide.³⁰ The shape is almost identical to the first. However, the recessed décor has a different design. It depicts a pair of almond-shaped eyes with round eyeballs at the bottom and a T-shaped feature on the top.³¹ The shape and arrangement of the turquoise inlays are also different from plaque M4:5. The turquoise pieces of plaque M4:5 have various shapes, which allows them to be inlaid along the raised bands of the recessed décor, while the turquoise inlays of plaque M11:7 are more uniform, rectangular in shape, and are arranged in vertical lines across the surface of the plaque.

The third, M57:4, was unearthed in 1987 from Tomb M57 of the fourth phase in Sector VI (Figure 1.1.3).³² It is 15.9 cm long and 7.5 to 8.9 cm wide.³³ The shape distinguishes it from the first two examples. It is a trapezoid with convex ends, straight sides, rounded corners, two small loops on each side, and bowed surface. The plaque also has a distinct construction. It does not have a bronze backing, and the zoomorphic design is formed by the openwork of the bronze frame. The zoomorphic design also varies from the first two examples. The design has more features, such as round eyes, crescent-shaped eyebrows, a mouth with long curved features at the

²⁹ Zhongguo shehui kexueyuan kaogu yanjiusuo Erlitou gongzuodui 中国社会科学院考古研究所二里头工作队, “1984 nian qiu Henan Yanshi Erlitou yizhi faxian de jizuo muzang” 1984 年秋河南偃师二里头遗址发现的几座墓葬 [Several tombs found at Erlitou in Yanshi, Henan in 1984], *Kaogu* 考古 4 (1986): 318-319.

³⁰ Zhongguo, 1984, 320.

³¹ Wang Qing 王青, “Xianqian tongpaishi de yuyi zhu wenti zai yanjiu” 镶嵌铜牌饰的寓意诸问题再研究 [A second study on the implied meaning of inlaid bronze plaques], *Dongfang kaogu* 东方考古 9 (2012): 224.

³² Zhongguo shehui kexueyuan kaogu yanjiusuo Erlitou gongzuodui 中国社会科学院考古研究所二里头工作队, “1987 nian Yanshi Erlitou yizhi muzang fajue jianbao” 偃师二里头遗址墓葬发掘简报 [A brief report on the excavation of tombs at Erlitou in Yanshi of Henan in 1987], *Kaogu* 考古 4 (1992): 294.

³³ Erlitou gongzuodui, “1987 nian Yanshi Erlitou yizhi muzang fajue jianbao,” 295.

bottom, and twelve crocodile-scale-shaped patterns evenly arranged in three rows at the top. The turquoise inlays are rectangular in shape and are arranged vertically, like those of plaque M11:7. Because these turquoise inlays were set in straight-walled openwork without bezels, it is unlikely that they were squeezed into the openwork and were able to hold their position only with the aid of friction between one another.³⁴ The black substance attached to the back of the turquoise inlays suggests that adhesive had been used to hold the inlays in position on a backing made of perishable materials that has not survived.

In 2002, a turquoise “dragon” was discovered in Tomb 3, a second-phase tomb in the courtyard of Palace 3 in Sector V (Figure 1.1.4).³⁵ The object was created using the same turquoise inlay technique by attaching neatly trimmed turquoise pieces to a backing with the aid of adhesive, and the head has a very similar zoomorphic design to that of plaque M4:5. This suggests that the turquoise dragon may be a precursor to the turquoise-inlaid bronze plaques at Erlitou. The object was found on top of the skeletal remains of a 30 to 35 year-old male. The object is composed of two parts, a large trapezoidal head and a long winding tail. The head is 13.6 to 15.6 cm long and 11 cm wide, and the tail has a length of 64.5 cm with its widest part of 4 cm.³⁶ The dragon was created using over 2000 turquoise tesserae of various shapes, with sizes varying from 0.2 to 0.9 cm and a thickness of around 0.1 cm.³⁷ These small turquoise pieces created a mosaic effect across the entire surface of the object. The zoomorphic design for the head has almond-shaped eyes, round eyeballs formed of button-shaped white jade, a long and

³⁴ Robert Dale Jacobsen, “Inlaid Bronzes of Pre-Imperial China: A Classic Tradition and Its Later Revivals” (PhD Diss., University of Minnesota, 1984), 72.

³⁵ Zhongguo shehui kexueyuan kaogu yanjiusuo Erlitou gonguodui 中国社会科学院考古研究所二里头工作队, “Henan Yanshi Erlitou yizhi zhongxinqu de kaogu xin faxian” 河南偃师二里头遗址中心区的考古新发现 [New discoveries from excavations in the central area of Erlitou of Yanshi in Henan] *Kaogu* 考古 07 (2005): 17.

³⁶ Erlitou gonguodui, “Henan Yanshi Erlitou yizhi zhongxinqu de kaogu xin faxian,” 18.

³⁷ *Ibid.*

high nose ridge formed by two white jade tubes and one turquoise tube in the middle, and a large garlic-shaped turquoise nose. A horizontal band of turquoise tesserae was found perpendicular to the tail, 3.6 cm to the east of the end of the tail. Traces of lacquer remains were discovered between the tail and the band, along with traces of ash.³⁸ The red lacquer remains and the traces of ash suggest that these turquoise pieces may have been originally inlaid on the surface of a wooden backing, with lacquer functioning both as adhesive for the inlay and decoration and preservative for the wooden backing.

In spite of the small number of these turquoise-inlaid objects excavated at Erlitou, some changes in the design can be recognized from the second to fourth phases of the Erlitou culture. Turquoise-inlaid objects with zoomorphic designs first appeared during the second phase. The zoomorphic design was created by the mosaic effect of small turquoise tesserae inlaid across a wooden surface with the aid of adhesive. In the late second phase, the zoomorphic design started being applied on bronze objects by combining turquoise inlay techniques and piece-mold bronze casting technique, a method that casts bronze with the aid of clay section molds. A bronze plaque was first made with cast channels, probably with the aid of two clay molds. Later, turquoise tesserae were worked by grinding them into different shapes and sizes to be inlaid along the walls of the cast channels. During the fourth phase, turquoise was ground into rectangular pieces of more uniform shape, size, and thickness to be inlaid in vertical lines in cast channels across the plaque, rather than following the direction of the raised walls of the channels. This was probably done to reduce the amount of time and effort spent on the grinding and inlaying process. Another kind of bronze plaque was cast with openwork instead of recessed channels. However, turquoise pieces were still inlaid in vertical lines in the openwork across the surface of

³⁸ Ibid.

the plaque, but probably to a wooden backing, a revival of the wooden backing technology of the second phase.

Bronze plaques with turquoise-inlaid zoomorphic design appeared to have fallen out of fashion after the Erlitou period. This may be explained by the expense of such time-consuming labor as well as the loss of their functions as ritual objects in later periods due to their foreign origin. However, the turquoise inlay techniques and the use of turquoise inlay on bronze objects made a dramatic comeback in the late Shang period (1300-1000 BCE).

1.2 Excavated turquoise-inlaid bronze plaques from the Sanxingdui culture.

Two plaques have been excavated from pits at and near Sanxingdui. These show lots of similarities to the plaques excavated at the Erlitou site in terms of shape and size, the intention for attachment, and the use of turquoise inlays. However, the recessed designs on the Sanxingdui plaques are much more geometric and abstract.

The first was discovered in 1976, together with three jade objects, when workers of a local brick-making factory at Gaopian were digging a channel for waste water (Figure 1.1.5).³⁹ It is 12.3 cm long, 5 cm wide on one end and 4.3 cm on the other, with a trapezoidal shape.⁴⁰ The wider end is concave, the narrower end is convex, the two sides are straight with four small semi-circle loops, and the surface is convex. The openwork design of the plaque is composed of ten geometric patterns. The pattern on top looks like a spinning top in shape flanked by two triangular-shaped patterns. Below are two symmetrical rows of forked patterns on top, square

³⁹ Ao Tianzhao 敖天照, “Guanghan Gaopian chutu shangdai yuqi de buzheng” 广汉高骈出土商代玉器的补正 [Supplementation and correction on the jade objects of the Shang period unearthed at Gaopian, Guanghan] in *Sanxingdui yanjiu: diyiji tianye ziliao* 三星堆研究: 第一辑田野资料 [Research on Sanxingdui: volume one field reports], edited by Sanxingdui yanjiuyuan 三星堆研究院 and Sanxingdui bowuguan 三星堆博物馆 (Chengdu: Sichuan chuban jietuan tian di chubanshe 四川出版集团天地出版社, 2006), 129.

⁴⁰ Ao Tianzhao, “Guanghan Gaopian chutu shangdai yuqi de buzheng,” 129.

patterns in the middle, and forked patterns at the bottom. At the bottom of the plaque are two connected curved patterns. The excavator assigned this pit to the Sanxingdui culture due to its proximity to the Sanxingdui site, and dated the bronze plaque to the late Erlitou period through comparing the jade objects and the bronze plaques from the pit with objects from Sanxingdui and Erlitou.⁴¹

The second turquoise-inlaid bronze plaque was discovered in 1987, together with other jade, stone, and bronze objects, when workers of a local brick-making factory at Zhenwu 真武 within the Sanxingdui site were procuring earth from a mound named Cangbaobao in 1987 (Figure 1.1.6).⁴² It is 13.8 cm long, 5.2 to 5.6 cm wide, and 0.1 cm deep. It has a trapezoidal shape with one straight end, one convex end, and straight sides with four small loops.⁴³ The recessed design consists of two symmetrical rows of geometrical patterns. Each row has a triangular pattern on top, followed by two diamond patterns with eyed motif, and a geometric pattern with at the bottom.

Besides the turquoise-inlaid bronze plaque, two other plaques were also found in the same pit. These bronze plaques resemble the turquoise-inlaid one in shape and size. However, these plaques do not have turquoise inlays. One is 14 cm long and 4.9 to 5.3 cm wide (Figure 1.1.7).⁴⁴ It is trapezoidal with rounded corners, two pairs of small loops, and a convex surface. The design is composed of two symmetrical rows of openwork. Each row has crescent-shaped

⁴¹ Ibid., 130.

⁴² Sichuan sheng wenwu kaogu yanjiusuo Sanxingdui gongzuozhan 四川省文物考古研究所三星堆工作站 and Guanghan shi wenwu guanlisuo 广汉市文物管理所, “Sanxingdui yizhi Zhenwu Cangbaobao jishiken diaocha jianbao” 三星堆遗址真武仓包包祭祀坑调查简报 [A brief report on the sacrificial pit at Cangbaobao of Zhenwu village at the Sanxingdui Site] in *Sichuan kaogu baogao ji* 四川考古报告集 [Compilation of archaeological reports of Sichuan], eds Sichuan sheng wenwu kaogu yanjiusuo 四川省文物考古研究所 (Beijing: Wenwu chubanshe, 文物出版社, 1998), 78.

⁴³ Sanxingdui gongzuozhan, “Sanxingdui yizhi Zhenwu Cangbaobao jishiken diaocha jianbao,” 78.

⁴⁴ Ibid., 80.

openwork on the top, five S-shaped sections of openwork lining up vertically, two lines of five small triangular openwork sections alternating with the five S-shaped openwork sections on its two sides, and one comma-shaped openwork section at the bottom.⁴⁵ The other plaque is almost identical in shape and size to the first, but has a much more crude and simple form (Figure 1.1.8). Its surface is flat, and the design is represented by two recessed spherical areas connected by a recessed channel. Another difference from the first plaque is the position of the two attachment holes at the two ends of the plaque. The stratigraphic information of these two pits had been destroyed before the excavators were informed of the discoveries. By comparing the plaques and jade objects to dated examples of other sites and studying the casting techniques of the plaques, the excavator dated both pits and their contents to the late Erlitou period or the early Shang period (1600-1500 BCE).⁴⁶

1.3 Excavated and collected turquoise-inlaid bronze plaques from the Qijia culture

No example of a turquoise-inlaid bronze plaque has yet been excavated from sites of the Qijia culture. However, a group of turquoise tesserae has been discovered at Qijiaping. This group of turquoise pieces is still in museum storage, and its archaeological context has not yet been published. In a book published in 2015, a photograph of this group of turquoise tesserae was included, but there was no discussion of the material (Figure 1.1.9).⁴⁷ According to the photograph, the tesserae have rectangular shapes of different sizes. The rectangular turquoise pieces do not have holes to be strung together, and resemble the pieces inlaid on the Erlitou plaques in shape, size, and thickness. Many pieces have a black substance adhering to the back,

⁴⁵ Ibid.

⁴⁶ Ibid., 89.

⁴⁷ Yi Hua 易华, *Qijia huaxia shuo* 齐家华夏说 [Talking about Qijia as Huaxia culture], (Lanzhou, Gansu renmin chubanshe, 2015). n.p.

and it is likely that these were originally inlaid on another material. The book also included a photograph of a bronze plaque collected at Qijiaping (Figure 1.1.10). Certain parts of the plaque had been damaged, but it is still possible to tell that the plaque has a trapezoidal shape with convex ends, straight sides, and small loops. The zoomorphic design is represented by the cast openwork with almond-shaped eyes and round eyeballs. If the openwork was intended for turquoise inlay, all the inlaid turquoise tesserae are missing. What is remarkable is that, based on the two published photographs, the pile of excavated turquoise included a round turquoise object that matches the eyeball of the collected plaque. However, no studies have been conducted to test whether these turquoise pieces excavated from the Qijiaping site were originally inlaid in the collected bronze plaque.

Another plaque, collected by a local resident at Tianshui is now held at the Tianshui Museum (Figure 1.1.11).⁴⁸ The plaque is about 15 cm long and 10 cm wide and has convex ends, concave sides, a convex surface, and four small loops.⁴⁹ The recessed zoomorphic design inlaid with turquoise pieces has two almond-shaped eyes, round eyeballs, and a feature that looks like up-side-down ram's horns. Some of the inlaid turquoise pieces have flaked off from the cast channels. The face of the animal mask closely resembles that of the plaque excavated from Tomb M11 at Erlitou, each looking like the face of a fox. However, the features on top of the two plaques differ, with one in a T-shape and the other in the shape of ram's horns.

2. Turquoise-inlaid Bronze Plaques from Museums outside China

In 1991, Li Xueqin made the first attempt to study turquoise-inlaid bronze plaques in museum collections outside China. Based on Li Xueqin's study, Wang Qing made several

⁴⁸ Zhang Tianen, "Tianshui chutu de shoumian tongpaishi ji youguan wenti," 43.

⁴⁹ Ibid.

attempts to catalogue turquoise-inlaid bronze plaques collected by overseas museums and private dealers. He has recorded about seven turquoise-inlaid plaques in museum collections outside China. These are located in the Miho Museum (Kyoto, Japan), the Honolulu Museum of Art (Honolulu, Hawai'i, USA), the Arthur M. Sackler Gallery, Smithsonian Institution (Washington, D.C., USA), and the Arthur M. Sackler Museum at Harvard University (Cambridge, Massachusetts, USA). There are also additional plaques in unnamed private collections. These are described in detail below.

2.1 A turquoise-inlaid bronze plaque from the Miho Museum

A plaque at the Miho Museum was first published in a catalogue made by the museum when it was opened near Kyoto, Japan in 1997 (Figure 1.2.1).⁵⁰ The plaque is 15 cm long and 8.5 cm wide.⁵¹ It has one convex end and one straight end, slightly concave sides, rounded corners, a slightly convex surface, and four small loops. The recessed zoomorphic design inlaid with turquoise pieces has almond-shaped eyes and round eyeballs at the lower section, and features that look like crocodile's scales at the upper section. The scale-shaped features closely resemble those of the plaque excavated from Tomb 57 at Erlitou.

⁵⁰ Wang Qing 王青, "Shenmi de xiandai yibao: xianqian tongpaishi" 神秘的夏代遗宝: 镶嵌铜牌饰 [Mysterious treasure from the Xia dynasty: inlaid bronze plaques], *Xungen* 寻根 02 (2005): 87

⁵¹ Wang Qing, "Shenmi de xiandai yibao: xianqian tongpaishi," 87.

2.2 A turquoise-inlaid bronze plaque from the Honolulu Museum of Art

The plaque at the Honolulu Museum of Art is 16.5 cm long and 8.6 cm wide (Figure 1.2.2).⁵² It has convex ends, concave sides, four rounded corners, a slightly bowed surface, and four small loops. The recessed zoomorphic design inlaid with turquoise pieces has two almond-shaped eyes and round eyeballs in the lower section, and deer antler-shaped features in the upper section. This plaque is the only known example that has a pair of antler-like features. The symmetric antler-like features remind one of the symmetric ear-like features on the plaque excavated from Tomb 4 at Erlitou.

2.3 Turquoise-inlaid bronze plaques from the Arthur M. Sackler Gallery of the Smithsonian Institution

Two bronze plaques originally collected by Dr. Paul Singer were donated to the Arthur M. Sackler Gallery of the Smithsonian Institution in 2002.⁵³ Of these, one appears to be authentic while the other may be a forgery. The first is 14 cm long and 10.1 cm wide and has convex ends, concave sides, four round corners, and a pair of small loops on each side (Figure 1.2.3).⁵⁴ The recessed zoomorphic design inlaid with turquoise tesserae has two almond-shaped eyes and round eyeballs in the lower section, a T-shaped feature in the upper section, and a pattern in the shape of a water droplet in between. The zoomorphic design resembles that of the plaque from Tomb 11 at Erlitou, except the water droplet pattern.

The second is 18.5 cm long, 12 cm wide, and 1.5 cm thick, and has one straight end and one slightly convex end, straight sides, rounded corners, and four loops on the sides (Figure

⁵² Robert Poor, *Ancient Chinese Bronze, Ceramics and Jade in the Collection of the Honolulu Academy of Arts* (Honolulu: Honolulu Academy of Arts, 1979), 48.

⁵³ Keith Wilson, "The Singer Collection," *Orientation* 7 (2012), 58

⁵⁴ Max Loehr, *Relics of Ancient China from the Collection of Dr. Paul Singer* (New York: Asia Society, 1965), 151.

1.2.4).⁵⁵ The zoomorphic design has two eyes in the lower section and a T-shaped feature in the upper section. Comparative studies and laboratory examination suggest this plaque may be inauthentic, a modern forgery imitating Erlitou turquoise-inlaid plaques.⁵⁶ Comparing this plaque to other known examples, the bronze casting technique and turquoise inlaying technique are not similar to those of other plaques. Unlike other examples, the raised bands of the recessed design of this plaque are not of uniform width. The shapes of the turquoise tesserae are very irregular and appear to have been inlaid in the recessed design quite randomly. Moreover, the T-shaped pattern is connected to the face of the animal mask, while all other examples have the T-shaped pattern as a separate feature.

2.4 Turquoise-inlaid bronze plaques from the Sackler Museum at Harvard University

Three turquoise-inlaid plaques were collected by Grenville Winthrop and donated to the Arthur M. Sackler Museum at Harvard University. The first is 15.9 cm long and 9.8 cm wide (Figure 1.2.5).⁵⁷ It has convex ends, concave sides, rounded corners, four small loops attached to the sides, and a slightly curved surface. The recessed zoomorphic design inlaid with turquoise pieces has almond-shaped eyes and round eyeballs in the lower section, a U-shaped face, and two heart-shaped features in the upper section. The plaque also bears traces of woven fabric on its back (Figure 1.2.6).

⁵⁵ Wang Qing 王青, “Ji baoluo xing yisheng suocang dierjian xiangqian tongpaishi” 记保罗辛格医生所藏第二件镶嵌铜牌饰 [Recording the second plaque collected by Dr. Paul Singer], *Zhonguo wenwebao* 中国文物报 September 17 (2010): n.p.

⁵⁶ The plaque was compared to other examples and examined in the laboratory of the Sackler Gallery by using stereomicroscopy and radiography. The preliminary examination showed that the turquoise and bronze plaque was in good and stable condition, unlike other objects that have been examined. However, further research is needed to test the authenticity of the plaque.

⁵⁷ Wang Qing, “Shenmi de xiandai yibao: xiangqian tongpaishi,” 86.

The second is 17.2 cm long and 11.3 cm wide, and has slightly convex ends, concave sides, round corners, four loops on the sides, and a slightly convex surface (Figure 1.2.7).⁵⁸ The zoomorphic design has almond-shaped eyes and round eyeballs in the lower section and a T-shaped feature in the upper part, and resembles that of the plaque excavated from Tomb 11 at Erlitou. This plaque also has traces left by woven fabric on its back.

