Exploring the Lower Xiajiadian in Northeast China (ca. 2000-1300 BC)

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Abstract

This thesis investigates the Lower Xiajiadian culture (ca. 2000-1300 BC) in northeast China, with a focus on two major questions: first, what were the principal cultural features of the Lower Xiajiadian culture; second, how did it emerge in China's northern borderland. Three groups of archaeological materials are analyzed and presented: the settlement data from excavated Lower Xiajiadian sites and regional surveys in northeast China, the burial evidence from the Dadianzi cemetery, and the material remain in the Chinese Central Plains of the same period.

It argues that the Lower Xiajiadian's cultural distinctiveness reveals strong local characteristics as well as many features that can be attributed to the Yellow River area in the south and the Eurasian steppe to the north and west. These include the introduction of mudbrick constructions, lime-floor plastering, stone buildings, bronze metallurgy, animal husbandry, and tripod vessel types of the 3rd millennium BC. It is also revealed from the mortuary data at Dadianzi that the status manifestations of the Lower Xiajiadian society were structured to emphasize a higher value on foreign artifacts than local grave goods in northeast China. Overall, a wide range of new materials, technologies, and activities were brought into the Lower Xiajiadian area after 2000 BC and were employed in a local fashion that was different from other contemporary borderland communities. With benefits from contacts with a variety of regions, what we see from the Lower Xiajiadian archaeological records is a society that was deeply engaged with its southern predecessor—Longshan, as well as in contact with cultural entities in the north and west.

Table of Contents

LIST OF ILLUSTRATIONS 4

LIST OF TABLES 14

CHAPTER ONE: INTRODUCTION 15

1.1 Subject Matter 15
1.2 Research Area: Landscape and Climate 23
1.3 Archaeological Landscape of China's Late Neolithic and Early Bronze Age 26
1.3.1 "Longshan Culture" and the "Longshan Period" 26
1.3.2 The Rise of Erlitou 31
1.4 Thesis Structure 43

CHAPTER TWO: LITERATURE REVIEW 45

2.1 Research History of the Lower Xiajiadian Culture 45
2.2 Major Topics in Past Research 49
2.2.1 Chronology and Pottery Typology 49
2.2.2 Settlement Pattern and Social Organization 50
2.2.3 Research Work on the Dadianzi Cemetery 57
2.3 Chapter Summary 63

CHAPTER THREE: SETTLEMENTS OF THE LOWER XIAJIADIAN CULTURE 64

3.1 Settlement Distribution 64
3.2 Site Classification and Relative Chronology 68
3.3 Radiocarbon Dates 70
3.4 Habitation Sites and Settlement Patterns 78
3.4.1 Type A: Low-Platform Settlements 78
3.4.2 Type B: High Hillforts 103
3.4.3 Type C: Hill-Slope Sites 124
3.5 Lower Xiajiadian Occupation: Site Function and Evidence of Subsistence Economy 127
3.5.1 Climatic Conditions 131
3.5.2 Millet Cultivation 133

3.5.3 Site Functions *140*

3.5.4 Animal Resourses *144*

3.6 Chapter Summary **152**

CHAPTER FOUR: AN ANALYSIS OF THE DADIANZI CEMETERY **154**

4.1 The Layout and Chronology of the Dadianzi Site **156**

4.2 Organization of the Cemetery **158**

4.3 How Social Differences were Manifested at the Dadianzi Cemetery **161**

4.3.1 Theoretical Backgound *161*

4.3.2 Grave Types and Constructions *166*

4.3.3 Grave Sizes *171*

4.3.4 Grave Goods in the Niche *176*

4.3.5 Grave Goods in the Chamber *200*

4.3.6 Dadianzi Ritual: Animals in the Fill *228*

4.3.7 Sex Differences *231*

4.4 Chapter Summary **239**

CHAPTER FIVE: LOWER XIAJIADIAN IN CONTEXT **240**

5.1 The Widespread Use of Hollow-foot Tripods in Northern China **240**

5.2 A Pottery Perspective: New Elements in the Lower Xiajiadian Assemblage **258**

5.3 Contributors to Lower Xiajiadian: The Push from the South **264**

5.3.1 Hydrological Change and its Profound Influence on Northeast China *265*

5.3.2 Shifts in the Course of the Yellow River *270*

5.3.3 Hougang Phase II and the Lower Xiajiadian *273*

5.4 Contact as seen from Pottery and Metals **283**

5.4.1 Erlitou-style Tripods from Dadianzi *283*

5.4.2 Early Penetration of Metal Objects into Northeast China *292*

5.5 The Band of Northern Settlements: Shared Stone Constructions in China's Frontier **311**

5.5.1 Huge Increase of Archaeological Sites *311*

5.5.2 Shimao, Bicun and Their Stone Constructions *314*

5.6 Chapter Summary **328**

CHAPTER SIX: DISCUSSION **330**

I. New Features in Residential Structures **331**

II. A Burial System Exhibited Strong Local Features and Placed High Values to Foreign Items 336
III. Material Culture and Cross-Regional Links 340

CHAPTER SEVEN: FINAL REMARKS..... 345

BIBLIOGRAPHY..... 349

APPENDIX..... 373

List of Illustrations

Figure 1.1 Map of major Neolithic centers, the crescent-shaped borderland and northeast China (the Lower Xiajiadian).
Figure 1.2 Map of Northeast China.
Figure 1.3A Examples of painted ceramics from the Dadianzi cemetery (after Color plate 1-17 of IA CASS 1996).
Figure 1.3B Lower Xiajiadian ceramic assemblage from the Sanzuodian site (after Color plate 6 of Neimenggu Wenwu Kaogu Yanjiusuo 2007).
Figure 1.4 Stone tool assemblage from Fengxia site in western Liaoning (after Figure 8 of Liaoningsheng Wenwu Ganbu Peixunban 1976).
Figure 1.5 Examples of the metal objects of the Lower Xiajiadian culture (1-4: excavated from Dadianzi cemetery, after plate 56 of IA CASS 1996; 5-7: excavated from Kangjiatun site, photo by author in the Liaoning Provincial Museum; 8-9: excavated from Erdaojingzi site, after Figure 1 and 2 of Wang, Y. L. et al. 2013).
Figure 1.6 Major weather systems affecting the climatic conditions in China (after Figure 1 of Yi, S. 2011).
Figure 1.7 Map of annual precipitation (mm) averages in China (after Figure 5 of Shelach, G. 2015).
Figure 1.8 Map showing pronounced north-eastern shift in archaeological site densities in northern China between (a) ca. 2350 BC and (b) ca. 1750 BC (after Figure 7 of Hosner, D. et al. 2016).
Figure 1.9 Egg-shell pottery from Shandong Longshan culture sites (1: excavated from Dafanzhuang site, after Figure 56 of Shandongsheng Bowuguan 2004;2 and 3: excavated from Liangchengzhen site, photo by author in the Shandong Provincial Museum; 4: excavated from Yinjiacheng site, photo by author in the Shandong University Museum; 5: excavated from Liangchengzhen site, after Figure 50 of Shandongsheng Bowuguan 2004; 6 and 7: excavated from Yaoguanzhuang site, after Figure 52 and 53 of Shandongsheng Bowuguan 2004).
Figure 1.10 Map showing the Shandong peninsula, Longshan type cultures (ca. 2600-1900 BC) in the middle reach of the Yellow River (dotted circles), and the location of sites associated with Longshan remain mentioned in this thesis. (Calibrated dates for Keshengzhuang II, see Appendix I; Taosi, see Appendix II; Wangwan III, see Appendix III; Hougang II, see Appendix IV).
Figure 1.11 Plan of the Taosi site and location of cemeteries (after Figure 7.6 of Liu, L. and Chen, X. C. 2012).
Figure 1.12 Map showing the location of Erlitou site (after Color Plate 1 of IA CASS 2015).
Figure 1.13 Distribution of the Erlitou culture sites (after Figure 15.1 of Xu, H. 2013).
Figure 1.14 Palace foundations at the Erlitou site (after Figure 15.2 of Xu, H. 2013). Foundations 1, 2, 4, 7–9 were built in Phase III and used until Phase IV. Foundations 6, 10–11 were built in Phase IV.
Figure 1.15 Plan of foundation No. 1 at the Erlitou site (after Figure 6-3-1-2A of IA CASS 2014).