The third varies slightly from the first two plaques in its shape. It has a protrusion at one end that resembles a short handle with a triangular point and slightly concave sides (Figure 1.2.7). This plaque is the only known example that has a protrusion. The zoomorphic design has almond-shaped eyes and round eyeballs in the lower section, and two heart-shaped features echoing each other in the upper part.

3. Turquoise-inlaid Bronze Plaques from Private Collections

In addition to overseas museums, four turquoise-inlaid bronze plaques have been catalogued from private collections outside of China. All four plaques have been displayed in exhibitions. The first, measuring 15.5 cm long, was displayed in an exhibition in London organized by Eskenazi in 1991 (Figure 1.3.1).⁵⁹ The plaque has convex ends, concave sides, four small loops on the sides, and a slightly convex surface. The recessed zoomorphic design inlaid with turquoise has almond-shaped eyes and round eyeballs in the lower section, and a small T-shaped feature in the upper section. The small T-shaped feature of this plaque resembles that of the one from Tomb 11 at the Erlitou site. Eskenazi put another 14.8 cm long plaque on display in an exhibition held in New York in 1999 (Figure 1.3.2).⁶⁰ The shape and design of this

⁵⁸ Ibid.

⁵⁹ Eskenazi, *Inlaid Bronze and Related Material from Pre-Tang China*, (London: Eskenazi, 1991), 148.

⁶⁰ Eskenazi, *Ancient Chinese Bronzes and Ceramics*, (London: Eskenazi, 1999), 10.

plaque are similar to those of the first except that it has two incurved, horn-like features in its upper section. The incurved horn-like features are reminiscent of the ear-like features on the plaque excavated from Tomb 4 at Erlitou.

Wang Qing has also documented two other plaques from private collections that share many similarities with each other in terms of shape and design, but which may be inauthentic (Figure 1.3.3).⁶¹ Both plaques have U-shaped faces with almond-shaped eyes and round pupils in the lower section, and a U-shaped feature in the upper section. A notable difference is that one plaque has its U-shaped feature facing downward, while the other plaque's feature faces upward. Comparing them to other excavated and collected examples, Wang Qing points out that the zoomorphic design, casting technique, and turquoise inlay technique of these two plaques are different from those of other examples, and that it is likely that they are forgeries.

4. Functions of Erlitou Turquoise-inlaid Bronze Plaques

Before such plaques were discovered at Erlitou, several plaques in museum collections outside China had been published, misdated to the Shang dynasty, and misidentified as horse frontlets that formed part of the elaborate ornaments of horse trappings.⁶² However, it is unlikely that these plaques were horse frontlets since horse remains have not been discovered yet at Erlitou. Now, with the discoveries of the three plaques at the Erlitou site, the uses and functions of these plaques can be better understood in light of their archaeological context. They appear to have been objects worn on the arms of ritual specialists.

⁶¹ Wang Qing 王青, "Niuyue Xinjian liangjian xiangqian tongpaishi bianwei" 纽约新见两件镶嵌铜牌饰辨伪 [On the authenticity of two inlaid bronze plaques newly seen in New York], *Zhongguo wenwubao* 中国文物报 February 16 (2007): n.p.

⁶² Robert Poor, *Ancient Chinese Bronze, Ceramics and Jade*, 48.

Based on the scale of grave, the number, variety, and quality of grave goods, and whether a coffin was used, Li Zhipeng classified 265 dated burials at Erlitou into five categories from first-class burial to fifth-class burial, and considered the first three classes, 84 in total, as elite burials.⁶³ So far, only three burials have yielded turquoise-inlaid bronze plaques, and one burial has yielded a turquoise “dragon,” accounting for only a small percentage of the total elite burials. Such a small number indicates a special identity for the plaque owners that distinguishes them from other elite members of the Erlitou society.

Each of the three turquoise-inlaid plaques and the turquoise-inlaid dragon were accompanied by a bronze bell in the burials. Six bronze bells have been excavated from burials at Erlitou. Each bell has a conical shape with a flat top, a small loop at the top, a flange on the side, a jade clapper, and traces of woven fabric (Figure 1.4.1). These were found near the tomb occupant’s waist, close to the turquoise-inlaid objects which were found on the deceased’s chest or side. This consistent combination of a bronze bell and a turquoise-inlaid bronze plaque, their physical proximity to their owner, and their intention for attachment suggest that they might have had the same function and been used together.

Ye Shuxian argues that bells and animal imageries are commonly used to exorcise evil spirits by shamans in different minority groups of modern China and suggests that turquoise-inlaid plaques and bronze bells discovered at Erlitou functioned as a set of shamanistic objects.⁶⁴ Lothar von Falkenhausen notes that all the Neolithic and Erlitou bronze bells were closely

⁶³ Li Zhipeng 李志鹏, *Erlitou wenhua muzang yanjiu* 二里头文化墓葬研究 [Research on the burials of Erlitou culture] in *Zhongguo zaoqi qingtong wenhua: Erlitou wenhua zhuanji yanjiu* 中国早期青铜文化: 二里头文化专题研究 [Early Chinese bronze cultures: studies on Erlitou culture], ed. by Zhongguo shehui kexueyuan kaogu yanjiusuo 中国社会科学院考古研究所 (Beijing: Kexue chubanshe 科学出版社, 2008): 28-31.

⁶⁴ Ye Shuxian 叶舒宪, “Zhonghua wenming tanyuan de renleixue shijiao: yi Erlitou yu Sanxingdui tongling tongpai de minzuzhi jiedu weili” 中华文明探源的人类学视角: 以二里头与三星堆铜铃铜牌为例的民族志解读为例 [Anthropological perspectives on the origin of Chinese civilization: a case study on bronze bells and plaques of Erlitou and Sanxingdui], *wenyi yanjiu* 文艺研究 07 (2006): 130-133.

related to an individual person, and suggests that the bronze bell found at the Taosi 陶寺 site was attached to the belt of a shaman due to its sound-producing quality and proximity to the tomb occupant's waist.⁶⁵ Robert Thorp extends Falkenhausen's suggestion to the Erlitou bronze bells and proposes that the Erlitou bells might have a similar usage, being worn by a shaman on his belt together with the turquoise-inlaid bronze plaques attached to his garment or shield.⁶⁶ Sarah Allan employs David Pearce and David Lewis-Williams' theory. This theory states that hypnagogic experiences achieved by means of alcohol, music and dancing, and drugs are common to early cultures. Sarah Allan uses this theory to examine the grave goods excavated from the four tombs where the turquoise dragon and turquoise-inlaid plaques were separately found. She points out that the "clear implication of the two-eye plaques worn on the chest, wine vessels, bells and drum, jade baton-like artifacts and usual headgear is that the figures buried in all four tombs were specialist seers." She argues that the people buried in these tombs used alcohol to perform rituals and wore costumes with a plaque that has two eyes to enhance their "supernatural vision."⁶⁷

The suggestion that the owners of bronze bells and turquoise-inlaid plaques were shamans is still speculative because it is mainly based on the association of several objects with shamans, such as bells and animal imageries. Moreover, the word "shaman" or "seer" is loaded with meanings, such as possessing "supernatural" power, entering a trance state, and communicating with the realm of spirits. However, little is known about the nature and content of rituals conducted by Erlitou elites. Neither do we know whether they used mind-altering

⁶⁵ Lothar von Falkenhausen, *Suspended Music: Chime-Bells in the Culture of Bronze Age China* (Berkeley: University of Berkeley Press, 1993), 134.

⁶⁶ Robert Thorp, *China in the Early Bronze Age: Shang Civilization* (Philadelphia: University of Pennsylvania Press, 2006), 40.

⁶⁷ Sarah Allan, "The Taotie Motif on Early Chinese Ritual Bronzes," in *The Zoomorphic Imagination in Chinese Art and Culture*, eds. Jerome Silbergeld and Eugene Wang (Honolulu: University of Hawai'i Press, 2016): 33-43.

substances to enter a trance state to perform the ritual. Therefore, this paper will take a more conservative approach to the identity of the plaque owners and refer to them as ritual specialists. It will likewise refer to bronze bells and turquoise-inlaid plaques as ritual objects rather than shaman's paraphernalia.

Grave goods from the three tombs where turquoise-inlaid bronze plaques were found include mostly ritual objects such as handle-shaped jade objects, round clay disks, pottery *jue* 爵 and *he* vessels, jade ritual blades, lacquerware, and bronze vessels, with the exception of very few utilitarian and ornamental objects. Bronze, turquoise, and jade were highly valued materials in Erlitou society as they were limited to elite burials. The combination of these materials in the bronze bell with jade clapper and bronze plaque with turquoise inlay, added more significance to these objects. The delicacy of the turquoise inlays on the plaques and the vulnerability of the jade clapper of the bell suggest that they were ritual objects rather than utilitarian objects or attachable ornaments worn in daily life.

The bronze bells were found near the waist of the deceased person and bear traces of woven fabric, suggesting that these bells could have been worn by the tomb occupant on the waist during the ritual. Two of the turquoise-inlaid plaques were reported to have been located in the vicinity of the chest of the deceased person and one on the side. Therefore they were generally thought to be sewn to the cloth at the chest region of the tomb occupant. However, the curvature and weight of these plaques would make them very inconvenient to wear on the chest. The curvature and the two loops on each side of these plaques suggest that these plaques might have been tied around the arm of the tomb occupant during the ritual. The majority of ritual objects such as pottery and bronze wine vessels suggest that one of the most important rituals of the elite culture of the Erlitou society was wine and food offering to the realm of spirits. During

this offering ritual, bronze bells and turquoise-inlaid bronze plaques might have been worn by a ritual specialist to invite the spirits to enjoy their offerings. The sound producing quality of the bell and the animation of the zoomorphic design on the plaque created by the swift movement of the arm made the bell and turquoise-inlaid plaque the most efficient and effective ritual objects in inviting the spirits.

Chapter 2: Origin and Transmission of Turquoise-Inlay Techniques from the Neolithic to the Erlitou Periods

This chapter focuses on the exploitation of turquoise in ancient China from the Neolithic to the Erlitou periods. It will particularly examine the origin and transmission of turquoise inlay techniques through studying documented turquoise-inlaid objects excavated from different regions. Examination of the turquoise-inlaid objects excavated at the Qijia and Erlitou sites shows that the people of Qijia culture commonly inlaid untrimmed turquoise pieces to the body of a pottery vessel or used them to create an unsmooth texture along the rim of a pottery vessel, a technique adopted from the Longshan culture in middle Yellow River Valley region. However, the people of the Erlitou culture inlaid trimmed turquoise pieces to bronze objects to create a mosaic, a technique adopted from the Longshan culture in the Lower Yellow River Valley.

1. Physical Properties, Exploitation, and Working Techniques of Turquoise in Ancient China

Turquoise, a combination of hydrated copper and aluminum phosphate, is an opaque mineral with a wax-like luster that commonly occurs in veins and seams of altered rocks or in disseminated, compact grains and nodules.⁶⁸ It is primarily a secondary, surface mineral that is associated with copper-bearing veins, and it is copper to which it owes its color. The color of turquoise ranges from sky-blue through a wide diversity of intermediate shades to pale green.⁶⁹ After reviewing the geological features of turquoise deposits around the world, Joseph Poque proposed three models for the geological origins of turquoise: 1) resulting from ascending magmatic solutions which supplied all the components of turquoise, 2) resulting from alteration

⁶⁸ Joseph Pogue, *The Turquoise: A Study of Its History, Mineralogy, Geology, Ethnology, Archaeology, Mythology, Folklore, and Technology*, Glorieta, New Mexico. Originally published 1915, Memoirs of the National Academy of Sciences Vol.XII, Part II, Washington D.C. 1974: 23-27.

⁶⁹ Joseph Pogue, *The Turquoise*, 23-24.

of host rock by magmatic solutions by which the host rock supplies part of the components of turquoise, and 3) resulting from descending cold solutions of meteoric waters percolating through fractures of rocks near the surface. He suggested that the third model best explained the formation of most turquoise deposits.⁷⁰

Turquoise supposedly derives its name from Turkey, from where the mineral was transported to Europe. It is likely that the name referred specifically to the source at Nishapur in Iran (Persia), once thought to be within the obscurely defined Turkey.⁷¹ In addition to Iran, turquoise also occurs in Egypt, Afghanistan, Central Asia, Serbia, Mexico, and the Southwestern U.S.

In Chinese, Turquoise is known as *lusongshi* 绿松石. The term was first used in *Qin hui dian tu* 清会典图 (Illustrated Record of the Collected Statutes of the Qing Dynasty), and before the Qing dynasty, turquoise was referred to under various names such as *sese* 瑟瑟 and *dianzi* 甸子.⁷² The earliest exploitation of turquoise in ancient China dates back to the early Neolithic period at the sites of the Peiligang 裴李岗 culture (7000-5000 B.C.E.), where a large number of mostly perforated turquoise ornaments of various shapes were discovered. The scope and scale of production of turquoise items increased significantly over time and turquoise working technologies become increasingly complex, reaching their first peak of sophistication in the Erlitou period. Through studying excavated turquoise objects, Pang Xiaoxia identified seven major regions for production of turquoise items in the Neolithic period: 1) the Central Plain

⁷⁰ Ibid., 63-67.

⁷¹ Ibid., 129.

⁷² Luan Bing'ao 栾秉璈, "Gudai lusongshi shiming, shiqian chutuwu fenbu tezheng ji yuanliao lai yuan wenti" 古代绿松石释名, 史前出土物分布特征及原料来源问题 [Questions on interpretation of names of turquoise in ancient China, characteristics of distribution of unearthed turquoise objects, and sources of raw materials], in *Haixia liangai guyuxue huiyi lunwen zhuanji* 海峡两岸古玉学会议论文集 (Taipei: National Taiwan University Press, 2001), 531-536.

region (central Yellow River region), 2) the Haidai culture region (lower Yellow River region), 3) the Gansu-Qinghai-Ningxia region (upper Yellow River region), 4) the northern region (Liao River region), 5) the upper Yangzi River region, 6) the lower Yangzi River region, and 7) the Huainan region (Zhu River region).⁷³ The distribution of production centers of turquoise products did not change much during the Erlitou period. Thus this chapter will follow this identification of major production centers for turquoise items in discussing the likely origin and transmission of turquoise inlay techniques during the Neolithic and the early Bronze Age (Erlitou) periods.

Very few ancient turquoise mines have been identified in China. Modern turquoise mines are mainly located in Hubei, Shaanxi, Henan, Qinghai, Xinjiang, Yunnan, and Anhui, particularly the fold-fault zone of the Eastern Qinling Mountains where turquoise deposits were formed by meteoric water leaching into fractures of altered rocks.⁷⁴ It is not clear when and how turquoise deposits in these locations had been exploited. However, excavations of an ancient turquoise mine site from 2010 to 2015 have helped fill a gap in knowledge on the turquoise mining processes in the late Neolithic period and the Bronze Age and mining activities closely associated with the production of turquoise artifacts at Erlitou. The site, known as the Hekou 河 □ ancient turquoise mine site, is located in Luonan 洛南 County in southeastern Shanxi. It consists of ten caves created by mining and a slope of debris that included pottery sherds, stone hammers, stone cobbles, grindstones, lamp-like stone objects, turquoise nodules, and artifacts of

⁷³ Pang Xiaoxia 庞小霞, “Zhongguo chutu xinshiqi shidai lusongshiqi yanjiu” 中国出土新石器时代绿松石器研究 [A study on turquoise objects unearthed in the Neolithic period], *Kaogu xuebao* 考古学报 2 (2014): 140.

⁷⁴ Xian Yiheng 先怡衡, “Shanxi luonan Laziya caikuang yizhi ji zhoubian lusongshi chanyuan tezheng yanjiu” 陕西洛南辣子崖采矿遗址及周边绿松石产源特征研究 [Studies on the characteristics of the geographical origin of turquoise from the Laziya mine sites in Luonan, Shanxi province and the surrounding mine areas] (PhD Diss. University of Science and Technology Beijing, 2016), 81-83.

bone and wood.⁷⁵ Analysis of pottery sherds and Accelerator Mass Spectrometry (AMS) of eight samples, including four charcoal samples and four bone samples, calibrated by dendrochronology have provided a range of dates from 2030 to 500 B.C.E., suggesting that exploitation of turquoise at this site started in late Neolithic period and continued to the Spring and Autumn period.⁷⁶

The majority of stone tools discovered at the site are hammers, most commonly cylindrical in shape with grooves around the center for hafting. These have evidence of wear at both ends, suggesting that these were the primary tools used to mine turquoise (Figure 2.1.1).⁷⁷ Xian Yiheng noted that stone cobbles were usually found together with stone hammers, that the curvatures of these could fit into the grooves of the stone hammers, and suggested that these were pecking tools used to make grooves on the hammers (Figure 2.1.2).⁷⁸ He also observed that the grooves on the grindstones matched the pointed ends of the stone hammers and pointed out they were likely to be stone hammer processing tools (Figure 2.1.3).⁷⁹ The primary depositions inside these caves consist of stone mining debris, and include fragments with hammer marks indicating that they resulted from the mining process (Figure 2.1.4).⁸⁰ Thus, the prehistoric turquoise mining process can be reconstructed as including on-site stone hammer manufacture with stone cobbles and grindstones, turquoise mining through hard blows with stone hammers, and collection of turquoise nodules. No processed turquoise objects have been

⁷⁵ Beijing keji daxue yejin yu cailiaoshi yanjiusuo 北京科技大学与材料史研究所 and Shanxisheng kaogu yanjiusuo 陕西省考古研究所, “Shanxi Luonan Hekou lusongshikuang yizhi diaocha baogao” 陕西洛南河口绿松石矿遗址调查报告 [Survey report on Hekou turquoise mine site at Luonan in Shaanxi], *Kaogu yu wenwu* 考古与文物 3 (2016): 11-16.

⁷⁶ Beijing keji daxue yejin yu cailiaoshi yanjiusuo and Shanxisheng kaogu yanjiusuo, “Shanxi Luonan Hekou lusongshikuang yizhi diaocha baogao,” 17.

⁷⁷ *Ibid.*, 15-16.

⁷⁸ Xian Yiheng, “Shanxi luonan Laziya caikuang yizhi ji zhoubian lusongshi chanyuan tezheng yanjiu,” 67.

⁷⁹ *Ibid.*

⁸⁰ *Ibid.*, 70.

recovered from the site. Because turquoise nodules are small and easy to transport, the extracted turquoise was probably transported directly to workshops where it was manufactured into ornaments.

A turquoise workshop that covers an area of about 1000 m² south of the palace complex district and was in operation from Phase Two to Phase Three was discovered at Erlitou in 2004.⁸¹ The close proximity suggests that the production of turquoise items at this workshop was under direct control by Erlitou elites. Within this area, especially in Pit 290, a large quantity of raw material of turquoise, semi-finished and finished turquoise items, and turquoise debris was found, along with turquoise processing tools such as grindstones and stone saws.⁸² Most of the turquoise nodules found in Pit 290 bear manufacturing marks and were used to make turquoise tubes, beads, and inlay material. The manufacturing marks left on the tubes and beads suggest that their making required indirect percussion knapping of turquoise nodules at the two ends, grinding into desired shapes, polishing, and drilling from the opposite two sides with solid drills that have not yet been found at the workshop area.⁸³ While the making of thin pieces of turquoise inlay requires rubbing thin turquoise chips at one or two sides to smooth the surface, grinding the sides into desired shapes, polishing, and, in rare cases, cutting.⁸⁴

Several attempts have been made to identify the sources of turquoise at Erlitou. Portable X-ray Florescence (XRF) analysis of turquoise samples from the ancient turquoise mine site at Luonan in Shaanxi and samples from Erlitou shows significant compositional similarities among turquoise materials from these two sites, indicating that the Hekou ancient turquoise mine in

⁸¹ Zhongguo shehui kexueyuan kaogu yanjiusuo 中国社会科学院考古研究所, Erlitou: 1999-2006 二里头: 1999-2006, (Beijing: Wenwu chubanshe, 2014), 337.

⁸² Zhongguo shehui kexueyuan kaogu yanjiusuo, "Erlitou: 1999-2006," 337.

⁸³ Ibid., 1394.

⁸⁴ Ibid., 1391-1392.

Shaanxi was one likely source. Turquoise mined at this site was mostly likely transported along the Luo River near the site to Gongyi County in Henan province where the Luo River joins the Yellow River, and was carried back there to the turquoise workshop at the Erlitou site. At the workshop, turquoise lumps were processed to make turquoise ornaments and ritual objects. These turquoise products were distributed exclusively for the use of the Erlitou elites, as indicated by the concentration of turquoise products in elite tombs at Erlitou and the extreme scarcity of this material at other sites of the Erlitou culture.

2. Turquoise Inlay Techniques in the Neolithic Period

Inlay is the embedment of one material on the surface of another which involves selecting the base and inlay materials, making grooves on the base material for the inlay material, cutting the inlay material into the desired shape and size, and fitting the inlay material into the grooves on the base. The basic concept of inlay is well rooted in the early Neolithic period in Northeast, Northwest, and Southeast China when microlithic tools were commonly fitted into grooves on bone or wood handles, perhaps with the aid of adhesive or string to hold the microlithic tools in position, in order to form composite tools.⁸⁵ During the middle and late Neolithic periods, the tradition of making composite tools continued. However, turquoise became the favored inlay material. Inlay techniques became more developed, and were not only applied to implements but also to ornaments, vessels, sculptures, and other types of artifacts made of a wide variety of materials such as clay, jade, ivory, and lacquer. Turquoise inlay techniques were not first

⁸⁵ Yun Xiang 云翔, “Shilun shiren guqi” 试论石刃骨器 [Discussion on bone-handled stone blade tools], *Kaogu* 考古 9 (1988): 825-835.

developed in areas that had a long tradition of making bone-handled stone blade tools, which indicates that turquoise inlay techniques might have an independent origin.⁸⁶

2.1 Turquoise inlay techniques in the lower Yellow River region

The earliest evidence for the use of turquoise inlay on other materials in the archaeological record comes from sites of the Dawenkou 大汶口 culture (4150-2650 B.C.E), which covers the entire Shandong province and the northern part of Jiangsu and Anhui provinces, where a large number of turquoise products were discovered. The Dawenkou site in Shandong provides the first documented turquoise-inlaid artifacts. In 1959, a circular finger ring, M22:10, made of bone was excavated from Tomb 22. It dates to the middle phase of the Dawenkou culture (Figure 2.2.1).⁸⁷ The bone ring was originally inlaid with three button-shaped turquoise pieces which had shed off from the grooves. The three grooves are rather shallow, indicating that the three turquoise buttons were inlaid to the grooves on the ring with the aid of adhesive, the material of which has not yet been identified, to hold them in position. This bone ring shows an inlay technique which involves a process of carving grooving on the base material, cutting turquoise into the desired shape and size to fit the grooves, applying adhesive to either or both the grooves and turquoise inlays, and attaching the turquoise inlays to the grooves. Another documented turquoise-inlaid object from Dawenkou is a three-sided cylindrical bone tube, M4:10, discovered from Tomb 4 that dates to the late phase of the Dawenkou culture (Figure 2.2.2).⁸⁸ The bone tube measures 7.7 cm in height and has raised bands with incised lines around

⁸⁶ Wang Qiang 王强, "Shi lun shiqian yushi qi xiangqian gongyi" 试论史前玉石器镶嵌工艺 [Attempted discussion on prehistoric jade inlay techniques]. *Nanfang wenwu* 南方文物 3 (2008): 89.

⁸⁷ Shandongsheng wenwu guanlichu 山东省文物管理处 and Ji'nanshi bowuguan 济南市博物馆, *Dawenkou: xinshiqi shidai muzang fajue baogao* 大汶口: 新石器时代墓葬发掘报告 [Dawenkou: report on excavations of burials in the Neolithic period], (Beijing: wenwu chubanshe 文物出版社, 1974), 99.

⁸⁸ Shandongsheng and Ji'nanshi, "Dawenkou: xinshiqi shidai muzang fajue baogao," 101-102.

the body at the top, middle, and bottom parts.⁸⁹ Each of the two flat areas between raised bands with incised lines was originally inlaid with five turquoise buttons, some of which had fallen off. One button was embedded into the hole at one of the three ridges, and two buttons were squeezed into the holes on each of the two sides that form the ridge at an even distance. A similar cylindrical tube, M62:47, was found in Tomb 62, also dated to late Dawenkou period, at the Yedian 野店 site of the Dawenkou culture (Figure 2.2.3).⁹⁰ The tube is made of ivory and has a comparable design to M4:10. The flat area at the upper part of the tube was inlaid with four small turquoise buttons which had all fallen off from their original grooves. The inlay technique used on this ivory tube from Yedian is identical to that applied to the bone ring at Dawenkou. However, the three-sided cylindrical bone tube from the Dawenkou site shows a slightly different technique in which holes, rather than grooves, were drilled through the base material, and small turquoise buttons were squeezed into the holes without the aid of adhesive. This technique is referred to as monolithic inlay without the use of adhesive.⁹¹

This monolithic inlay technique continued to the Longshan period (2650-2050 B.C.E) in the lower Yellow River region, and started to be used on other base materials. A new turquoise inlay technique to create a mosaic effect on the surface of the base material was also developed during the late Longshan period. An example of the continuation of the monolithic inlay technique is a jade axe excavated from the Dantu 丹土 site in Shandong (Figure 2.2.4).⁹² The jade axe measures 30.5 cm in height, 18 cm in width, and 0.3 cm in thickness and is trapezoidal

⁸⁹ Ibid.

⁹⁰ Shandongsheng bowuguan 山东省博物馆 and Shandongsheng wenwu kaogu yanjiusuo 山东省文物考古研究所, Zouxian Yedian 邹县野店, (Beijing: Wenwu chubanshe 文物出版社, 1985), 95.

⁹¹ Qin Xiaoli, "Turquoise Ornaments and Inlay Technology in Ancient China," *Asian Perspectives* 55.2 (2016): 225.

⁹² Gu Fang 古方, *Shandong juan* 山东卷 vol. 4, *Zhongguo chutu yuqi quanqi* 中国出土玉器全集 [Complete collection of unearthed jade in China] (Beijing: Kexuchubanshe 科学出版社, 2005), 25.

in shape.⁹³ The axe was drilled with three holes, and the hole near the left side of the axe was inlaid with a round turquoise piece. Another example is a hairpin found to the left of the skull of the tomb occupant in Tomb 202 at Zhufeng 朱封 from the late Longshan culture in Shandong province in 1989 (Figure 2.2.5).⁹⁴ The pin itself is made of bone and measures 23 cm in length and was designed like a bamboo stem.⁹⁵ The pin is slotted into a decorative jade plaque engraved with a zoomorphic pattern. The plaque was drilled with two symmetrical holes in which turquoise was inlaid. In the same tomb, over 981 tiny turquoise tesserae, with a size of only several millimeters, were discovered next to the hairpin (Figure 2.2.6).⁹⁶ Based on the placement of these turquoise pieces near the deceased's head, these tiny turquoise tesserae were probably used as inlays for the hair ornament made of perishable base material. Wang Qing argued that the vicinity of the turquoise tesserae to the hairpin and their minute size suggested that they could have been embedded in the perforated designs in the decorative jade plaque of the hairpin and later fallen off due to the loss of effectiveness of the adhesive or the fall of the coffin lid.⁹⁷ Archeological experiments need to be conducted before determining whether these turquoise tesserae were really inlays for the perforated designs in the jade plaque. However, the uniform thickness of these tesserae, the neatly trimmed sides of each piece, and the black substance attached to backs of them indicate that they were used as inlays to create a mosaic design on the

⁹³ Gu Fang, *Shandong juan*, 25.

⁹⁴ Zhongguo shenhui kexueyuan kaogu yanjiusuo Shandong gongzuodui 中国社会科学院考古研究所山东工作队, "Shandong Linqi Zhufeng longshan wenhua muzang" 山东临朐朱封龙山文化墓葬 [Tombs of the Longshan culture at Zhufeng in Linqi, Shandong], *Kaogu* 考古, 7 (1990): 591.

⁹⁵ Zhongguo shehui kexueyuan kaogu yanjiusuo Shandong gongzuodui, "Shandong Linqi Zhufeng longshan wenhua muzang," 591.

⁹⁶ *Ibid.*

⁹⁷ Wang Qing 王青, "Xizhufeng longshan wenhua damu shenhui shiwen de fuyuan yanjiu" 西朱封龙山文化大墓神徽饰纹的复原研究 [Research on the reconstruction of the deity decoration found in tombs of the Longshan culture at Xizhufeng] in *Liu Dunyuan xiansheng jinian wenji* 刘敦愿先生纪念文集 [Memorial essays on Liu Duyuan] edited by Shandong daxue kaogu xuexi 山东大学考古学系, (Ji'nan: Shandong daxue chubanshe 山东大学出版社, 2000), 171-172.

base material. Another example of this inlay technique to create a mosaic effect is a group of small turquoise tesserae found near the left wrist of the tomb occupant.⁹⁸ These small tesserae were probably originally attached to the surface of a wrist ornament made of perishable base material that has not survived. This use of neatly trimmed turquoise tesserae to create a mosaic effect is referred to as neatly trimmed inlay technique. It was adopted by the craftsmen at the turquoise workshop at Erlituo, and was first applied to bronze to produce turquoise-inlaid bronze plaques for ritual purposes.

These documented turquoise-inlaid objects show that turquoise inlay techniques first emerged in the Dawenkou culture in Shandong in the lower Yellow River region and the main technique used during this period is monolithic inlay technique, which involves inlaying turquoise to grooves or holes on the base material with or without the aid of adhesive. During the late Longshan period of this region, monolithic inlay technique continued, and then started to be used on jade. At the same time, neatly trimmed inlay technique was invented to create a mosaic effect on the surface of another material with the aid of adhesive to hold inlays in position. This method of using turquoise as inlay material was quickly adopted by other regions of the Longshan period, and new techniques were invented to accommodate the different cultural context of each region.

2.2 Turquoise inlay techniques in the lower Yangzi River region

In the lower Yangzi River region, inlaid objects first emerged in the Liangzhu 良渚 culture and were mainly discovered in burials at Fanshan 反山 and Yaoshan 瑶山 (c.3300-2200

⁹⁸ Zhongmei liangcheng diqu lianhe kaogudui 中美两城地区联合考古队, “Shandong Rizhaoshi Liangchengzhen yizhi 1998-2001 nian fajue jianbao” 山东日照市两城镇遗址 1998-2001 年发掘简报 [Report on the excavations of the Liangchengzhen site in Rizhao County, Shandong from 1998 to 2001], *Kaogu* 考古 9 (2004): 15.

B.C.E.), and the Haochuan 好川 cemetery in Zhejiang province (c.2300-1500 B.C.E.). Among the inlaid objects found in the Liangzhu culture, only one was inlaid with turquoise. The rest were inlaid with jade or green-colored pyrophyllite, indicating that jade rather than turquoise was the most commonly used inlay material, most likely due to the lack of turquoise sources in this region. The only example of a turquoise-inlaid object is a piece of lacquerware, M52:2, found in Tomb 52 at the Haochuan cemetery (Figure 2.2.7).⁹⁹ The remains of the lacquerware are 35 cm long and 20 cm wide and coated with red lacquer. Five turquoise beads and two steatite beads were lined up along one end of the remains.¹⁰⁰ The turquoise and steatite beads were probably inlays that were originally attached along the rim of the lacquerware. In this inlay technique, lacquer functioned not only as decoration and protection for the base material, but also as an adhesive to attach the inlay material. The other four documented inlaid objects from the Haochuan cemetery are lacquer cups inlaid with jade or green-colored pyrophyllite. Cup M8:1 excavated from Tomb 8 and cup M39:2 from Tomb 39 were coated with red lacquer to which eighteen round pieces of pyrophyllite were attached (Figure 2.2.8 and Figure 2.2.9).¹⁰¹ The other two cups, M1:1 and M60:2, were also coated with red lacquer, but were inlaid with carefully designed jade plaques (Figure 2.2.10 and Figure 2.2.11).¹⁰² These jade plaques were cut into different shapes such as squares, trapezoids, disks, and triangles, and have various curvatures to fit and encrust the surface of the cup. This inlay technique was probably intended to transform the surface of the base material into the texture of the inlay material and enhance the prestige and aesthetics of the base object.

⁹⁹ Zhejiangsheng wenwu kaogu yanjiusuo 浙江省文物考古研究所 and Suichangxian wenwu guanli weiyuanhui 遂昌县文物管理委员会, *Haochuan mudi* 好川墓地 [Haochuan cemetery] (Beijing: Wenwu chubanshe 文物出版社, 2001), 257.

¹⁰⁰ Zhejiangsheng and Suichangxian wenwu guanli weiyuanhui, *Haochuan mudi*, 257.

¹⁰¹ *Ibid.*, 151, 225.

¹⁰² *Ibid.*, 131, 279.

This inlay on lacquer technique was also the most prevalent technique used to make inlaid objects found at Fanshan and Yaoshan. Lacquaware M12:1 found in Tomb 12 at Fanshan, after reconstruction, is shaped like a pitcher with a handle (Figure 2.2.12).¹⁰³ It was first engraved with patterns of spirals and concentric circles. The spirals and concentric circles were then painted with red lacquer, and 141 jade granules with diameters varying from 0.2 to 0.7 cm were inlaid in the centers of the spirals and concentric circles.¹⁰⁴ Tomb 12 also yielded a disk-shaped object inlaid with one jade disk and 181 tiny jade granules (Figure 2.2.13).¹⁰⁵ The jade disk was inlaid in the center of this object and the jade granules were arranged in different patterns around the jade disk. Objects with similar designs and inlay technique were also found in Tombs 14 and 22 at Fanshan, and Tombs 7 and 155 at Yaoshan. The disk-shaped lacquerware, M7:155, found in Tomb 7 at Yaoshan shows a slight difference in design. It was inlaid with a jade *bi* 璧 disk with perforation in the center and tiny jade granules around the ring (Figure 2.2.14).¹⁰⁶

When Liangzhu culture rose to power in the lower Yangzi River region, Dawenkou culture in the lower Yellow River region had begun to be superseded by the Shandong Longshan culture. It is unclear if the practice of using inlays in the Liangzhu culture was inspired by the turquoise inlay style of the lower Yellow River region. However, the inlay material, inlay technique, and inlay design systems are rather different from those of the lower Yellow River region. The dominant inlay material in the Liangzhu culture and Haochuan cemetery contexts is jade granules rather than turquoise. These tiny granules were probably recycled wasters of the

¹⁰³ Zhejiangsheng wenwu kaogu yanjiusuo 浙江省文物考古研究所, Fanshan 反山, (Beijing: Wenwu chubanshe 文物出版社, 2005), 88-89.

¹⁰⁴ Zhejiangsheng wenwu kaogu yanjiusuo, *Fanshan*, 89.

¹⁰⁵ *Ibid.*, 90

¹⁰⁶ Zhejiangsheng wenwu kaogu yanjiusuo 浙江省文物考古研究所, *Yaoshan* 瑶山, (Beijing: Wenwu chubanshe 文物出版社, 2003), 105.

jade material that was used to make prestige objects. The inlay technique is an inlay on lacquer technique, in which lacquer functions both as decoration and protection of the base object, and adhesive for the inlay material. It was most likely developed out of the lacquer-making tradition in this region. The inlay design system was used to create pictorial representations with jade inlays and lacquer paintings, such as patterns of spirals and concentric circles and the radiating sun ray-like pattern in the Liangzhu cultural context. It was also used to encase and transform the surface of the base object with jade inlays, as in the Haochuan cemetery, rather than to create a mosaic effect with neatly trimmed turquoise pieces, as in the Shandong Longshan culture context.

2.3 Turquoise inlay techniques in the middle Yellow River region

Recorded turquoise inlaid objects in this region were mainly discovered at Taosi and Xiajin 下靳 of the late Longshan culture period (c.2500-2000 B.C.E.) in Shanxi, and all the inlaid objects are body ornaments such as hairpins and wrist ornaments. The inlay technique used at these two sites shows both connection with and difference from that of the lower Yellow River region.

Turquoise-inlaid objects found at Taosi are all hairpins. In total, twenty four hairpins have been discovered, and ten of them were inlaid with turquoise chips.¹⁰⁷ Each of them is composed of several parts that were joined and held together by a black substance which has not been identified yet (Figure 2.2.15). A common composition for the hairpins consists of a bone stem, a jade disk with a perforated hole in the center, and a jade pendant. The bone stem was

¹⁰⁷ Gao Wei 高炜, "Longshan shidai yugu zuhe toudi de fuyuan yanjiu" 龙山时代玉骨组合头饰的复原研究, [Study on the reconstruction of hair ornaments made of jade and bone of the Longshan period] in *Xiangfang Taosi yizhi yanjiu* 襄汾陶寺遗址研究 [Studies on the Taosi site in Xiangfeng] edited by Xie Xigong 解希恭 (Beijing: Kexue chubanshe 科学出版社, 2007), 478.

inserted into the perforated hole, enhanced by a semi-sphere sculpted with a black substance on one or both sides of the jade disk. A jade pendant was tied to the perforated or incised terminal, or the natural bulge of the bone stem. Some hairpins have an additional L-shaped jade insert with a perforated terminal from which the pendant was hung.

This technique of inlaying turquoise chips onto objects sculpted with a black substance was also applied to two wrist ornaments found from Tombs 136 and 76 at the Xiajin cemetery.¹⁰⁸ Wristlet M76:1 is a wide circular band which was found around the right wrist of the tomb occupant (Figure 2.2.16). The band itself was sculpted with a black substance. Turquoise chips and three shells were inlaid all over the surface of the wide band. Wristlet M136:1 is a narrow circular band also found around the right wrist of the tomb occupant and sculpted with a black substance on which turquoise chips are inlaid across the surface (Figure 2.2.17).

This technique of inlaying turquoise chips across the surface of the hairpins and wristlets found in this region shows certain similarities to the neatly trimmed inlay technique used to create a mosaic effect from the lower Yellow River region. However, the turquoise chips are fragmentary and irregular in shape rather than neatly trimmed, and the surface on which turquoise chips were inlaid was sculpted with a black substance which functions both as base material and adhesive to hold the turquoise chips in position. Zhang Zhichao noted that these chips were randomly inlaid on a surface to create an unsmooth and fragmentary textured effect rather than a mosaic with identifiable patterns.¹⁰⁹

¹⁰⁸ Xiajin Kaogudui 下靳考古队, “Shanxi Linfen Xiajin mudi fajue jianbao” 山西临汾下靳墓地发掘简报 [A brief report on the excavation of Xiajin cemetery at Linfen in Shanxi], *Kaogu* 12 (1998): 4-13.

¹⁰⁹ Zhang Zhichao 张智超, “Xinshiqi shidai zhi erlitou shiqi xiangqian zhuangshi yu sheji xitong zhi fazhan” 新石器时代至二里头文化时期镶嵌装饰与设计系统之发展 [The development of the inlay design system from the Neolithic age to the Erlitou culture period] (Master’s Thesis, Tainan National University of the Arts, 2010), 46-47.

2.4 Turquoise inlay techniques in the upper Yellow River region

Turquoise-inlaid objects in the upper Yellow River region were mainly discovered from burials at Zongri 宗日 (c.2500-2300 B.C.E.) in Qinghai province and Yuanyangchi 鸳鸯池 (c.2300-2000 B.C.E.) in Gansu province. The turquoise inlay technique of this region shows a strong connection with that of Taosi and Xiajin in the middle Yellow River region.

At Zongri, a tube-like wrist ornament made of bone was recovered in Tomb 322 (Figure 2.2.18).¹¹⁰ The bone tube was inlaid with small, untrimmed turquoise chips similar in shape to those inlaid on the wristlet discovered at Xiajin. They were also used to create a fragmentary, unsmooth textured effect on the surface of the tube. Two hairpins, M32:7 and M43:6, recovered at Yuanyangchi also point to a strong connection with Taosi in the middle Yellow River region (Figure 2.2.19). Each hairpin is composed of three parts: a bone stem, a sphere sculpted with a black substance, and a round, bowed bone cap. The bone stem is pointed at one end, and the other end of it holds a sculpted sphere. The round, bowed cap was incised with concentric circles and put on top of the sphere. The sculpted sphere of hairpin M32:7 was inlaid with 36 small bone beads. However, the sculpted sphere of hairpin M43:6 was not inlaid.¹¹¹ These two hairpins closely resemble those from Taosi in terms of shape, composition, manufacturing technique, and inlay design, suggesting that the fashion and technique of making such hairpins in this region may have come from Taosi in the middle Yellow River region.