Figure 1.16 Plan of the Erlitou site and location of archaeological features (after Figure 8.5 of Liu, L. and Chen, X. C. 2012)
Figure 1.17 Examples of metal artifacts of Phase I-III from the Erlitou site (1 and 2: Phase I, after Plate 3.1 and 3.2 of IA CASS 1999; 3-6: Phase II, after Plate 28.6-8 and 62.11 of IA CASS 1999; 7-15: Phase III, after Plate 77, 78 and 123.2 of IA CASS 1999).
Figure 1.18 Cast bronze vessels from Phase IV of the Erlitou site (after Figure 1, 7, 13 and 19 of Zhongguo Qingtongqi Quanji Bianji Weiyuanhui 1998, volume 1).
Figure 1.19 Plan of tomb No.2002VM3 (after Figure 6-4-3-4-1B of IA CASS 2014).
Figure 1.20 A turquoise mosaic in dragon-serpent shape excavated from tomb No.2002VM3 (after Color Plate 120 of IA CASS 2014).
Figure 3.1 Distribution of major Lower Xiajiadian sites (Blue symbols stand for mud-brick sites and red symbols for stone constructed sites). 1: Xidachuan; 2: Fengxia; 3: Luoguodi; 4: Redianchang; 5: Shuiquan; 6: Kalaqin Hedong; 7: Xianlingsi; 8: Xiaoyushulinzi; 9: Xidalizi; 10: Nanpaozigou; 11: Dongshanzui; 12: Erdaojingzi; 13: Dashanqian; 14: Dadianzi; 15: Kangjiatun; 16: Pingdingshan; 17: Chengzishan; 18: Kangjiawan; 19: Sanzuodian; 20: Dongbajia; 21:Shangjifangyingzi; 22: Yantaishan; 23: Zhizhushan; 24: Xindian; 25: Yinjiadian.
Figure 3.2 Evidence of stones being used in constructing residential walls at Erdaojingzi (photo by author).
Figure 3.3a. Radiocarbon dates for the Lower Xiajiadian culture (data source in Table 3.2).
Figure 3.3b. Modeled start and end date probability, and summary dates of Type A and Type B settlements.
Figure 3.3c. Modeled start and end dates of Type A and Type B sites.
Figure 3.4a Plan of house F1 at the Dongshanzui site (after Figure 3 of Liaoningsheng Bowuguan 1983a).
Figure 3.4b Plan of house F2 at the Dongshanzui site (after Figure 4 of Liaoningsheng Bowuguan 1983a).
Figure 3.5 Plan of house F86 at the Dashanqian site (after Figure 3 of IA CASS 2004).
Figure 3.6 Plan of house F5 at the Dongshanzui site (after Figure 5 of Liaoningsheng Bowuguan 1983a).
Figure 3.7 Plan of house F5 at the Fengxia site (after Figure 5 of Liaoningsheng Wenwu Ganbu Peixunban 1976).
Figure 3.8a Erdaojingzi site before excavation (photo by the author at the Erdaojingzi Museum).
Figure 3.8b Erdaojingzi site during excavation (after Color Plate 5-1 of Neimenggu Wenwu Kaogu Yanjiusuo 2010).
Figure 3.9 Section view of the Erdaojingzi moat (after Color Plate 6-3 of Neimenggu Wenwu Kaogu Yanjiusuo 2010).
Figure 3.10 Remains of mudbricks on the Erdaojingzi wall (photo by author).
Figure 3.11 Remains of Erdaojingzi houses (photo by author).
Figure 3.12 Sizes of reported Erdaojingzi houses.
Figure 3.13 Subdivision of courtyard at Erdaojingzi (photo by author).
Figure 3.14 a, b Plan of house Unit 3 at Erdaojingzi (after Figure 4 and Color Plate 6-2 of Neimenggu Wenwu Kaogu Yanjiusuo 2010).