In addition to inlaid objects that point to interaction with the middle Yellow River region, some turquoise-inlaid objects show innovations in turquoise inlay technique in this region. A red

¹¹⁰ Ge Sangben 格桑本 and Chen Honghai 陈洪海, *Zongri yizhi: wenwu jingcui ji lunshu xuanji* 宗日遗址: 文物精粹及论述选集 [Zongri site: treasures and selection of essays] (Chengdu: Sichuan kexue jishu chubanshe 四川科学技术出版社, 1999), 15.

¹¹¹ Gansusheng bowuguan wenwu gongzuodui 甘肃省博物馆文物工作队 and Wuwei diqu wenwu puchadui 武威地区文物普查队, "Gansu Yongchang Yuanyangchi xinshiqi shidai mudi" 甘肃永昌鸳鸯池新石器时代墓地 [Cemetery of the Neolithic period at Yuanyangchi in Yongchang County, Gansu], *Kaogu* 2 (1982): 216.

pottery jar, M27:1, found at Yuanyangchi shows the earliest example of decorating pottery with turquoise. It measures 9 cm in height and has an ovoid body, flaring rim, and a small loop handle. Around its shoulder are six small round grooves in which turquoise buttons were originally inlaid (Figure 2.2.20).¹¹² This tradition of inlaying pottery with turquoise was adopted by the Qijia culture of this region in the early Bronze Age.

Turquoise-inlaid artifacts have not yet been discovered in other regions. The current archaeological data show that turquoise inlay technique first emerged in the Dawenkou culture in the lower Yellow River region around the 4th millennium B.C.E. During this period, turquoise inlays were attached to grooves or holes of the base object with or without the aid of adhesive. During the Longshan period in this region, a new turquoise inlay technique was developed. Neatly trimmed turquoise pieces were inlaid across the surface of the base object to create a mosaic effect. In the lower Yangzi River region, jade was the preferred material for inlays. Jade granules were attached to objects coated or painted with lacquer to form pictorial patterns or to encase and transform the surface of the base object. In this inlay on lacquer technique, lacquer functioned both as decoration for the base object and as an adhesive for the jade granules. This probably evolved out of the highly-developed lacquerware manufacturing tradition in this region. The turquoise inlay technique practiced in the middle Yellow River region shows certain similarities to that of the lower Yellow River region, but also notable differences. In this region, turquoise chips of irregular shapes were inlaid across the surface of spheres or objects sculpted with a black substance to create a fragmentary and unsmooth texture effect. The trend and technique of making inlaid ornaments such as bracelets and hairpins in the upper Yellow River region were probably acquired from the middle Yellow River region. However, a new inlay

¹¹² Gansusheng bowuguan wenwu gongzuodui and Wuwei diqu wenwu puchadui, “Gansu Yongchang Yuanyangchi xinshiqi shidai mudi,” 213, 216.

technique was also developed in the upper Yellow River region where turquoise was first inlaid onto pottery.

3. Turquoise Inlay Techniques in the Erlitou period

In the Erlitou period, Turquoise-inlaid objects were mainly discovered at sites of the Qijia culture (c.2200-1600 B.C.E.) and the Siba 四坝 culture (c.1900-1500 B.C.E.) in the upper Yellow River region, and Erlitou in the middle Yellow River region. One main change in turquoise inlay technique during the Erlitou period is that turquoise was inlaid onto bronze objects for the first time.

3.1 Turquoise inlay techniques in the middle Yellow River region during the Erlitou Period

In the middle Yellow River region, turquoise-inlaid objects were mainly found at Erlitou during the Erlitou period. The earliest turquoise-inlaid object found at Erlitou is the turquoise “dragon” from Tomb 3. The “dragon” mosaic was created with over two thousand neatly trimmed turquoise tesserae, originally attached to an organic base material that did not survive. By the end of the second phase of the Erlitou culture, turquoise inlay technique was combined with bronze casting to make turquoise-inlaid bronze plaques. Each plaque was cast with recessed channels into which neatly trimmed turquoise pieces were inlaid to create a zoomorphic mosaic. In addition to rectangular turquoise-inlaid plaques, four circular bronze plaques were also found at the Erlitou site. Plaque K4:2 was cast with two concentric rows of three cross-shaped channels

around the center and dentate channels around the rim to which turquoise pieces were inlaid (Figure 2.2.21).¹¹³

Erlitou also yielded four turquoise-inlaid jade objects, a jade axe and a forked jade tablet from Tomb 3, a jade knife from Tomb 11, and a crescent-shaped jade object from Tomb 57 (Figure 2.2.22).¹¹⁴ Each object has drilled holes to which turquoise buttons were fitted.

Turquoise-inlaid objects from Erlitou suggest that the Erlitou culture adopted the monolithic inlay technique and the neatly trimmed inlay technique from the lower Yellow River region. The Erlitou culture additionally combined the neatly trimmed inlay technology with its bronze casting technique to produce turquoise-inlaid bronze plaques.

3.2 Turquoise inlay techniques in the upper Yellow River region during the Erlitou period

Three documented turquoise-inlaid pottery artifacts discovered from this region in the Erlitou period show a continuation of the tradition of inlaying pottery vessels with turquoise in this region during the Neolithic period. One of them is a pottery jar found at Huoshaogou 火烧沟 of the Siba culture in Gansu province (Figure 2.2.23).¹¹⁵ It has an ovoid body, a long neck, and two handles connecting the rim and the ridge of the body. It is painted with geometric lines and inlaid with turquoise pieces of irregular shapes on the upper part of the body and the handles. The other two turquoise-inlaid pottery artifacts, M2:7 and M1:10, were excavated at Dianhe 店

¹¹³ Zhongguo shehui kexueyuan kaogu yanjiu suo Erlitou gongzuodui 中国社会科学院考古研究所二里头工作队, “Yanshi Erlitou yizhi xin faxian de tongqi he yuqi” 偃师二里头遗址新发现的铜器和玉器 [New discoveries of bronze and jade objects at Erlitou in Yanshi], *Kaogu* 考古 04 (1976): 259-260

¹¹⁴ Zhang Zhichao, “Xinshiqi shidai zhi erlitou shiqi xiangqian zhuangshi yu sheji xitong zhi fazhan,” 75.

¹¹⁵ Guansusheng bowuguan 甘肃省博物馆, *Gansu sichouzhilu wenming* 甘肃丝绸之路文明 [Civilizations along the Silk Road in Gansu] (Beijing: Kexue chubanshe 科学出版社, 2008), photo 13.

河 of the Qijia culture in Ningxia (Figure 2.2.24).¹¹⁶ Each measures around 1.3 cm in height and has a concave body.¹¹⁷ Artifact M2:7 was inlaid with 17 small untrimmed turquoise chips along the rim, while turquoise chips inlaid on artifact M1:10 have all fallen off from the rim.¹¹⁸ These two artifacts show that Qijia culture adopted both the tradition of inlaying turquoise to pottery vessels of this region and the tradition of using untrimmed turquoise chips to create a textured effect from the middle Yellow River region.

In addition to turquoise-inlaid pottery artifacts, a group of neatly trimmed turquoise tesserae was discovered at Qijiaping of the Qijia culture. Most of the tesserae still have the black substance attached to them, indicating that they were originally used as inlays. These tesserae closely resemble those on the bronze plaques from Erlitou. However, this group of turquoise tesserae is the only excavated example of neatly trimmed turquoise inlays in the Qijia culture context. The neatly trimmed inlay technique had been extensively used from the second phase to the fourth phase of the Erlitou culture to make a variety of artifacts. Therefore, it is most likely that the group of neatly trimmed turquoise tesserae were originally manufactured at Erlitou.

¹¹⁶ Ningxia wenwu kaogu yanjiusuo 宁夏文物考古研究所, “Ningxia Guyuan Dianhe qijia wenhua muzang qingli jianbao” 宁夏固原店河齐家文化墓葬清理简报 [Report on excavation of tombs of the Qijia culture at Dianhe in Guyuan county, Ningxia], *Kaogu* 考古 8 (1987): 673-675.

¹¹⁷ Ningxia wenwu kaogu yanjiusuo, “Ningxia Guyuan Dianhe qijia wenhua muzang qingli jianbao,” 675.

¹¹⁸ *Ibid.*

Chapter 3: Origin and Transmission of Turquoise-Inlaid Bronze Plaques

Since the discoveries of the three turquoise-inlaid bronze plaques at the Erlitou site in the 1980s, scholars have been studying and debating the zoomorphic designs on these plaques. The focus of the debate concerns the iconographies of the zoomorphic designs on these plaques and the connections between these designs and comparable zoomorphic designs on objects of the Neolithic period and the Shang dynasty. However, less attention has been given to the plaques themselves, or the origin and transmission of such plaques. This chapter aims to examine the origin of Erlitou turquoise-inlaid bronze plaques, the mechanism of their transmission, and the role of such interaction in the spread of the elite culture of the Erlitou society. I propose the possibility that Erlitou elites adopted the practice of making attachable bronze plaques from the Tianshanbeilu culture through the link of the Qijia culture.

1. Local Tradition Versus Non-local Tradition

Chen Guoliang studied over 130 published bronze objects excavated at Erlitou, and divided them into five main categories, including vessel, musical instrument, weapon, implement, and ritual object whose function is unclear. Chen noted that most objects in the categories of vessels, weapons, and implements had prototypes in the Wangwan Third Phase 王

湾三期 culture, a variant of Longshan culture in western and central Henan province.¹¹⁹ Gideon Shelach-Lavi also noted the continuity in the shapes of Erlitou bronze vessels from their pottery prototypes in the Longshan culture.¹²⁰ An Jiayuan compared the bronze bells excavated at Erlitou to the copper bell found at Taosi of the Longshan culture in Shanxi province, and argued that Erlitou bells were developed from the Taosi bell and continued the function of the Taosi bell as an adornment worn at the waist.¹²¹ The above studies have shown that most objects in the Erlitou bronze assemblage had prototypes in the pottery traditions of the Longshan culture in the middle Yellow River valley region. However, prototypes of the bronze plaques have not yet been identified in the pottery tradition in this region.

The three turquoise-inlaid plaques from Erlitou show remarkable uniformity in shape and size. The earliest plaque, M4:5, entered the bronze assemblage during late second phase of the Erlitou culture with a complex shape and design, suggesting that a plaque of such shape and design was already a fully developed concept among the Erlitou craftsmen when they were making turquoise-inlaid plaques. The lack of prototypes for the Erlitou plaques from local Neolithic traditions, and the lack of an experimentation period of making these plaques, opens up the possibility that the prototypes might have come from other early Bronze Age cultures. The most likely region for such prototypes is the Tianshanbeilu site where attachable bronze plaques of various shapes were commonly used to adorn the tomb occupant's body.

¹¹⁹ Chen Guoliang 陈国梁, "Erlitou wenhua tongqi yanjiu" 二里头文化铜器研究 [Research on Erlitou bronze objects] in *Zhongguo zaoqi qingtong wenhua: Erlitou wenhua zhuanti yanjiu* 中国早期青铜文化: 二里头文化专题研究 [Early bronze cultures in China: monographic research on the Erlitou culture], ed. Zhongguo shehui kexueyuan kaogu yanjiusuo 中国社会科学院考古研究所 (Beijing: Kexue chubanshe 科学出版社, 2008), 127, 134, 192.

¹²⁰ Gideon Shelach-Lavi, *The Archaeology of Early China: From Prehistory to the Han Dynasty* (Cambridge: Cambridge University Press, 2015), 171.

¹²¹ An Jiayuan 安家瑗, "Zhongguo zaoqi de tongling" 中国早期的铜铃 [Bronze bells in early China], *Zhongguo lishi bowuguan guankan* 中国历史博物馆馆刊 00 (1987): 37-38.

2. Likely Prototypes from Tianshanbeilu

The Tianshanbeilu site is located in the Hami basin close to Hami city in Xinjiang. The site was first excavated in 1988 and hundreds of graves have been excavated ever since.¹²² Grave goods discovered at the site include pottery vessels and small bronze implements and ornaments, such as knives, buttons, mirrors, and plaques.¹²³ Pottery vessels found at the Tianshanbeilu site closely resemble those of the Siba culture (1950-1500 BCE). Thus, it is suggested that the site could be dated to 1950 to 1550 BCE.¹²⁴ Most of the graves with grave goods have one to dozens of bronze objects. Among these bronze objects, the most popular type is the bronze plaque, especially a circular one.¹²⁵

The archaeological data of the Tianshanbeilu cemetery have not yet been published. Only a small number of bronze objects are discussed without detailed archaeological context. Liu Xuetao and Li Wenying first pointed out that bronze plaques similar to the Erlitou turquoise-inlaid bronze plaques were commonly found in graves at the Tianshanbeilu site, and proposed the possibility that the plaques found at the Tianshanbeilu site might have served as prototypes for the Erlitou turquoise-inlaid bronze plaques.¹²⁶ Based on their proposal, Chen Xiaosan further compared the bronze plaques found at Tianshanbeilu to those found at Sanxingdui, Qijia, and Erlitou, and argued that rectangular bronze plaques found at Tianshanbeilu were possible prototypes which inspired the turquoise-inlaid bronze plaques.¹²⁷ In his paper, Chen Xiaosan published two bronze plaques found at the Tianshanbeilu site. Each one is a small rectangle that

¹²² Li Shuicheng, "The Interaction between Northwest China and Central Asia during the Second Millennium BC: An Archaeological Perspective," 175-178.

¹²³ Ibid, 176-177.

¹²⁴ Ibid.

¹²⁵ Liu Xuetao 刘学堂, *Qingtong changge* 青铜长歌 (Gansu: Gansu renmin chubanshe 甘肃人民出版社, 2015), 78.

¹²⁶ Liu Xuetao and Li Wenying, "Zhongguo zaoqi qingtong wenhua de qi yuan jiqi xiangguan wenti xintan," 60.

¹²⁷ Chen Xiaosan, "Shi lun xiangqian lusongshi paishi de qi yuan," 94-97.

has convex ends and rounded corners. One has small holes for attachment near the two ends and a recessed channel that connects the two small holes (Figure 3.1). It resembles one of the plaques found at Cangbaobao in the recessed channel design across the plaque and the placement of the two small holes for attachment near the two ends.¹²⁸ The other one has four rows of diamond-shaped openwork (Figure 3.2). The diamond-shaped pattern can also be observed on the turquoise-inlaid bronze plaque found at Cangbaobao.¹²⁹ The significant similarities between the plaques found at Tianshanbeilu and Erlitou-type turquoise-inlaid plaques suggest that the plaques from Tianshanbeilu might have served as prototypes for turquoise-inlaid bronze plaques. Such possibility is further enhanced by the strong connection among circular plaques and bronze knives found at Tianshanbeilu, Qijia, and Erlitou.

3. Additional Evidence from Circular Plaques and Knives with Ring-shaped Pommels

In addition to rectangular turquoise-inlaid plaques, four circular turquoise-inlaid plaques have also been recovered at Erlitou. In past studies on turquoise-inlaid plaques at Erlitou, these circular plaques have been generally neglected in the discussion. However, these circular plaques from Erlitou are important evidence for the possibility that attachable bronze plaques of various shapes found at the Tianshanbeilu site had inspired the attachable turquoise-inlaid plaques at Erlitou.

All four circular turquoise-inlaid plaques were found in 1957 when the Erlitou archaeological team was excavating three pits, subsequently named as K3, K4, and K5.¹³⁰ Plaque

¹²⁸ Ibid, 95.

¹²⁹ Ibid.

¹³⁰ Zhongguo shehui kexueyuan kaogu yanjiu suo Erlitou gongzuodui, “Yanshi Erlitou yizhi xin faxian de tongqi he yuqi,” 259.

K3:9 measures 13.3 cm in diameter and has a flat rim and a concave surface (Figure 3.3).¹³¹ The rim of the plaque has two symmetrical holes, and it is inlaid with turquoise.¹³² Plaque K3:16 measures 11.6 cm in diameter and has a slightly convex surface, symmetrical pair of holes on the rim, and turquoise inlays along the rim (Figure 3.4).¹³³ Plaque K3:17 is damaged and slightly smaller than plaque K3:16 (Figure 3.5).¹³⁴ It consists of two sheets of disks attached to each other. Between the two sheets, turquoise inlays were inserted.¹³⁵

Circular bronze plaques are the most popular and characteristic objects in the bronze assemblage at Tianshanbeilu.¹³⁶ In certain burials, circular plaques of various kinds covered the entire body of the tomb occupant.¹³⁷ All three types of circular turquoise-inlaid plaques: 1) plaque with concave surface, flat rim, and symmetrical holes for attachment, 2) plaque with slightly bowed surface and symmetrical pair of holes for attachment, and 3) plaque consisting of two thin disks attached to each other, were found at Tianshanbeilu (Figure 3.6).¹³⁸ The difference is that the circular plaques found at Tianshanbeilu are smaller and do not have turquoise inlays.

Plaque K4:2, found at Erlitou, measures 17 cm in diameter and 0.5 cm in thickness (Figure 2.2.21).¹³⁹ It was cast with two circles of thirteen alternating cross-shaped channels around the center and 61 denticulations along the rim.¹⁴⁰ The cross-shaped cast channels and denticulations together form a design resembling radiating sun rays from the center to the rim. All the cross-shaped channels and the space between two adjacent denticulations are inlaid with

¹³¹ Ibid, 260.

¹³² Ibid.

¹³³ Ibid.

¹³⁴ Ibid.

¹³⁵ Ibid.

¹³⁶ Liu Xuetang and Li Wenyong, "Zhongguo zaoqi qingtong wenhua de qi yuan jiqi xiangguan wenti xintan," 20.

¹³⁷ Ibid.

¹³⁸ Ibid, 21.

¹³⁹ Zhongguo shehui kexueyuan kaogu yanjiu suo Erlitou gongzuodui, "Yanshi Erlitou yizhi xin faxian de tongqi he yuqi," 260.

¹⁴⁰ Ibid.

turquoise. One comparable example is a ritual bronze axe at the Shanghai Museum (Figure 3.7).¹⁴¹ It was cast with round openwork in the center which is surrounded by two circles of cross-shaped cast channels and a circular channel encircling the cross-shaped channels.

Similarly, all the cast channels are inlaid with turquoise.

Plaques with a similar design of lines radiating from the center have also been discovered at Qijia and Tianshanbeilu.¹⁴² The plaque found at the Qijia culture site has two circles of alternating cross-shaped openwork around the center and denticulations along the rim (Figure 3.8). The cross-shaped patterns on both the Erlitou plaque and the Qijia plaque have a shorter horizontal line and a longer vertical line. The plaque found at the Tianshanbeilu cemetery has straight lines radiating from the center to the rim and denticulations around the rim (Figure 3.9). The basic concept in the radiating design is the same as that of the Qijia and Erlitou plaques. The significant similarities among circular plaques at Erlitou and Tianshanbeilu suggest that circular bronze plaques found at Tianshanbeilu may have served as prototypes for the Erlitou turquoise-inlaid circular plaques.

Other objects that were also likely transmitted from the Tianshanbeilu site to the central plain through the link of the Qijia culture are knives with ring-shaped pommels (Figure 3.10). Among all the small implements that were made at the Tianshanbeilu site, knives were the most popular tool.¹⁴³ Several types of knives have been identified at the Tianshanbeilu site, such as a willow-leaf-shaped knife without a cast handle, a long and narrow knife with a curled-up point

¹⁴¹ Zhou Ya 周亚, “Shanghai bowuguan cang xiangqian lusongshi shizhiwen fangyue guan cha” 上海博物馆藏镶嵌绿松石十字纹方钺观察 [Observations on the square *yue* with cross-shaped patterns at Shanghai Museum] in *Erlitou yizhi yu Erlitou wenhua yanjiu: Zhongguo Erlituo yizhi yu Erlitou wenhua guoji xueshu yantaohui lunwenji* 二里遗址与二里头文化研究: 中国二里头遗址与二里头文化国际学术研讨会论文集 [Erlitou site and Erlitou culture: Collected essays from the international symposium on Erlitou site and Erlitou culture], eds. Du Jinpeng 杜金鹏 and Xu Hong 许宏 (Beijing: Kexue chubanshe 科学出版社, 2006), 200.

¹⁴² Liu Xuetao, *Qingtong changge*, 91.

¹⁴³ Liu Xuetao, *Qingtong changge*, 78.

and no handle, a knife with a straight handle, and a knife with a ring-shaped pommel.¹⁴⁴ The knife with a ring-shaped pommel has either a straight blade or a blade with a curled-up point, a handle with geometric designs, and a ring-shaped pommel. Knives of this type have been found in early Bronze Age cultures in a wide range of areas, including the Hexi Corridor region and the Central Plains. One such knife was discovered from Tomb 2 in Zone III at Erlitou in 1980.¹⁴⁵ The knife has a slightly curved blade with its tip slightly curled up and a straight handle with a ring-shaped pommel, distinguishing itself from other types of knives found at Erlitou, and showing a remarkable resemblance to knives of the same type found at Tianshanbeilu. The lack of prototypes for the attachable plaques in local traditions at Erlitou, the popularity of using attachable plaques of various shapes as ornaments at Tianshanbeilu, and the circular bronze plaques and knives with ring-shaped pommels shared by Tianshanbeilu and Erlitou suggest that the attachable plaques of various shapes at Tianshanbeilu are the most likely source of inspiration for turquoise-inlaid plaques at Erlitou, rather than a mere coincidence.

Based on the above analysis, I argued that the turquoise-inlaid bronze plaque was an innovation first made at the Erlitou site based on traditions of different regions. Through combining the neatly trimmed turquoise inlay technique adopted from the lower Yellow River region, and the tradition of making attachable bronze plaques at Tianshanbeilu, Erlitou elites first made turquoise-inlaid plaques to serve their own ritual purposes.

4. The Interaction Sphere Model and Cultural Hegemony

¹⁴⁴ Ibid.

¹⁴⁵ Zhongguo shehui kexueyuan kaogu yanjiusuo Erlitou gongzuodui 中国社会科学院考古研究所二里头工作队, “1980 nian qiu Henan Yanshi Erlitou yizhi fajue jianbao” 1980 年秋河南偃师二里头遗址发掘简报 [A brief archaeological report on excavations at Erlitou in Yanshi, Henan, in autumn 1980], *Kaogu* 03 (1983): 202.

The interaction sphere model was first proposed by Joseph Caldwell in his study on Hopewell societies. His central view in this model was that interaction spheres of various kinds would lead to increases in the rate of innovation.¹⁴⁶ Kwang-Chih Chang first applied this concept to the study of Chinese prehistory, and referred to the broad network of exchange at the elite level that happened around 3000 B.C.E. as the Late Longshan Interaction Sphere. He argued that this interaction sphere was a major contribution to the development of state-level societies.¹⁴⁷ A similar application of this argument was made by Gina Barnes, in which she used the term, “The Yellow Sea Interaction Sphere,” to describe the interaction at the elite level among China, the Korean Peninsula, and the Japanese Archipelago. Barnes argued that participation in this interaction sphere promoted the development of greater sociopolitical complexity as well as state formation in Korea and Japan.¹⁴⁸

The interaction sphere model focuses on the correlation among interaction, innovation, and state formation. The interaction sphere of the Erlitou site and other regions enabled Erlitou culture to draw inspiration from the local traditions of other regions to make innovations. The turquoise-inlaid plaque was such an innovation made by Erlitou elites through rearranging existing traditions of neatly trimmed turquoise inlay technique from the lower Yellow River region, and of making attachable bronze plaques to adorn the body from the Hami basin region.

The cultural hegemony model was proposed by Sarah Allan, in which she argues that an elite culture first emerged at the Erlitou site marked by the practice of using bronzes for ritual purposes and gradually dominated the Chinese continent. She proposes that in ancient times, cultural representations tended to be transmitted from the powerful culture to the less powerful

¹⁴⁶ Joseph R. Caldwell, “Interaction Sphere in Prehistory,” 135-136.

¹⁴⁷ Kwang-Chih Chang, *The Archaeology of Ancient China*, 234.

¹⁴⁸ Gina Barnes, *State Formation in Japan: Emergence of a 4th-Century Ruling Class* (London and New York: Routledge, 2007), 1-4.

cultures more often than the reverse.¹⁴⁹ As a cultural representative of the Erlitou culture, the turquoise-inlaid plaque was imported, probably through gift exchange at the elite level, by certain elites of the Qijia culture to show their connections with a society of higher complexity, and to enhance their own power and prestige in Qijia society. Along with the acquisition of these turquoise-inlaid bronze plaques, there probably also came the symbolic system of the Erlitou society carried by these plaques.

The turquoise-inlaid plaques found in the Sanxingdui cultural context were made with untrimmed turquoise chips of random shapes. Inlaying objects with untrimmed turquoise chips of random shapes was a tradition practiced in the Qijia culture during the Erlitou period. There is also no evidence of any local bronze foundry of this time period that could have supported the production of these plaques.¹⁵⁰ Thus the plaques found in the Sanxingdui culture were most likely made by the Qijia culture imitating the Erlitou turquoise-inlaid plaques with its own turquoise inlay technique. These imitated plaques were probably imported by some Sanxingdui elites as a common strategy for prestige.

In addition to turquoise-inlaid plaques, pottery *he* vessels of the Erlitou culture were also found in the Qijia and Sanxingdui cultures.¹⁵¹ Liu Li proposed that Erlitou *he* vessels were associated with drinking rituals, and that the discoveries of such vessels in the Qijia and Sanxingdui cultures suggested the spread of Erlitou's ritual influence.¹⁵² Another type of object that is associated with the Erlitou site and widely distributed is the VM3:4-type jade *zhang*

¹⁴⁹ Sarah Allan, *Erlitou and the Formation of Chinese Civilization*, 470.

¹⁵⁰ Jay Xu, "Bronze at Sanxingdui." In *Ancient Sichuan: Treasures from a Lost Civilization*, edited by Robert Bagley, 59-60. Seattle, WA and Princeton, NJ: Seattle Art Museum and Princeton University Press, 2001.

¹⁵¹ Louisa Fitzgerald-Huber, "The Qijia Culture: Paths East and West," in *Bulletin of the Museum of Far Eastern Antiquities*, 75 (2003): 68-69.

¹⁵² Liu Li and Chen Xingcan, *The Archaeology of China: From the Late Paleolithic to the Early Bronze Age* (Cambridge: Cambridge University Press, 2012), 331.

forked tablet (*yazhang* 牙璋). Deng Cong argued that the wide distribution and imitation of this type of forked tablet indicated that Erlitou's political influence had reached widely dispersed regions, which was an important marker for the formation of state-level society.¹⁵³ Turquoise-inlaid plaques suddenly fell out of fashion after the fall of the Erlitou state, and never made a comeback in the ritual assemblage of later periods. The practice of wearing bronze objects was commonly associated with groups of the peripheral regions. Perhaps such a practice was considered too foreign to be included in the ritual assemblage of the subsequent Shang dynasty.

¹⁵³ Deng Cong 邓聪 and Wang Fang 王方, "Erlitou yazhang VM3:4 zai nanzhongguo de boji: zhongguo zaoqi guojia zhengzhi zhidu de qiyuan he kuosan" 二里头牙璋 VM3:4 在南中国的波及: 中国早期国家政治制度的起源和扩散 [Spreading of Erlitou *yazhang* (VM3:4) in South China: origin and dispersal of early political states and order in China], *Zhongguo guojia bowuguan guankan* 中国国家博物馆馆刊 5 (2015): 21.

Conclusion: Seeing a Broader Picture of the Proto-Silk-Road

The turquoise-inlaid plaque was an innovation by the Erlitou elites which drew upon the combination of two existing traditions: 1) the neatly trimmed turquoise inlay technique from the low Yellow River Valley region, and 2) the making of attachable bronze plaques of various shapes from the Hami Basin region. Turquoise inlay techniques were first the subject of experimentation in the Dawenkou culture in the lower Yellow River region when small turquoise nodules were inlaid into drilled holes of cylindrical bone tubes or shallow grooves of bone rings with the aid of adhesive. The inlay techniques from the Dawenkou culture were adopted by local groups to adorn jade objects in the lower Yellow River Valley region during the Longshan period. The contemporaneous technique of inlaying small neatly trimmed rectangular turquoise tesserae to perishable materials with the aid of adhesive to make ornaments was the source of knowledge for subsequent Erlitou artisans.

Before and during the Erlitou period, attachable bronze plaques of various shapes were the most popular bronze items among the elites of Tianshanbeilu in the Hami Basin. Circular plaques of various designs are the most common types there, and they were the most likely models for circular turquoise-inlaid plaques found at Erlitou. Another type of item that demonstrates Tianshanbeilu inspiration is the bronze knife with ring-shaped pommel found both

at Tianshanbeilu and Erlitou. Even though rectangular plaques are only a small percentage of plaques at Tianshanbeilu, the strong connection between the circular plaques of Tianshanbeilu and Erlitou suggests that the rectangular plaques of Tianshanbeilu might have served as prototypes for the turquoise-inlaid plaques at Erlitou.

Combining the neatly trimmed turquoise inlay technique from the lower Yellow River Valley region and the tradition of making attachable bronze plaques from the Hami basin region, Erlitou elites first made turquoise-inlaid plaques to serve the ritual purposes of their society. As representatives of the elite culture of a more complex society, turquoise-inlaid plaques, together with other ritual objects such as pottery *he* vessels and forked jade tablets, were acquired by certain elites of the Qijia culture to enhance their status. Turquoise-inlaid plaques found at Sanxingdui were most likely acquired from the Qijia culture. The spread and imitation of the elite culture of Erlitou society was a significant marker of the formative stage of a shared belief system.

The elite culture of Erlitou society made use of highly sophisticated bronze technology. Before the development of piece-mold casting technology at the Erlitou site, metalworking technologies had been widely practiced in Northwest China, particularly in the context of the Tianshanbeilu, Siba, and Qijia sites. The earlier development of metallurgy in Northwest China, lack of experimentation stages in developing metallurgy in the Central Plains, and metal objects at Erlitou have led many scholars to believe that the rise of metallurgy in the Central Plains was stimulated by contacts with early bronze cultures in Northwest China and the Eurasian steppe.

In 1995, Louisa Fitzgerald-Huber proposed the hypothesis that the beginning of the Bronze Age in China was associated with metal objects and metallurgical skills that were introduced to the borderlands of Northwestern China by Seima-Turbino and Andronovo groups

through long-distance cultural transmission.¹⁵⁴ As more archaeological discoveries of metal objects in Northwest China were made, and scientific studies on these metal objects were undertaken, the connection between early Bronze Age cultures and distant cultures of the Eurasian steppe proposed by Fitzgerald-Huber has become much clearer. Scholars have pointed out that many Qijia metal forms, such as the socketed axe, socketed spearhead with hook, and back-curved knife, closely resemble those from the Seima-Turbino complex, and that the common use of arsenical bronze also suggests connection with Seima-Turbino and Andronovo cultures.¹⁵⁵ It is still not clear whether contacts with distant cultures of the Eurasia steppe played a pivotal role in the beginning of metallurgy in Northwest China and the Central Plains. However, the proto-Silk-Road was clearly in operation, enabling the societies of Northwestern China to have been in early contact with cultures farther to the north and west in the Eurasian steppe and the Central Plains.

¹⁵⁴ Louisa Fitzgerald-Huber, "Qijia and Erlitou: The Question of Contacts with Distant Cultures," *Early China* 20 (1995): 17-68.

¹⁵⁵ Mei Jianjun, "Qijia and Seima-Turbino: The Question of Early Contacts between Northwest China and the Eurasian Steppe," *Bulletin of the Museum of Far Eastern Antiquities*, 75 (2013): 36-37.

Illustrations



Figure 1.1.1 Turquoise-inlaid bronze plaque M4:5 from Tomb 4 at Erlitou (Wang Qing, “Shenmide xiasai yibao,” Fig. 1).



Figure 1.2 Turquoise-inlaid bronze plaque M11:7 from Tomb 11 at Erlitou (Wang Qing, “Shenmide xiasai yibao,” Fig. 2).



Figure 1.1.3 Turquoise-inlaid bronze plaque M57:4 from Tomb 57 at Erlitou (Wang Qing, “Shenmide xiasai yibao,” Fig. 2)



Figure 1.1.4 Turquoise “dragon” from Tomb 3 at Erlitou
(Erlitou gongzuodui, “Henan Yanshi Erlitou yizhi zhongxinqu de kaogu xin faxian,” Pl. 5).

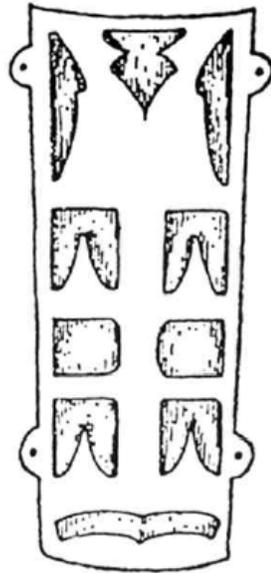


Figure 1.1.5 Turquoise-inlaid bronze plaque from pit at Gaopian
(Wang Qing, “Shenmide xiasai yibao,” Fig. 6).



Figure 1.1.6 Turquoise-inlaid bronze plaque from pit at Cangbaobao (Wang Qing, “Shenmide xiasai yibao,” Fig. 4).

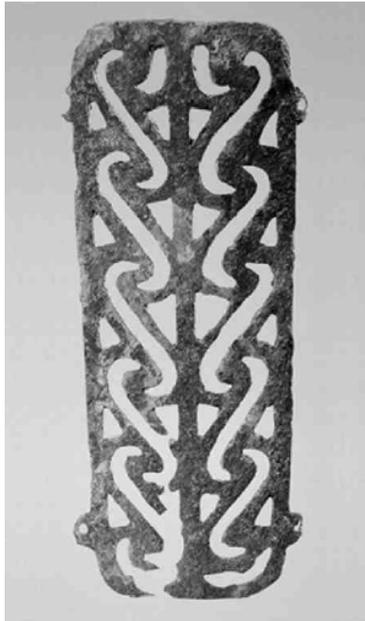


Figure 1.1.7 Bronze plaque from pit at Cangbaobao (Wang Qing, “Shenmide xiasai yibao,” Fig. 5).

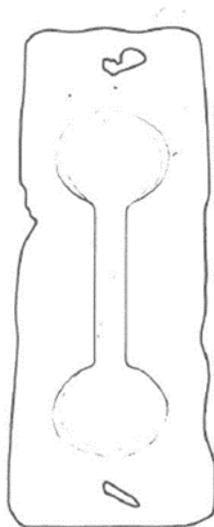


Figure 1.1.8 Bronze plaque from pit at Cangbaobao
(Chen Xiaosan, “Shi lun xiangqian lusongshi paishi de qi yuan,” Fig. 5.4).



Figure 1.1.9 Turquoise tesserae from Qijiaping
(Yi Hua, *Qijia huaxia shuo*, Pl. 2).



Figure 1.1.10 Bronze plaque from Qijiaping
(Yi Hua, Qijia huaxia shuo, Pl. 1).

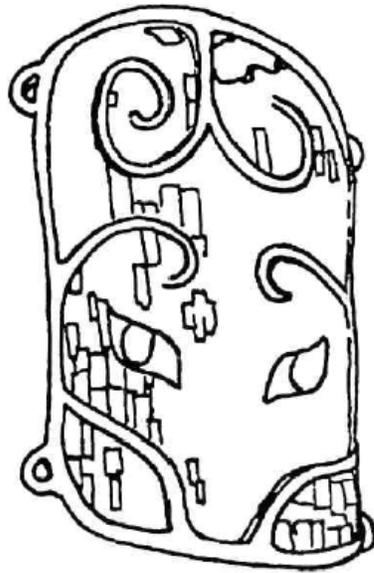


Figure 1.1.11 Turquoise-inlaid bronze plaque at Tianshui Museum
(Wang Qing, "Shenmide xiasai yibao," Fig. 7).

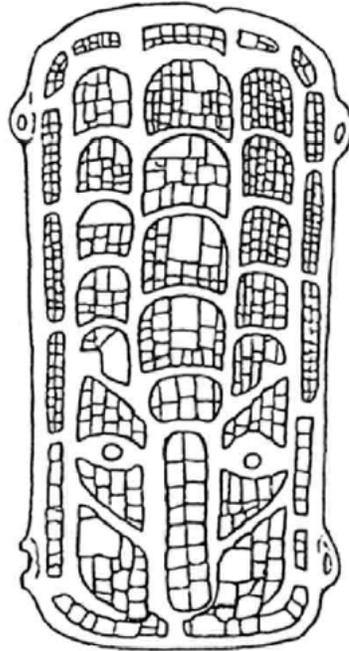


Figure 1.2.1 Turquoise-inlaid plaque at Miho Museum in Japan
(Wang Qing, "Shenmide xiasai yibao," Fig. 14).

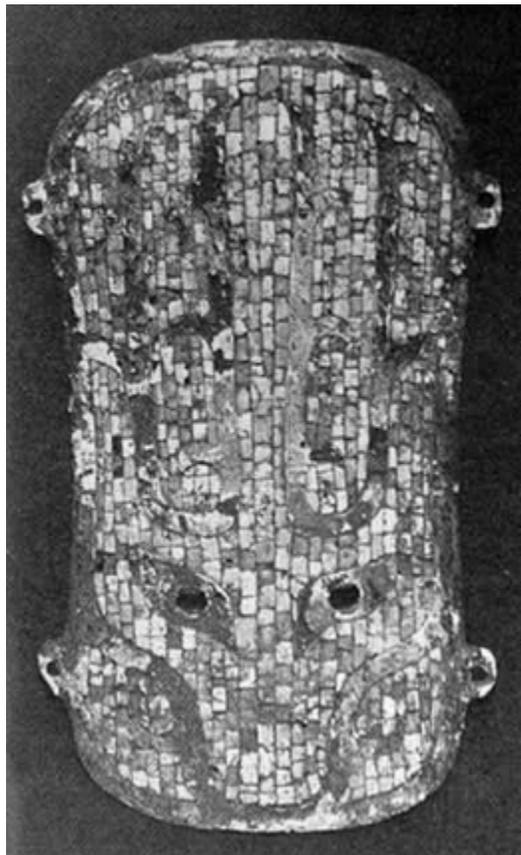


Figure 1.2.2 Turquoise-inlaid bronze plaque at the Honolulu Museum of Art, USA

(Wang Qing, “Shenmide xiasai yibao,” Fig. 12).



Figure 1.2.3 Turquoise-inlaid bronze plaque at Freer and Sackler Galleries, USA
(Wang Qing, “Shenmide xiasai yibao,” Fig. 11).

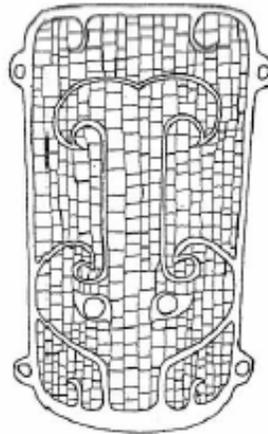


Figure 1.2.4 Turquoise-inlaid bronze plaque at Freer and Sackler Galleries, USA
(Chen Xiaosan, “Shi lun xiangqian lusongshi paishi de qiyan,” Fig. 4.3).