Figure 3.14c Remains of silt paints at house Unit 3 (photo by author).
Figure 3.15 Overview of house no. 8, Erdaojingzi (photo by the author at the Erdaojingzi Museum).
Figure 3.16 The surviving inner wall of house no. 8, Erdaojingzi (photo by the author at the Erdaojingzi Museum).
Figure 3.17 Plan of house no. 54 at Erdaojingzi (after Figure 5 of Neimenggu Wenwu Kaogu Yanjiusuo 2010).
Figure 3.18 Comparison of house sizes at Type A locations.
Figure 3.19 Remains of mudbricks at Erdaojingzi (photo by author).
Figure 3.20 Mud-brick walls of F34 at Dahecun site (after Figure 143.2 of Zhengzhoushi Wenwu Kaogu Yanjiusuo 2001).
Figure 3.21 Plan of house F8 at the Hougang site (after Figure 12 of IA CASS 1985b).
Figure 3.22 Plan of house F12 at the Hougang site (after Figure 11 of IA CASS 1985b).
Figure 3.23 Remains of lime-plastered floor and mud-brick walls at house F1 of the Dahancun site (after Color Plate 1 of IA CASS 1990a).
Figure 3.24 Map of Xu Guangji's survey in the Chifeng region (after Figure 1 of Xu, G. J. 1986).
Figure 3.25 Sanzuodian site during the excavation of 2006, showing circular-shaped house remains and divided courtyards (after Figure 6 of Liu, X. Y. et al. 2017).
Figure 3.26 Plan of the Kangjiatun site (after Figure 1 of Li, W. Y. 2015).
Figure 3.27 Bastion no. 4 at the Kangjiatun site (after Figure 5 of Liaoningsheng Kaogu yanjiusuo 2001).
Figure 3.28 Slab-paved roads at the Kangjiatun site (after Color Plate 6-3 of Liaoningsheng Kaogu yanjiusuo 2001).
Figure 3.29 Stone constructed drainage facilities at the Kangjiatun site (after Color Plate 6-4 of Liaoningsheng Kaogu yanjiusuo 2001).
Figure 3.30a Plan of house F19 at Kangjiatun (after Figure 11 of Liaoningsheng Kaogu yanjiusuo 2001).
Figure 3.30b Overview of house F19 at Kangjiatun (after Color Plate 6-1 of Liaoningsheng Kaogu yanjiusuo 2001).
Figure 3.30c Photo of house F19 from the southern entrance at Kangjiatun (after Color Plate 7-1 of Liaoningsheng Kaogu yanjiusuo 2001).
Figure 3.31 Overview of the Sanzuodian site (after Color Plate 5-1 of Neimenggu Wenwu Kaogu Yanjiusuo 2007).
Figure 3.32 Sanzuodian site from the south (photo by the author at the Erdaojingzi Museum)
Figure 3.33 Semi-circular stone bastions enclosing the Sanzuodian large settlement (after Color Plate 5-2 of Neimenggu Wenwu Kaogu Yanjiusuo 2007).
Figure 3.34a, b Plan and overview of house F7 and house F9 at the Sanzuodian site (after Figure 8 and Color Plate 5-3 of Neimenggu Wenwu Kaogu Yanjiusuo 2007).
Figure 3.35 Plan of the Xindian site, southeastern Inner Mongolia (after Figure 2 of Xu, G. J. 1986).
Figure 3.36 Stone bastion no. 7 at the Sanzuodian site, with an earthen core (after Figure 3 of Neimenggu Wenwu Kaogu Yanjiusuo 2007).

Figure 3.37 Stone terrace at the Xiliang site (after Figure 149 of Neimenggu Wenwu Kaogu Yanjiusuo 2012).
Figure 3.38 Tomb M2 at the Xiliang site (after Figure 150 of Neimenggu Wenwu Kaogu Yanjiusuo 2012).
Figure 3.39 Distribution of the Lower Xiajiadian settlement sites, near Chaoyang city of Liaoning province (after Figure 4 of Zhang, X. D. and Xin, Y. 2015).
Figure 3.40a Characterization of a Logistical Subsistence System (After Figure 3 of Binford, L. 1980)
Figure 3.40b Agricultural territories reconstructed from regional surveys. Intensive and less-intensive cultivation zones are based on field-scatter densities (after Figure 6.17 of Wilkinson, T. J. 1993).
Figure 3.40c Satellite image showing the sites and linear hollows/wadis around Tell al-Hawa (marked in red and green respectively) on a CORONA satellite image from December 1967 (after: http://eamena.arch.ox.ac.uk/impact-risks/channel-irrigation/).
Figure 3.41 Location of the Dali lake and the major weather systems influencing China (after Figure 1 of Xiao, J. et al. 2008).
Figure 3.42 TOC (total organic carbon) and TIC (total inorganic carbon) concentrations of the Dali sediment core. Shaded bars indicate the drought events occurring during the middle and late Holocene. Three horizontal solid lines bracket the early, middle, and late Holocene (after Figure 4 of Xiao, J. et al. 2008.
Figure 3.43 Location of Sanzuodian, Weijiawopu and Xinglonggou Location I and II.
Figure 3.44 Map showing the location of sites yielded millet remains of 1st millennium BC, and 2nd millennium BC or older (after Figure 1.a of Miller, N. F. et al. 2016).
Figure 3.45 Map of the location of the Inner Asian Mountain Corridor (after Figure 5 of Frachetti, M. D. 2012).
Figure 3.46 Examples of drilled oracle bones from the Lower Xiajiajiadian sites. (1: excavated from Erdaojingzi site, after Figure 20 of Neimenggu Wenwu Kaogu Yanjiusuo 2010; 2: excavated from Yaowangmiao site, after Plate 4.10 of IA CASS 1974; 3: excavated from Dashanqian site, after Figure 7 of IA CASS 1998; 4: excavated from Dadianzi site, after Figure 21.15 of IA CASS 1996).
Figure 3.47 Examples of drilled oracle bones in Shang period (1: excavated from Yanshi Shang city, after Figure 388.2 of IA CASS 2013; 2: excavated from Yuanqu Shang city, after Figure 157.12 of Zhongguo Lishi Bowuguan Kaogubu and Shanxisheng Kaogusuo 1996; 3: excavated from Zhengzhou Shang city, after Figure 560.2 of Henansheng Wenwu Kaogu Yanjiusuo 2001; 4: excavated from Yinxu site, Anyang, Henan province, photo by author; 5: excavated from tomb No. 5 at Yinxu site, Anyang, photo by author).
Figure 3.48 Map showing the Qijia culture area and the Shimao site.
Figure 3.49 Geographic distribution of horses with mtDNA type A2 (Equus caballus przewalskii horses) in Jansen, T. et al. 2002's database (after supporting Figure 5 of Jansen, T. et al. 2002).
Figure 4.1 Map of the Dadianzi settlement and cemetery (after Figure 2 of IA CASS 1996).
Figure 4.2 The northern section of the Dadianzi cemetery (after Plate 5.2 of IA CASS 1996).

Figure 4.3 Radiocarbon dates for the Dadianzi cemetery (data from Zhongguo 1991: 56).
Figure 4.4 Plan of the Dadianzi cemetery (after Figure 22 of IA CASS 1996).
Figure 4.5 Pie chart showing the distribution of grave constructions at Dadianzi.
Figure 4.6 Distribution of different tomb constructions at Dadianzi (Blue: simple-pit tombs; brown: wooden chamber tombs; purple: mudbrick graves)
Figure 4.7 Pie charts showing the percentage of each grave construction type in female and male tombs.
Figure 4.8 Distribution of burial construction type among all preserved skeletal remains at Dadianzi.
Figure 4.9a Distribution of the size for wooden chamber tombs (data from IA CASS 1996).
Figure 4.9b Distribution of the size for simple-pit graves (data from IA CASS 1996).
Figure 4.9c Distribution of the size for mud-brick tombs (data from IA CASS 1996).
Figure 4.10 Boxplot showing the distribution of tomb sizes in three burial types. A very high outlier of 43.68 m^3 for the wooden chamber tomb has been excluded for greater clarity in the remaining tombs.
Figure 4.11 Example of the Dadianzi wooden chamber structure (tomb No. M672, after Figure 23.2 of IA CASS 1996).
Figure 4.12 Plan of tomb M677 (after Figure 26 of IA CASS 1996).
Figure 4.13 Plan of tomb M905 (after Figure 27 of IA CASS 1996).
Figure 4.14 Plan of tomb M1144 (after Figure 31 of IA CASS 1996).
Figure 4.15 Plan of tomb M673 (after Figure 32 of IA CASS 1996).
Figure 4.16 Example of the tombs buried with the *guan-li* pottery set (after Plate 11-14 of IA CASS 1996).
Figure 4.17 Distribution of *guan-li* set at the Dadianzi cemetery.
Figure 4.18 Ceramic vessels from tomb M612 at Dadianzi (after Figure 94 of IA CASS 1996).
Figure 4.19 Erlitou ceramic set used in burial (tomb No. 2002VM4, after Color plate 130 of IA CASS 2014).
Figure 4.20 Distribution of pottery vessels found in foot niches at the Dadianzi cemetery.
Figure 4.21 Distribution of ceramic numbers against mean tomb size at Dadianzi.
Figure 4.22 Examples of painted ceramics from the Dadianzi cemetery (after Color plate 1-17 of IA CASS 1996).
Figure 4.23 Distribution of painted ceramics and quantities at the Dadianzi cemetery.
Figure 4.24 Distribution of painted ceramics and mean tomb size at the Dadianzi cemetery.
Figure 4.25 Ceramic assemblage from tomb M726 (after Figure 95 of IA CASS 1996).
Figure 4.26 Red pigment remains from tomb M453 (after Color Plate 18.2 of IA CASS 1996).
Figure 4.27 Wall paintings of Shimao and painted potteries found at Taosi (1 and 2: after Figure 1 and 14 of Shao, A. D. et al 2015; 3-6: after Color Plate 17, 27.1, 25.1 and 28.3 of IA CASS 2015).
Figure 4.28 Decorative patterns on Dadianzi painted ceramics (after Figure 54 and 55 of IA CASS 1996).
Figure 4.29 *Tao-tie* animal face pattern on early Shang period (ca. 16-15th century BC) bronze *zun* vessel, from Zhengzhou Shang city (after Figure 551.3 of Henansheng Wenwu Yanjiusuo 2001 and Figure 123 of Zhongguo Qingtongqi Quanji Bianji Weiyuanhui 1998, volume 1).