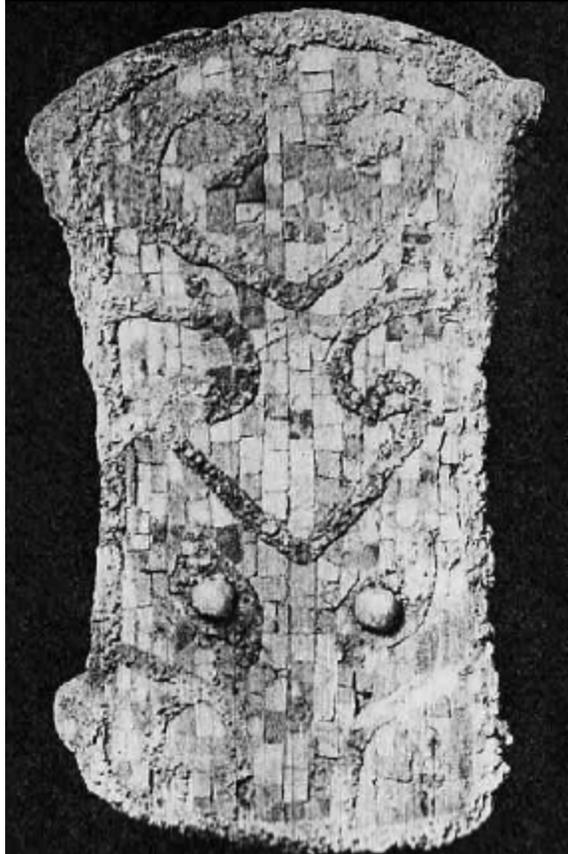


Figure 1.2.5 Turquoise-inlaid bronze plaque at Arthur M. Sackler Museum, Harvard (Wang Qing, “Shenmide xiasai yibao,” Fig. 9).



Figure 1.2.6 Fabric impression on the back of turquoise-inlaid bronze plaque (Photo on Harvard Art Museum website).



Figure 1.2.7 Turquoise-inlaid bronze plaque at Arthur M. Sackler Museum, Harvard (Wang Qing, "Shenmide xiasai yibao," Fig. 8).

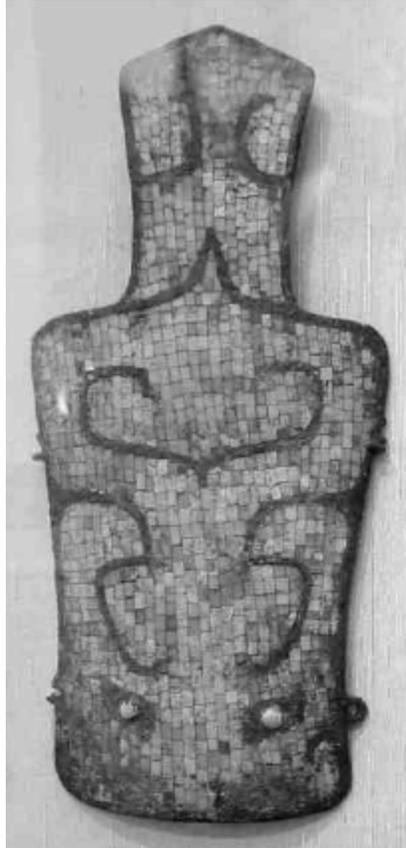


Figure 1.2.8 Turquoise-inlaid bronze plaque at Arthur M. Sackler Museum, Harvard (Wang Qing, "Shenmide xiasai yibao," Fig. 10).

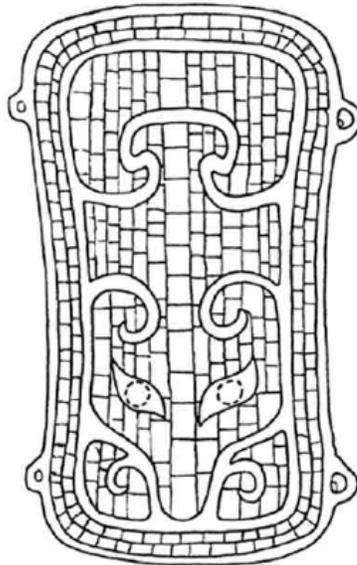


Figure 1.3.1 Turquoise-inlaid bronze plaque displayed in an exhibition in London organized by Eskenaki in 1991 (Wang Qing, "Shenmide xiasai yibao," Fig. 13).

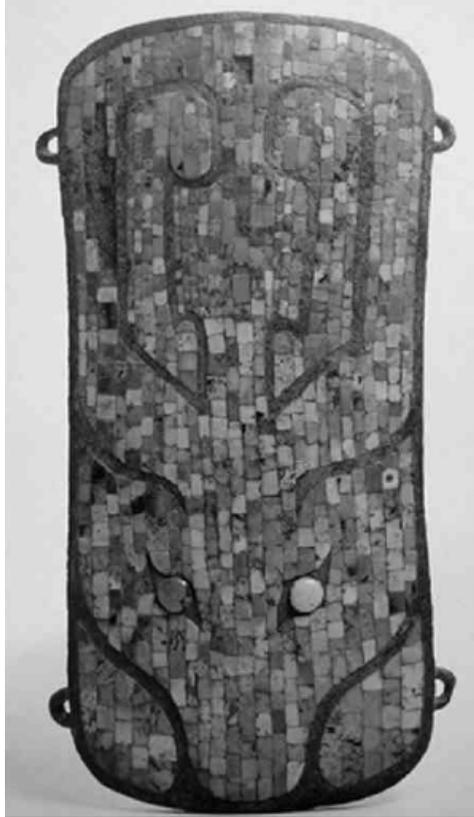


Figure 1.3.2 Turquoise-inlaid plaque displayed in an exhibition held in New York organized by Eskenazi in 1999 (Wang Qing, “Shenmide xiasai yibao,” Fig. 15).

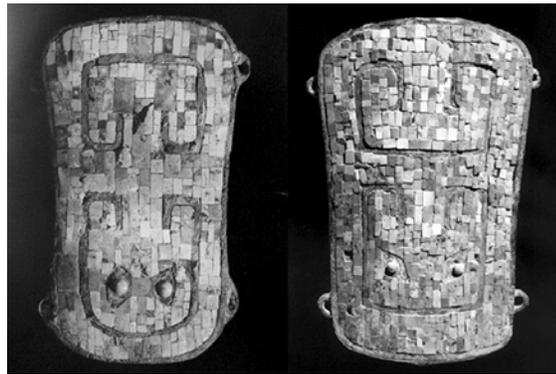


Figure 1.3.3 Turquoise-inlaid bronze plaque displayed in exhibitions in New York (Wang Qing, “Niuyue Xinjian liangjian xiangqian tongpaishi bianwei,”).

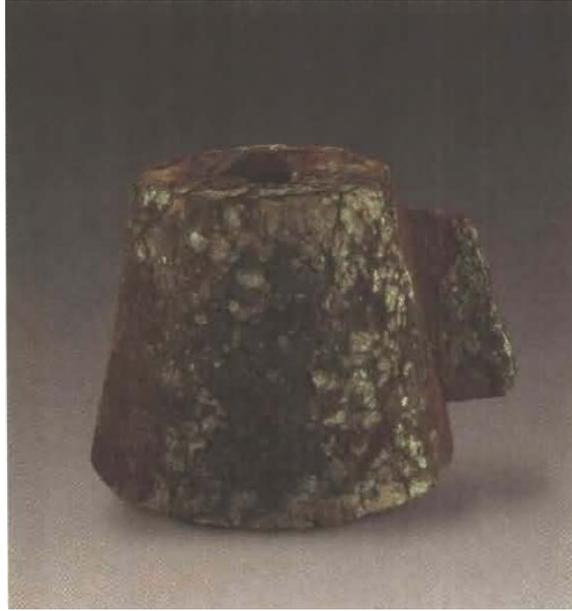


Figure 1.4.1 Bronze bell with traces of fabric at Erlitou
(Xu Hong, *Da du wu cheng*, 139.).



Figure 2.1.1 Stone hammer at the ancient turquoise mine site at Luonan in Shannxi
(Beijing keji daxue yejin yu cailiaoshi yanjiusuo and Shanxisheng kaogu yanjiusuo,
“Shanxi Luonan Hekou lusongshikuang yizhi diaocha baogao,” Fig. 12).



Figure 2.1.2 Stone corbel and stone hammer at Luonan turquoise mine in Shanxi (Xian Yiheng, “Shanxi luonan Laziya caikuang yizhi ji zhoubian lusongshi chanyuan tezheng yanjiu,” Fig. 3.62).

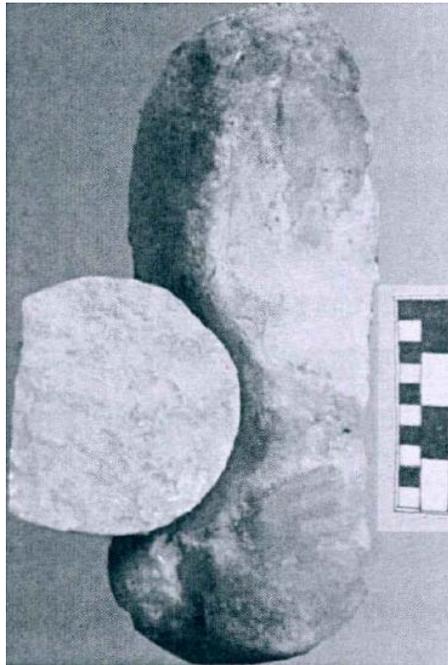


Figure 2.1.3 Grindstone and stone hammer at Luonan turquoise mine in Shanxi (Xian Yiheng, “Shanxi luonan Laziya caikuang yizhi ji zhoubian lusongshi chanyuan tezheng yanjiu,” Fig. 3.64).



Figure 2.1.4 Stone debris with blasting marks at Luonan turquoise mine in Shanxi (Xian Yiheng, “Shanxi luonan Laziya caikuang yizhi ji zhoubian lusongshi chanyuan tezheng yanjiu,” Fig. 3.76).

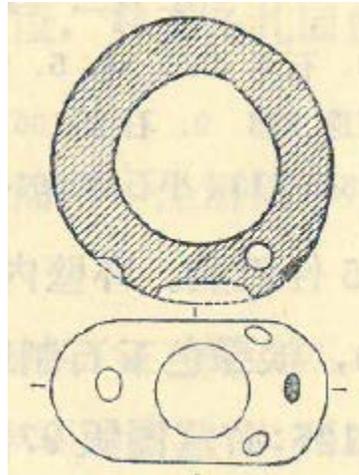


Figure 2.2.1 Bone finger ring M22:10 from Tomb 22 at Dawenkou (Shandongsheng wenwu guanlichu and Ji'nanshi bowuguan, *Dawenkou: xinshiqi shidai muzang fajue baogao*, Fig. 84.4).



Figure 2.2.2 Turquoise-inlaid bone tube M4:10 from Tomb 4 at Dawenkou (Shandongsheng wenwu guanlichu and Ji'nanshi bowuguan, *Dawenkou: xinshiqi shidai muzang fajue baogao*, Pl. 91).



Figure 2.2.3 Turquoise-inlaid bone tube M62:47 from Tomb 62 at Yedian (Shandongsheng bowuguan and Shandongsheng wenwu kaogu yanjiusuo, *Zouxian Yedian*, Pl. 74.5).



Figure 2.2.4 Jade axe with turquoise inlaid from Dantu in Shandong (Gu Fang, *Shandong juan* vol. 4, *Zhongguo chutu yuqi quanqi*, P. 25).



Figure 2.2.5 Bone hairpin and jade decorative plaque M202:1 and M202:2 with turquoise inlay from Tomb 202 at Zhufeng (Zhongguo shenhui kexueyuan kaogu yanjiusuo Shandong gongzuo dui, "Shandong Linqi Zhufeng longshan wenhua muzang," Pl. 2.2).

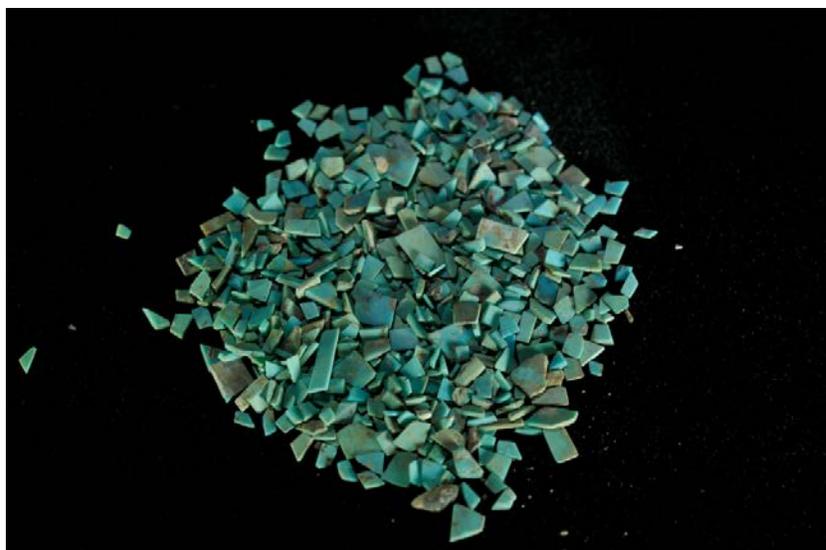


Figure 2.2.6 turquoise pieces from Tomb 202 at Zhufeng, Shandong
(Photo by Ye Xiaohong).

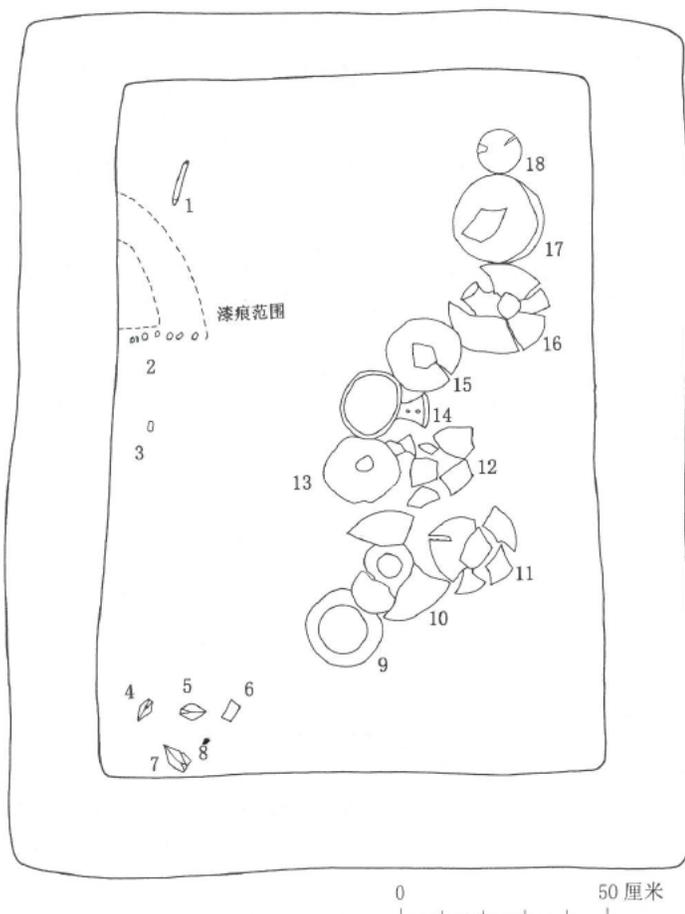


Figure 2.2.7 Remains of a lacquerware M52:2 with turquoise inlay from Tomb 52 at
Haichuan
(Zhejiangsheng wenwu kaogu yanjiusuo and Suichangxian wenwu guanli weiyuanhui,
Haichuan mudi, Fig. 172).



1. 出土情况



2. 室内清刷后的情形

Figure 2.2.8 Lacquer cup M8:1 with pyrophyllite inlay from Tomb 8 at Haochuan (Zhejiangsheng wenwu kaogu yanjiusuo and Suichangxian wenwu guanli weiyuanhui, *Haochuan mudu*, Pl. 28).



1. 玉锥形器 M39:1 (一)、漆器 M39:2 (一) 出土情况

Figure 2.2.9 Lacquer cup M39:2 with pyrophyllite inlay from Tomb 39 at Haochuan (Zhejiangsheng wenwu kaogu yanjiusuo and Suichangxian wenwu guanli weiyuanhui, *Haochuan mudu*, Pl. 29.1).



Figure 2.2.10 Lacquer cup M1:1 inlaid with jade from Tomb 1 at Haochuan
(Zhejiangsheng wenwu kaogu yanjiusuo and Suichangxian wenwu guanli weiyuanhui,
Haochuan mudi, Pl.).



Figure 2.2.11 Lacquer cup M60:2 inlaid with jade from Tomb 60 at Haochuan
(Zhejiangsheng wenwu kaogu yanjiusuo and Suichangxian wenwu guanli weiyuanhui,
Haochuan mudi, Pl. 30).

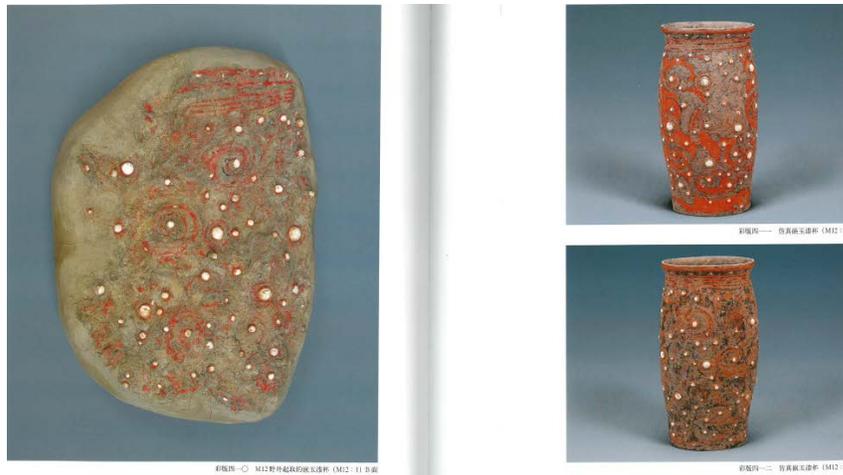


Figure 2.2.12 Lacquer pitcher M12:1 inlaid with jade from Tomb 12 at Fanshan (Zhejiangsheng wenwu kaogu yanjiusuo, *Fanshan*, Pls. 410, 411, and 412).

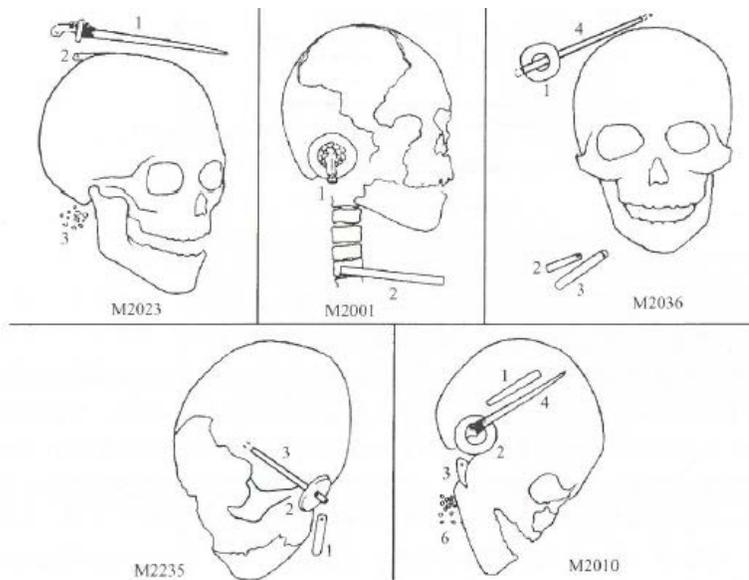


Figure 2.2.13 Lacquer disk M12:12 inlaid with jade from Tomb 12 at Fanshan (Zhejiangsheng wenwu kaogu yanjiusuo, *Fanshan*, Pl. 413).



彩图164. 嵌玉漆器出土情况

Figure 2.2.14 Lacquer disk M7:155 inlaid with jade from Tomb 7 at Yaoshan (Zhejiangsheng wenwu kaogu yanjiusuo, *Yaoshan*, Pl. 164).



图一 组合头饰出土位置示意图

Figure 2.2.15 Turquoise-inlaid hairpin at Taosi (Gao Wei, “Longshan shidai yugu zuhe toushi de fuyuan yanjiu,” Fig. 1).



Figure 2.2.16 Turquoise-inlaid wrist ornament M76:1 at Xiajin
(Xiajin Kaogudui, “Shanxi Linfen Xiajin mudi fajue jianbao,” Pl. 3.2).

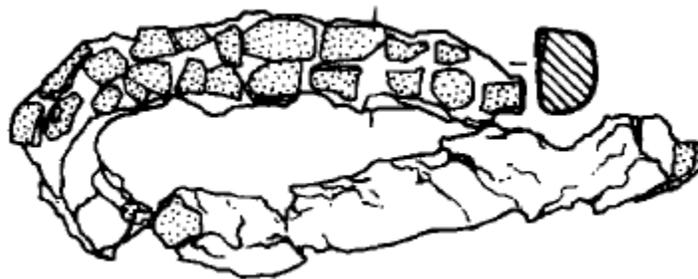
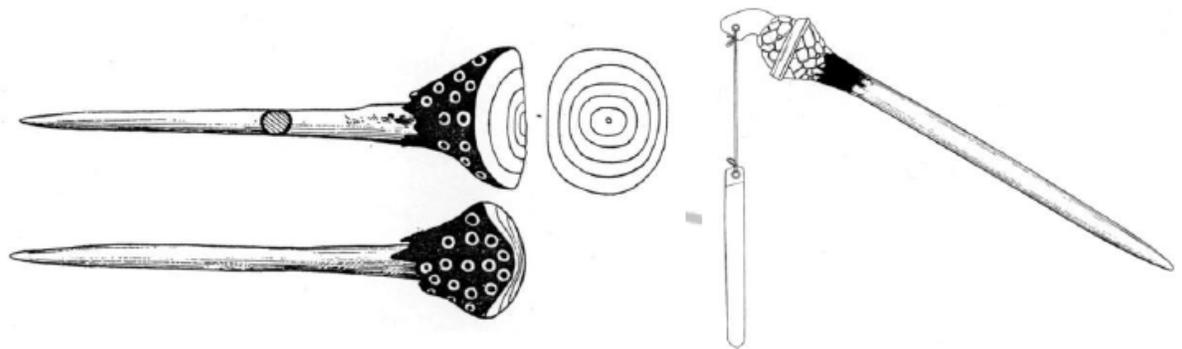


Figure 2.2.17 Turquoise-inlaid wrist ornament M136:1 at Xiajin
(Xiajin Kaogudui, “Shanxi Linfen Xiajin mudi fajue jianbao,” Fig. 18).



Figure 2.2.18 turquoise-inlaid wrist ornament at Zongri
 (Ge Sangben and Chen Honghai, *Zongri yizhi: wenwu jingcui ji lunshu xuanji*, P. 15).



2.2.19 (Left:) Bone hairpin inlaid with bone tubes from Yuanyangchi
 (Right:) Bone hairpin inlaid with turquoise from Taosi
 Zhang Zhichao, “Xinshiqi shidai zhi erlitou shiqi xiangqian zhuangshi yu sheji xitong zhi fazhan,” Figs. 2.47 and 2.48).



Figure 2.2.20 Pottery jar M27:1 with grooves intended for turquoise inlay from M27 at Yuanyangchi
(Gansusheng bowuguan wenwu gongzuodui and Wuwei diqu wenwu puchadui 武威地区文物普查队, “Gansu Yongchang Yuanyangchi xinshiqi shidai mudi,” Pl. 12.1).

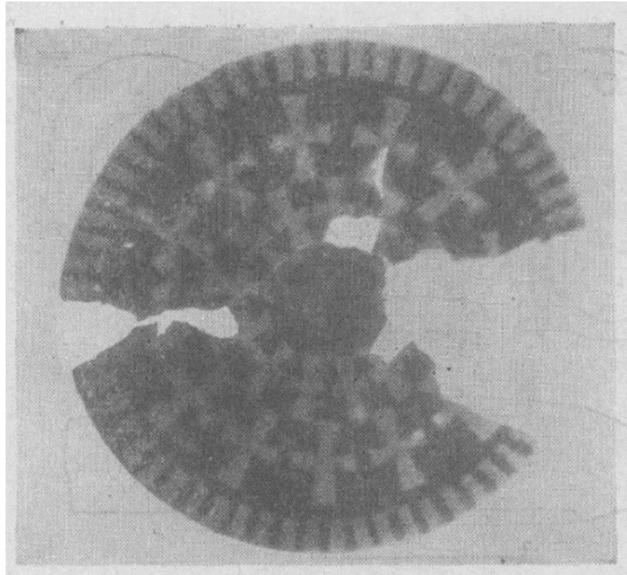


Figure 2.2.21 Turquoise-inlaid bronze plaque KM3 from Pit 4 at Erlitou
(Zhongguo shehui kexueyuan kaogu yanjiu suo Erlitou gongzuodui, “Yanshi Erlitou yizhi xin faxian de tongqi he yuqi,” Fig. 5).

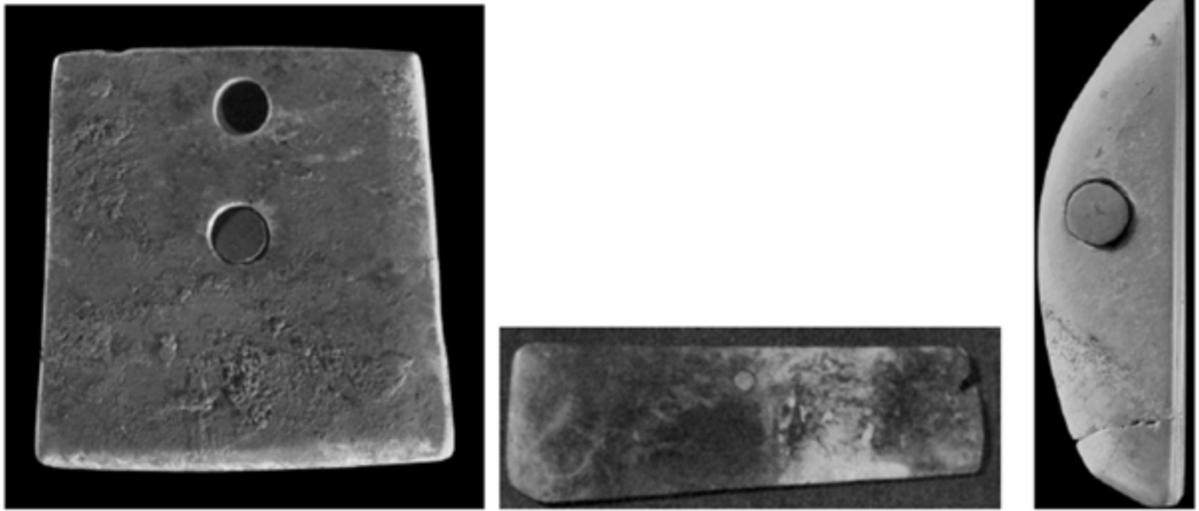


Figure 2.2.22 Turquoise-inlaid jade objects at Erlitou
Zhang Zhichao, “Xinshiqi shidai zhi erlitou shiqi xiangqian zhuangshi yu sheji xitong zhi fazhan,” Figs. 3.2.1, 3.2.2, and 3.2.3).



Figure 2.2.23 Pottery jar inlaid with turquoise at Huoshaogou in Gansu
Guansusheng bowuguan, *Gansu sichouzhilu wenming*, Fig. 13).

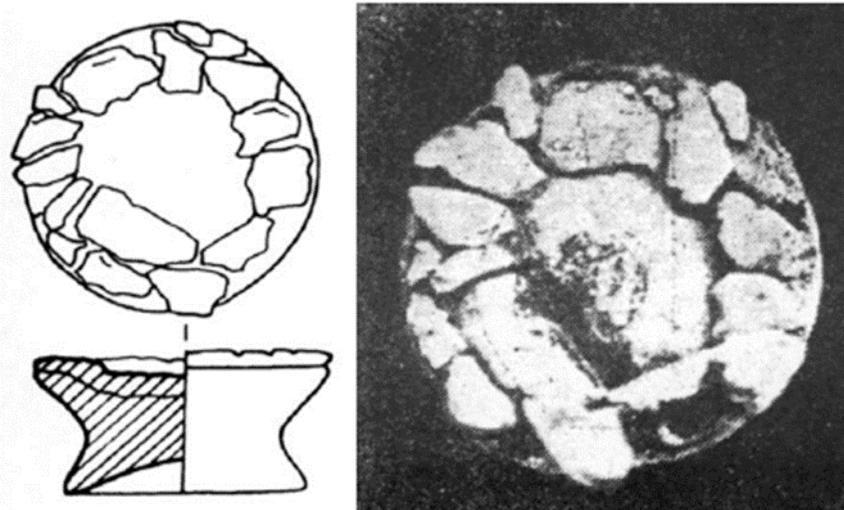


Figure 2.2.24 Turquoise-inlaid pottery objects M2:7 and M1:10 at Dianhe in Ningxia (Ningxia wenwu kaogu yanjiusuo, “Ningxia Guyuan Dianhe qijia wenhua muzang qingli jianbao,” Figs. 8.7 and 7.2).

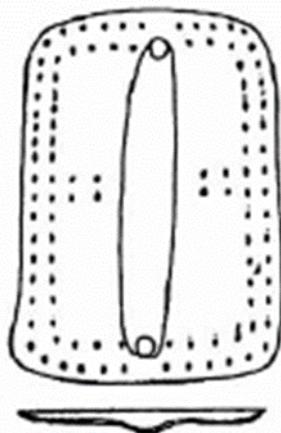


Figure 3.1 Bronze plaque at Tianshanbeilu in Xinjiang (Chen Xiaosan, “Shi lun xiangqian lusongshi paishi de qiyuan,” Fig. 6.1).



Figure 3.2 Bronze plaque at Tianshanbeilu in Xinjiang (Liu Xuetao, "Qijia tongqi dong cheng xi jie," P. 41).

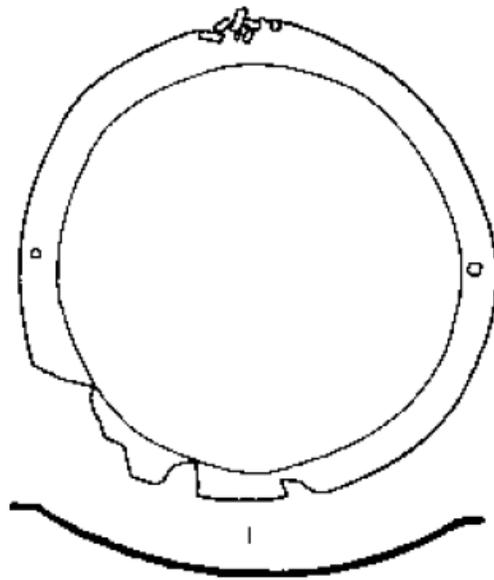


Figure 3.3 Bronze plaque inlaid K3:9 with turquoise from Pit 3 at Erlitou (Chen Guoliang, "Erlitou wenhua tongqi yanjiu," Fig. 7.3).



Figure 3.4 Bronze plaque K3:17 with turquoise inlay from Pit 3 at Erlitou
(Chen Guoliang, "Erlitou wenhua tongqi yanjiu," Fig. 7.4).

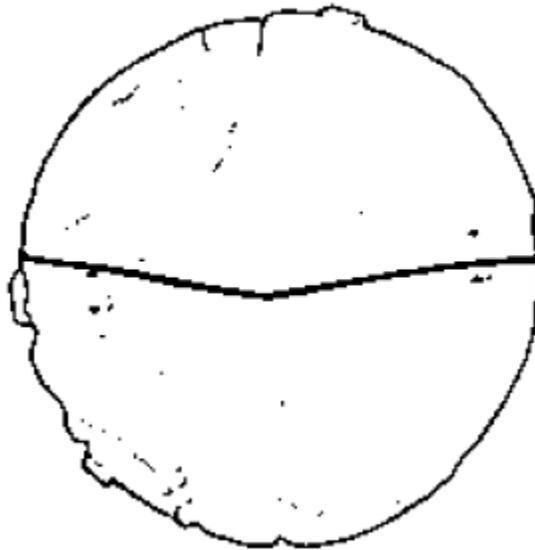


Figure 3.5 Bronze plaque k3:16 with turquoise inlay from Pit 3 at Erlitou
(Chen Guoliang, "Erlitou wenhua tongqi yanjiu," Fig. 7.2).

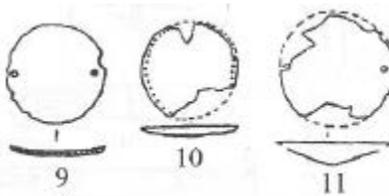


Figure 3.6 Bronze plaques at Tianshanbeilu in Xinjiang
(Liu Xuetao and Li Wenying, "Zhongguo zaoqi qingtong wenhua de qi yuan jiqi xiangguan wenti xintan," Figs. 7.9, 7.10, and 7.11).

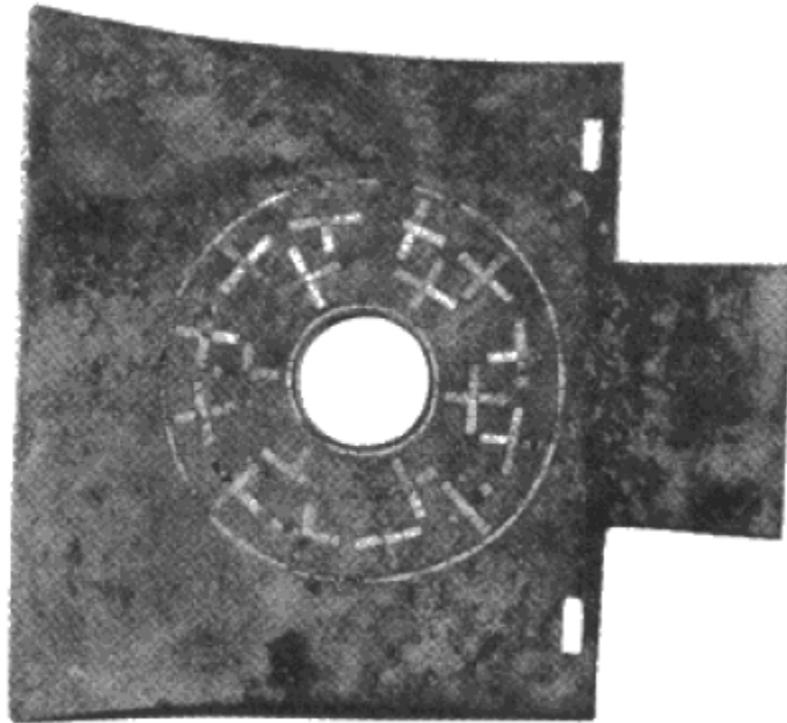


Figure 3.7 Bronze axe inlaid with turquoise at Shanghai Museum (Zhou Ya, "Shanghai bowuguan cang xiangqian lusongshi shiziwen fangyue guan cha," Fig. 1).



Figure 3.8 Bronze plaque of Qijia culture (Liu Xuetao, "Qijia tongqi dong cheng xi jie," P. 39).



Figure 3.9 Bronze plaque at Tianshanbeilu in Xinjiang (Liu Xuetao, "Qijia tongqi dong cheng xi jie," P. 40).

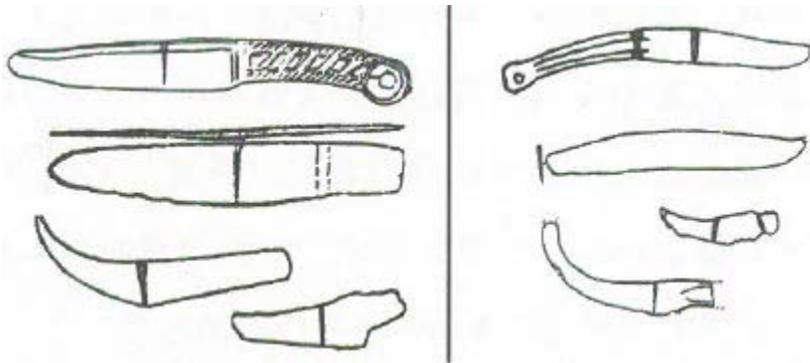


Figure 3.10 (Left:) Bronze knives at Erlitou
(Right:) Bronze Knives at Tianshanbeilu
(Liu Xuetao, *Caitao yu qingtong de duihua*, P. 164).

Bibliography

- Allan, Sarah. "Erlitou and the Formation of Chinese Civilization: Toward a New Paradigm." *The Journal of Asian Studies* 66:2 (2007), 461-496.
- Allan, Sarah. "The Taotie Motif on Early Chinese Ritual Bronze." in *The Zoomorphic Imagination in Chinese Art and Culture*, edited by Jerome Silbergeld and Eugene Wang, 21-66. Honolulu: University of Hawai'i Press, 2016.
- An Jiayuan 安家瑗. "Zhongguo zaoqi de tongling" 中国早期的铜铃 [Bronze bells in early China]. *Zhongguo lishi bowuguan guankan* 中国历史博物馆馆刊 00 (1987): 35-38.
- Ao Tianzhao 敖天照. "Guanghan Gaopian chutu shangdai yuqi de buzheng" 广汉高骊出土商代玉器的补正 [Supplementation and correction on the jade objects of the Shang period unearthed at Gaopian, Guanghan] in *Sanxingdui yanjiu: diyiji tianye ziliao* 三星堆研究: 第一辑田野资料 [Research on Sanxingdui: volume one field reports], edited by Sanxingdui yanjiuyuan 三星堆研究院 and Sanxingdui bowuguan 三星堆博物馆, 127-131. Chengdu: Sichuan chubanshe 四川出版集团天地出版社, 2006.
- Barnes, Gina. *State Formation in Japan: Emergence of a 4th-Century Ruling Class*. London and New York: Routledge, 2007.
- Beijing keji daxue yejin yu cailiaoshi yanjiusuo 北京科技大学与材料史研究所 and Shanxisheng kaogu yanjiusuo 陕西省考古研究所. "Shanxi Luonan Hekou lusongshikuang yizhi diaocha baogao" 陕西洛南河口绿松石矿遗址调查报告 [Survey report on Hekou turquoise mine site at Luonan in Shaanxi]. *Kaogu yu wenwu* 考古与文物 3 (2016): 11-17.
- Caldwell, Joseph. "Interaction Spheres in Prehistory." in *Hopewellian Studies*, edited by Joseph Caldwell and Robert Hall, 135-156. Springfield: Illinois State Museum, 1964.
- Chang Kwang-chih. *The Archaeology of Ancient China*. New Haven and London: Yale University Press, 1986.
- Chen Guoliang 陈国梁. "Erlitou wenhua tongqi yanjiu" 二里头文化铜器研究 [Research on Erlitou bronze objects] in *Zhongguo zaoqi qingtong wenhua: Erlitou wenhua zhuanqi yanjiu* 中国早期青铜文化: 二里头文化专题研究 [Early bronze cultures in China: monographic research on the Erlitou culture], edited by Zhongguo shehui kexueyuan kaogu yanjiusuo 中国社会科学院考古研究所, 124-274. Beijing: Kexue chubanshe 科学出版社, 2008.