Figure 4.30 Bronze vessels of early Shang (ca. 16-15th century BC) period, excavated from the Panlongcheng site (photo by author).
Figure 4.31 Bronze *ding* tripod from Anyang, Henan province (after Figure 16 of Zhongguo Qingtongqi Quanji Bianji Weiyuanhui 1998, volume 2)
Figure 4.32 Jade *cong* tube of the Liangzhu culture (ca. 3200-2100 BC) (after Figure I-13 of Zhejiangsheng Wenwu Kaogu Yanjiusuo et al. 2015).
Figure 4.33a Early Shang period pottery *gui* vessel with animal face pattern (photo by author).
Figure 4.33b Jade comb of late Shang period (ca. 1300-1200 BC) from tomb No. 5 at Anyang (photo by author).
Figure 4.33c Ivory goblet inlaid with turquoise, Anyang, late Shang period (ca. 1300-1200 BC) (after Figure 10-3 of Yang, X. N. 2004).
Figure 4.34 Panorama of Niuheliang Locality 2 (after Color Plate 38.2 of Liaoningsheng Kaogu Yanjiusuo 2012).
Figure 4.35 Lower Xiajiadian painted pottery (2) and its counterparts (1, 3, 4) of Hongshan culture (4500-3000 BC) (1: after Color Plate 135 of Liaoningsheng Kaogu Yanjiusuo 2012; 2: after Color Plate 11.1 of IA CASS 1996; 3: after Color Plate 263.6 of Liaoningsheng Kaogu Yanjiusuo 2012; 4: after Color Plate 176.5 of Liaoningsheng Kaogu Yanjiusuo 2012).
Figure 4.36 Plan of tomb No. 5 at Mound 4, Niuheliang Locality 2 (after Figure 106 of Liaoningsheng Kaogu Yanjiusuo 2012)
Figure 4.37 Picture showing painted ceramic vessels lined up around the stone mounds at Niuheliang Locality 2 (photo by author).
Figure 4.38 Boxplot of tomb sizes at the Dadianzi cemetery.
Figure 4.39 Black squares showing the location of tombs with a shaft larger than 5.8275 m3. Redrawn from Figure 22 of IA CASS 1996.
Figure 4.40 Distribution of tombs with cowries (marked in blue) and cowry copies (marked in azure). Redrawn from Figure 22 of IA CASS 1996.
Figure 4.41 An example of cowries used as decoration for clothes at tomb M672 (after Color Plate 20.2 of IA CASS 1996).
Figure 4.42 Distribution of tombs with turquoise (marked in turquoise). Redrawn from Figure 22 of IA CASS 1996.
Figure 4.43 An example of cylindrical-shaped turquoise excavated from the Dadianzi. cemetery (after Figure 81.16 of IA CASS 1996).
Figure 4.44 Map showing major turquoise mines in China (after Figure 1 of Qin, X. L. 2016).
Figure 4.45 Turquoise found at Erlitou turquoise foundry (after Color Plate 290 of IA CASS 2014).
Figure 4.46 Turquoise remains from the Shandong area (after Figure 2 of Pang, X. X. 2016).
Figure 4.47 Locations of Erlitou turquoise and bronze workshops, and the palatial area (after Figure 2 of Xu, H. 2018).
Figure 4.48 Brown symbols showing the distribution of tombs with Central Chinese pottery tripod vessels. Redrawn from Figure 22 of IA CASS 1996.
Figure 4.49 Orange symbols show the distribution of tombs with lacquerwares. Redrawn from Figure 22 of IA CASS 1996.