- Chen Xiaosan 陈小三. “Shi lun xiangqian lusongshi paishi de qiyuan” 试论镶嵌绿松石牌饰的起源 [Discussion on the origin of turquoise-inlaid plaques]. *Kaogu yu wenwu* 考古与文物 5 (2013): 91-100.
- Deng Cong 邓聪 and Wang Fang 王方. “Erlitou yazhang VM3:4 zai nanzhongguo de boji: zhongguo zaoqi guojia zhengzhi zhidu de qiyuan he kuosan” 二里头牙璋 VM3:4 在南中国的波及: 中国早期国家政治制度的起源和扩散 [Spreading of Erlitou yazhang (VM3:4) in South China: origin and dispersal of early political states and order in China]. *Zhongguo guojia bowuguan guankan* 中国国家博物馆馆刊 5 (2015): 6-22.
- Du Jinpeng 杜金鹏. “Guanghan Sanxingdui chutu shangdai tongpai qianshuo” 广汉三星堆出土商代铜牌浅说 [Brief discussion on the bronze plaques of the Shang dynasty excavated at the Sanxingdui site in Guanghan]. *Zhongguo wenwu bao* 中国文物报 April 9 (1995): n.p.
- Eskenazi. *Ancient Chinese Bronzes and Ceramics*. London: Eskenazi, 1999.
- Eskenazi. *Inlaid Bronze and Related Material from Pre-Tang China*. London: Eskenazi, 1991.
- Falkenhausen, Lothar. *Suspended Music: Chime-Bells in the Culture of Bronze Age China*. Berkeley: University of Berkeley Press, 1993.
- Fitzgerald-Huber, Louisa. “Qijia and Erlitou: The Question of Contacts with Distant Cultures.” *Early China* 20 (1995): 17-68.
- Fitzgerald-Huber, Louisa. “The Qijia Culture: Paths East and West,” *Bulletin of the Museum of Far Eastern Antiquities*, 75 (2003): 55-78.
- Gansusheng bowuguan wenwu gongzuodui 甘肃省博物馆文物工作队 and Wuwei diqu wenwu puchadui 武威地区文物普查队. “Gansu Yongchang Yuanyangchi xinshiqi shidai mudi” 甘肃永昌鸳鸯池新石器时代墓地 [Cemetery of the Neolithic period at Yuanyangchi in Yongchang County, Gansu]. *Kaogu* 2 (1982): 199-227.
- Gao Wei 高炜. “Longshan shidai yugu zuhe toushi de fuyuan yanjiu” 龙山时代玉骨组合头饰的复原研究 [Study on the reconstruction of the head ornaments made of jade and bone of the Longshan period] in *Xiangfang Taosi yizhi yanjiu* 襄汾陶寺遗址研究 [Studies on the Taosi site in Xiangfeng] edited by Xie Xigong 解希恭, 478-488. Beijing: Kexue chuanbanshe 科学出版社, 2007.
- Ge Sangben 格桑本 and Chen Honghai 陈洪海. *Zongri yizhi: wenwu jingcui ji lunshu xuanji* 宗日遗址: 文物精粹及论述选集 [Zongri site: treasures and selection of essays]. Chengdu: Sichuan kexue jishu chubanshe 四川科学技术出版社, 1999.

- Gu Fang 古方. *Shandong juan* 山东卷 vol. 4, *Zhongguo chutu yuqi quanqi* 中国出土玉器全集 [The complete collection of unearthened jade in China]. Beijing: Kexuchubanshe 科学出版社, 2005.
- Guansusheng bowuguan 甘肃省博物馆. *Gansu sichouzhilu wenming* 甘肃丝绸之路文明 [Civilizations along the Silk Road in Gansu]. Beijing: Kexue chubanshe 科学出版社, 2008.
- Jacobsen, Robert. “Inlaid Bronzes of Pre-Imperial China: A Classic Tradition and Its Later Revivals.” PhD Diss., University of Minnesota, 1984.
- Johann Gunnar Andersson, *Researches Into the Prehistory of the Chinese*. Stockholm: Museum of Far Eastern Antiquities, 1943.
- Pogue, Joseph. *The Turquois: A Study of Its History, Mineralogy, Geology, Ethnology, Archaeology, Mythology, Folklore, and Technology*. Glorietta, New Mexico. Originally published 1915, *Memoirs of the National Academy of Sciences Vol.XII, Part II*, Washington D.C. 1974.
- Li Liu and Xingcan Chen. *The Archaeology of China: From the Late Paleolithic to the Early Bronze Age*. Cambridge: Cambridge University Press, 2012.
- Li Shuicheng. “The Interaction between Northwest China and Central Asia during the Second Millennium BC: An Archaeological Perspective.” in *Ancient Interactions: East and West in Eurasia*, edited by Katie Boyle, Colin Renfrew and Marsha Levine, 171-182. Cambridge, UK: McDonald Institute for Archaeological Research, 2002.
- Li Xueqin 李学勤. “Cong yijian xin cailiao kan Guanghan tongpaishi” 从一件新材料看广汉铜牌饰 [Observation on the bronze plaques excavated at Guanghan through a new material]. *Zhongguo wenwu bao* 中国文物报 November 30 (1997): n.p.
- Li Zhipeng 李志鹏. Erlitou wenhua muzang yanjiu 二里头文化墓葬研究 [Research on the burials of Erlitou culture] in *Zhongguo zaoqi qingtong wenhua: Erlitou wenhua zhuanji yanjiu* 中国早期青铜文化: 二里头文化专题研究 [Early Chinese bronze cultures: studies on Erlitou culture], edited by Zhongguo shehui kexueyuan kaogu yanjiusuo 中国社会科学院考古研究所, 1-123. Beijing: Kexue chubanshe 科学出版社, 2008.
- Liu Xuetang 刘学堂 and Li Wenying 李文瑛. “Zhongguo zaoqi qingtong wenhua de qi yuan jiqi xiangguan wenti xintan” 中国早期青铜文化的起源及其相关问题新探 [New investigation on origins of early bronze cultures in China and relevant issues] in *Zangxue xuekan* (di san ji) 藏学学刊 (第3辑) [Journal of Tibetology (volume 3)], edited by Sichuan

- daxue zhongguo zangxue yanjiusuo 四川大学中国藏学研究所, 1-63. Chengdu: Sichuan daxue chubanshe 四川大学出版社, 2007.
- Liu Xuetao 刘学堂. *Qingtong changge* 青铜长歌. Gansu: Gansu renmin chubanshe 甘肃人民出版社, 2015.
- Loehr, Max. *Relics of Ancient China from the Collection of Dr. Paul Singer*. New York: Asia Society, 1965.
- Luan Bing'ao 栾秉璈. "Gudai lusongshi shiming, shiqian chutuwu fenbu tezheng ji yuanliao lai yuan wenti" 古代绿松石释名, 史前出土物分布特征及原料来源问题 [Questions on interpretation of names of turquoise in ancient China, characteristics of distribution of unearthened turquoise objects, and sources of raw materials] in *Haixia liangai guyuxue huiyi lunwen zhuanji* 海峡两岸古玉学会议论文集, 531-536. Taipei: National Taiwan University Press, 2001.
- Mei Jianjun. "Qijia and Seima-Turbino: The Question of Early Contacts between Northwest China and the Eurasian Steppe," *Bulletin of the Museum of Far Eastern Antiquities*, 75 (2013): 31-54.
- Ningxia wenwu kaogu yanjiusuo 宁夏文物考古研究所. Ningxia Guyuan Dianhe qijia wenhua muzang qingli jianbao 宁夏固原店河齐家文化墓葬清理简报 [Report on the excavation of tombs of the Qijia culture at Dianhe in Guyuan county, Ningxia]. *Kaogu* 考古 8 (1987): 673-677.
- Pang Xiaoxia 庞小霞. "Zhongguo chutu xinshiqi shidai lusongshiqi yanjiu" 中国出土新石器时代绿松石器研究 [A study on turquoise objects unearthened in the Neolithic period]. *Kaogu xuebao* 考古学报 2 (2014): 139-168.
- Poor, Robert. *Ancient Chinese Bronze, Ceramics and Jade in the Collection of the Honolulu Academy of Arts*. Honolulu: Honolulu Academy of Arts, 1979.
- Qin Xiaoli. "Turquoise Ornaments and Inlay Technology in Ancient China." *Asian Perspectives* 55.2 (2016): 208-239.
- Renfrew, Colin and Bahn, Paul. *Archaeology: Theories, Methods, and Practice*. New York: Thames and Hudson, 2008.
- Renfrew, Colin. "Introduction: Peer Polity Interaction and Socio-political Change." in *Peer Polity Interaction and Socio-political Change*, edited by Colin Renfrew and John Cherry, 1-18. New York: Cambridge University Press, 1986.

- Shandongsheng bowuguan 山东省博物馆 and Shandongsheng wenwu kaogu yanjiusuo 山东省文物考古研究所. *Zouxian Yedian* 邹县野店. Beijing: Wenwu chubanshe 文物出版社, 1985.
- Shandongsheng wenwu guanlichu 山东省文物管理处 and Ji'nanshi bowuguan 济南市博物馆. *Dawenkou: xinshiqi shidai muzang fajue baogao* 大汶口: 新石器时代墓葬发掘报告 [Dawenkou: report on excavations of burials in the Neolithic period]. Beijing: wenwu chubanshe 文物出版社, 1974.
- Shelach-Lavi, Gideon. *The Archaeology of Early China: From Prehistory to the Han Dynasty*. Cambridge: Cambridge University Press, 2015.
- Sichuan sheng wenwu kaogu yanjiusuo Sanxingdui gongzuozhan 四川省文物考古研究所三星堆工作站 and Guanghan shi wenwu guanlisuo 广汉市文物管理所. “Sanxingdui yizhi Zhenwu Cangbaobao jishiken diaocha jianbao” 三星堆遗址真武仓包包祭祀坑调查简报 [A brief report on the sacrificial pit at Cangbaobao of Zhenwu village at Sanxingdui Site] in *Sichuan kaogu baogao ji* 四川考古报告集 [Compilation of archaeological reports of Sichuan], edited by Sichuan sheng wenwu kaogu yanjiusuo 四川省文物考古研究所, 78-90. Beijing: Wenwu chubanshe, 文物出版社, 1998.
- Thorp, Robert. *China in the Early Bronze Age: Shang Civilization*. Philadelphia: University of Pennsylvania Press, 2006.
- Wallerstein, Immanuel. *The Modern World-System: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*. New York and London: Academic Press, 1974.
- Wang Qiang 王强. “Shi lun shiqian yushiqi xiangqian gongyi” 试论史前玉石器镶嵌工艺 [Attempted discussion on prehistoric jade inlay techniques]. *Nanfang wenwu* 南方文物 3 (2008): 85-91.
- Wang Qing 王青, “Xianqian tongpaishi de yuyi zhu wenti zai yanjiu” 镶嵌铜牌饰的寓意诸问题再研究 [A second study on the implied meaning of inlaid bronze plaques]. *Dongfang kaogu* 东方考古 9 (2012): 224.
- Wang Qing 王青. “Ji baoluo xinge yisheng suocang dierjian xiangqian tongpaishi” 记保罗辛格医生所藏第二件镶嵌铜牌饰 [Recording the second plaque collected by Dr. Paul Singer]. *Zhongguo wenwebao* 中国文物报 September 17 (2010): n.p.

- Wang Qing 王青. “Niuyue Xinjian liangjian xiangqian tongpaishi bianwei” 纽约新见两镶嵌铜牌饰辨伪 [On the authenticity of two inlaid bronze plaques newly seen in New York]. *Zhongguo wenwubao* 中国文物报 February 16 (2007): n.p.
- Wang Qing 王青. “Shenmi de xiandai yibao: xiangqian tongpaishi” 神秘的夏代遗宝: 镶嵌铜牌饰 [Mysterious treasure from the Xia dynasty: inlaid bronze plaques]. *Xungen* 寻根 02 (2005): 84-88.
- Wang Qing 王青. “Xizhufeng longshan wenhua damu shenhui shiwen de fuyuan yanjiu” 西朱封龙山文化大墓神徽饰纹的复原研究 [Research on the reconstruction of the deity decoration found in tomb of Longshan culture at Xizhufeng] in *Liu Dunyuan xiansheng jinian wenji* 刘敦愿先生纪念文集 [Memorial essays on Liu Duyuan], edited by Shandong daxue kaogu xuexi 山东大学考古学系, 171-181. Ji'nan: Shandong daxue chubanshe 山东大学出版社, 2000.
- Wilson, Keith. “The Singer Collection.” *Orientation* 7 (2012), 58-59.
- Xiajin Kaogudui 下靳考古队. “Shanxi Linfen Xiajin mudi fajue jianbao” 山西临汾下靳墓地发掘简报 [A brief report on the excavation of Xiajin cemetery at Linfen in Shanxi]. *Kaogu* 12 (1998): 4-13.
- Xian Yiheng 先怡衡. “Shanxi luonan Laziya caikuang yizhi ji zhoubian lusongshi chanyuan tezheng yanjiu” 陕西洛南辣子崖采矿遗址及周边绿松石产源特征研究 [Studies on the characteristics of geographical origin of turquoise from the Laziya mine sites in Luonan, Shanxi province and the surrounding mine areas]. PhD Diss. University of Science and Technology Beijing, 2016.
- Xu Xusheng 徐旭生. “1959 nian xia yuxi diaocha xiaxu de chubu baogao” 1959年夏豫西调查夏墟的初步报告 [Preliminary report on the investigation of Ruin of Xia in western Henan region]. *Kaogu* 考古 11 (1959): 592-600.
- Xu, Jay. “Bronze at Sanxingdui.” in *Ancient Sichuan: Treasures from a Lost Civilization*, edited by Robert Bagley, 59-151. Seattle, WA and Princeton, NJ: Seattle Art Museum and Princeton University Press, 2001.
- Ye Shuxian 叶舒宪. “Zhonghua wenming tanyuan de renleixue shijiao: yi Erlitou yu Sanxingdui tongling tongpai de minzuzhi jiedu weili” 中华文明探源的人类学视角: 以二里头与三星堆铜铃铜牌为例的民族志解读为例 [Anthropological perspective on the origin of Chinese civilization: a case study on bronze bells and plaques of Erlitou and Sanxingdui]. *wenyi yanjiu* 文艺研究 07 (2006): 125-136.

- Yi Hua 易华. *Qijia huaxia shuo* 齐家华夏说 [Talking about Qijia as Huaxia culture]. Lanzhou, Gansu renmin chubanshe, 2015.
- Yun Xiang 云翔. “Shilun shiren guqi” 试论石刃骨器 [Discussion on bone-handled stone blade tools]. *Kaogu* 考古 9 (1988): 825-835.
- Zhang Tian'en 张天恩. “Tianshui chutu de shoumian tongpaishi ji youguan wenti” 天水出土的兽面铜牌及有关问题 [Bronze plaque with animal mask unearthed at Tianshui and its relevant questions]. *Zhongyuan wenwu* 中原文物 1 (2002): 43-46.
- Zhang Zhichao 张智超. “Xinshiqi shidai zhi erlitou shiqi xiangqian zhuangshi yu sheji xitong zhi fazhan” 新石器时代至二里头文化时期镶嵌装饰与设计系统之发展 [The development of the inlay design system from the Neolithic age to the Erlitou culture period]. Master's Thesis, Tainan National University of the Arts, 2010.
- Zhao Dianzeng 赵殿增. “Sanxingdui yu Erlitou tongpaishi yanjiu” 三星队与二里头铜牌饰研究 [Research on the bronze plaques from Sanxingdui and Erlitou] in *Yinshang wenming ji jinian Sanxingdui yizhi faxian qishi zhounian guoji xueshu yantaohui lunwenji* 殷商文明暨纪念三星堆遗址发现七十周年国际学术研讨会论文集及 [Collected essays presented at the international conference commemorating the 70th anniversary of the discovery of the Sanxingdui site], edited by Song Zhenhao 宋镇豪 and Xiao Xianjin 肖先进, 90-94. Beijing: Shehui kexue chubanshe 社会科学出版社, 2003.
- Zhejiangsheng wenwu kaogu yanjiusuo 浙江省文物考古研究所 and Suichangxian wenwu guanli weiyuanhui 遂昌县文物管理委员会. *Haochuan mudi* 好川墓地 [Haochuan cemetery]. Beijing: Wenwu chubanshe 文物出版社, 2001.
- Zhejiangsheng wenwu kaogu yanjiusuo 浙江省文物考古研究所. *Fanshan* 反山, (Beijing: Wenwu chubanshe 文物出版社, 2005.
- Zhejiangsheng wenwu kaogu yanjiusuo 浙江省文物考古研究所. *Yaoshan* 瑶山. Beijing: Wenwu chubanshe 文物出版社, 2003.
- Zhongguo kexuyuan kaogu yanjiusuo Luaoyang fajuedui 中国科学院考古研究所洛阳发掘队. “1959 nian Henan Yanshi Erlitou shijue jianbao” 1959年河南偃师二里头试掘简报 [A brief report on the test excavations of the Erlitou site in Yanshi, Henan]. *Kaogu* 考古 2 (1961): 81-85.
- Zhongguo shehui kexueyuan kaogu yanjiu suo Erlitou gongzuodui 中国社会科学院考古研究所二里头工作队. “Yanshi Erlitou yizhi xin faxian de tongqi he yuqi” 偃师二里头遗址新发

现的铜器和玉器 [New discoveries of bronze and jade objects at Erlitou in Yanshi]. *Kaogu* 考古 04 (1976): 259-263.

Zhongguo shehui kexueyuan kaogu yanjiusuo Erlitou gongzuodui 中国社会科学院考古研究所二里头工作队. “Henan Yanshi Erlitou yizhi zhongxinqu de kaogu xin faxian” 河南偃师二里头遗址中心区的考古新发现 [New discoveries from excavations in the central area of Erlitou of Yanshi in Henan]. *Kaogu* 考古 07 (2005): 15-20.

Zhongguo shehui kexueyuan kaogu yanjiusuo Erlitou gongzuodui 中国社会科学院考古研究所二里头工作队. “1981nian Henan Yanshi Erlitou muzang fajue jianbao” 1981年河南偃师二里头墓葬发掘简报 [A brief report on the excavation of tombs at Erlitou in Yanshi of Henan in 1981]. *Kaogu* 考古 1 (1984): 37-40.

Zhongguo shehui kexueyuan kaogu yanjiusuo Erlitou gongzuodui 中国社会科学院考古研究所二里头工作队. “1984nian qiu Henan Yanshi Erlitou yizhi faxian de jizuo muzang” 1984年秋河南偃师二里头遗址发现的几座墓葬 [Several tombs found at Erlitou in Yanshi of Henan in 1984]. *Kaogu* 考古 4 (1986): 318-323.

Zhongguo shehui kexueyuan kaogu yanjiusuo Erlitou gongzuodui 中国社会科学院考古研究所二里头工作队. “1987 nian Yanshi Erlitou yizhi muzang fajue jianbao” 偃师二里头遗址墓葬发掘简报 [A brief report on the excavation of tombs at Erlitou in Yanshi of Henan in 1987]. *Kaogu* 考古 4 (1992): 294.

Zhongguo shehui kexueyuan kaogu yanjiusuo Erlitou gongzuodui 中国社会科学院考古研究所二里头工作队. “1980 nian qiu Henan Yanshi Erlitou yizhi fajue jianbao” 1980年秋河南偃师二里头遗址发掘简报 [A brief archaeological report on excavations at Erlitou in Yanshi, Henan, in 1980 autumn]. *Kaogu* 03 (1983): 199-205.

Zhongguo shehui kexueyuan kaogu yanjiusuo 中国社会科学院考古研究所. *Erlitou: 1999-2006* 二里头: 1999-2006. Beijing: Wenwu chubanshe, 2014.

Zhongguo shehui kexueyuan kaogu yanjiusuo 中国社会科学院考古研究所. *Yanshi Erlitou: 1959 nian-1978 nian kaogu fajue baogao* 偃师二里头: 1959年-1978年考古发掘报告 [The Erlitou site in Yanshi: Excavations in 1959-1978]. Beijing: Zhongguo dabaikequanshu chubanshe, 1999.

Zhongguo shehui kexueyuan kaogu yanjiusuo Shandong gongzuodui 中国社会科学院考古研究所山东工作队. “Shandong Linqu Zhufeng longshan wenhua muzang” 山东临朐朱封龙山文化墓葬 [Tombs of the Longshan culture at Zhufeng in Linqu, Shandong]. *Kaogu* 考古, 7 (1990): 587-591.

Zhongmei liangcheng diqu lianhe kaogudui 中美两城地区联合考古队. “Shandong Rizhaoshi Liangchengzhen yizhi 1998-2001 nian fajue jianbao” 山东日照市两城镇遗址 1998-2001 年发掘简报 [Report on the excavations of the Liangchengzhen site in Rizhao County, Shandong from 1998 to 2001]. *Kaogu* 考古 9 (2004): 7-18.

Zhou Ya 周亚. “Shanghai bowuguan cang xiangqian lusongshi shizhiwen fangyue guancha” 上海博物馆藏镶嵌绿松石十字纹方钺观察 [Observation on the square yue with cross-shaped patterns at Shanghai Museum] in *Erlitou yizhi yu Erlitou wenhua yanjiu: Zhongguo Erlitou yizhi yu Erlitou wenhua guoji xueshu yantaohui lunwenji* 二里遗址与二里头文化研究: 中国二里头遗址与二里头文化国际学术研讨会论文集 [Erlitou site and Erlitou culture: Collected essays from the international symposium on Erlitou site and Erlitou culture], edited by Du Jinpeng 杜金鹏 and Xu Hong 许宏, 200-204. Beijing: Kexue chubanshe 科学出版社, 2006.