Figure 4.50 Red symbols show the distribution of tombs with painted ceramics, and the ones circled are graves with five or more painted vessels. Redrawn from Figure 22 of IA CASS 1996.
Figure 4.51 Green symbols show the distribution of tombs with metal artifacts. Redrawn from Figure 22 of IA CASS 1996.
Figure 4.52 Plan of tomb M371 at the Dadianzi cemetery (after Figure 30 of IA CASS 1996).
Figure 4.53 Distribution of painted ceramics by sex at the Dadianzi cemetery.
Figure 4.54 Number of turquoises per grave with sex information at Dadianzi.
Figure 4.55 Distribution of jade artifacts per grave with sex information.
Figure 4.56 Distribution of beads per grave with sex information.
Figure 4.57 Distribution of real cowries and cowrie copies by sex.
Figure 5.1 Map showing the Shandong peninsula, Longshan type cultures (ca. 2600-1900 BC) in the middle reach of the Yellow River (dotted circles), and the location of sites associated with Longshan remain mentioned in this thesis. (Calibrated dates for Keshengzhuang II, see Appendix I; Taosi, see Appendix II; Wangwan III, see Appendix III; Hougang II, see Appendix IV).
Figure 5.2 Xizhufeng tomb M203 (after Figure 4.9 of IA CASS 2018).
Figure 5.3 Pottery assemblage of Xizhufeng M203 (after Figure 4.10A-M of IA CASS 2018).
Figure 5.4 Distribution of the Shandong *gui* pitchers and Miaodigou II *jia* tripods (after Figure 1 of Ozawa, M and Zhao, H. 2012)
Figure 5.5 Distribution of the Longshan period (2600-1900 BC) *jia* tripods (after Figure 3 of Ozawa, M and Zhao, H. 2012).
Figure 5.6 Plan of Taosi tomb M2001 (after Figure 4.38 and Color Plate 11 of IA CASS 2015).
Figure 5.7 Burial objects of Taosi tomb M2001 (after Figure 4.38B of IA CASS 2015).
Figure 5.8 Distribution of the Longshan period (2600-1900 BC) *yan* tripods (after Figure 5 of Ozawa, M and Zhao, H. 2012).
Figure 5.9 Distribution of the Longshan period (2600-1900 BC) *li* tripods (after Figure 4 of Ozawa, M and Zhao, H. 2012).
Figure 5.10 Molding of tripods (after Figure 20 of IA CASS 2015).
Figure 5.11 Characteristic Yangshao culture thick-walled amphorae with pointed bases (excavated from Dadiwan site, Gansu, photo by author in the Gansu Provincial Museum).
Figure 5.12 Lower Xiajiadian pottery assemblage. (1-8, 10-11, 15 and 18: excavated from Fengxia site, after Figure 11 and 14 of Liaoningsheng Wenwu Ganbu Peixunban 1976; 9, 14 and 19: excavated from Dashanqian site, after Figure 4 of IA CASS 1998;16: excavated from Dashanqian site, after Figure 5 of IA CASS 2004; 12-13 and 17: excavated from Dongshanzui site, after Figure 7 of Liaoningsheng Bowuguan 1983a).
Figure 5.13 A: Hongshan period (ca.4500-3000 BC) pottery assemblage
B: Xiaoheyan period (ca. 3000-2000 BC) pottery assemblage (after figure 4.56 and 4.64 of IA CASS 2010).
Figure 5.14 Hongshan pottery with a red coating (photo by author in the Liaoning Provincial Museum).

Figure 5.15 *Pan* plates from Longshan culture sites and Erlitou (1 and 2: excavated from Xizhufeng tomb M1, after Figure 5 of Shandongsheng Wenwu Kaogu Yanjiusuo 1989; 3: excavated from Xizhufeng tomb M22, after IA CASS 1990b; 4: excavated from Hougang site, after Figure 28 of IA CASS 1972; 5-7: excavated from Erlitou site, after Figure 3-2-1-10 of IA CASS 2014 and Figure 78 of IA CASS 1999).
Figure 5.16 Map showing the location of the North China Plain and related archaeological sites.
Figure 5.17 Correlation of the 4000 yr BP climatic event. (A) Daihai Lake, Inner Mongolia; (B) Yema Lake, Minqing Basin; (C) Arid and semiarid areas of China (after Figure 4 of Wu, W. X. and Liu, D. S. 2004).
Figure 5.18 The shifts of the course of Yellow River over time (after figure 8 of Wang, Y. J. and Su, Y. J. 2011).
Figure 5.19 Radiocarbon dates for the Hougang II culture period (data source from Table 2-31 of IA CASS 2010).
Figure 5.20 Pottery assemblage of the Hougang II culture (after Figure 6-15 of IA CASS 2010).
Figure 5.21 Radiocarbon dates for Zhangying site (data from Beijingshi Wenwu Yanjiusuo 2007).
Figure 5.22 Pottery assemblage of the Zhangying site (after Figure 27, 28, and 132 of Beijingshi Wenwu Yanjiusuo 2007).
Figure 5.23 Comparison of the Yabazhuang ceramic assemblage (1-9) with the Shandong Longshan assemblage (10-17) (after Figure 2 and 3 of Wang, Q. 1995, Figure 11-21 of Hebeisheng Wenwu Yanjiusuo 1992, Figure 6-21 and 6-39 of IA CASS 2010).
Figure 5.24 Comparison of pottery tripod vessels from Dadianzi (1-9) and Erlitou (10-17). (1-9: after Figure 41 and 42 of IA CASS 1996; 10, 12,14: after Figure 81.9, 81.7, and 80.1 of IA CASS 1999. 11: after Figure 4.2 of Erlitou Gongzuodui, IA CASS 1984; 13, 16: after Figure 4.3 and 4.8 of Erlitou Gongzuodui, IA CASS 1992; 15: after Figure 2-3-2-1B of IA CASS 2014; 17: after Figure 5.15 of Zhongguo Shehui Kexueyuan Kaogu Yanjiusuo Erlitou Gongzuodui 1985).
Figure 5.25 Examples of ceramic *he* and *jue* tripods of Phase II and III of the Erlitou site. (1-3: from Plate 60.2 60.3 and 61.3 of IA CASS 1999; 4-6: from Plate 122.1, 122.3 and 123.7 of IA CASS 1999).
Figure 5.26 A, B. Ceramic *gui* tripod from Dadianzi tomb M905 (photo by author in the Chifeng Museum, Inner Mongolia).
Figure 5.27 Ceramic *he* vessel with delicate surface decoration from Erlitou tomb V2002VM3 (photo by author).
Figure 5.28 Ceramic *he* vessel from Wushan, Tianshui, in Gansu province (photo by author in the Gansu Provincial Museum).
Figure 5.29 Pottery assemblage of Erlitou tomb V2002VM3 (after Color Plate 123 of IA CASS 2014).
Figure 5.30 Tripod pitchers made with kaolin clay from the Shandong area (1: Dawenkou period (4th millennium BC) *gui*, excavated from the Jiaojia site, photo by author in the National Museum, Beijing; 2 and 3: Longshan period (2nd millennium BC) *gui,* excavated from the Yinjiacheng site; photo by author in the National Museum, Beijing).

Figure 5.31 Map of the major copper deposits in China (after Figure 1 of Ying, L. J. et al. 2014).
Figure 5.32 Distribution of tin deposits in China (after Figure 1 of Xia, Q. L. et al. 2018).
Figure 5.33 Examples of the metal artifacts from the Dadianzi cemetery (after Figure 86 of IA CASS 1996).
Figure 5.34 Earrings with trumpet-shaped design found in northern China and Andronovo remains (1: after Figure 88.1 of IA CASS 1996; 2: excavated from Ganguya site, after Color Plate 4.6 of Beijing Daxue Kaogu Wenbo Xueyuan and Gansu Sheng Wenwu Kaogu Yanjiusuo 2012; 3: excavated from Erdaojingzi site, after Figure 2 of Wang, Y. L. et al. 2013; 4- 6: from Andronovo culture sites in south Siberia, after Figure 6.1, 6.5 and 6.7 of Wu, E. 2008).
Figure 5.35 The representation of ruler with mace heads on the Narmer Palette (ca. 3100 BC) found at Hierakonpolis (after https://zh.wikipedia.org/wiki/File:Narmer_Palette_smiting_si de.jpg.).
Figure 5.36 Map of the arc area and the eastern steppe showing the distribution of mace heads in the steppe and on the borders of central China (after Figure 8 of Rawson, J. 2015).
Figure 5.37 Early forms of bronze knives found along China's borderlands (1: excavated from Kangjiatun site, after Figure 20.1 of Liaoning Sheng Kaogu Yanjiusuo 2001; 2: excavated from Erdaojingzi site, after Figure 1 of Wang, Y. L. et al. 2013; 3: from Ganguya cemetery, after Color Plate 4.2 of Beijing Daxue Kaogu Wenbo Xueyuan and Gansu Sheng Wenwu Kaogu Yanjiusuo 2012; 4: from Anaiersen site in Gongliu county, Xinjiang, after Figure 2.2 of Wang, B., and Cheng, Z. G. 1989).
Figure 5.38 Ceramic mold from the Dongshanzui site (after Figure 11 of Liaoningsheng Bowuguan 1983a).
Figure 5.39 A two-piece stone mold excavated from the Kangjiatun site, Liaoning province (photo by author in the Liaoning Provincial Museum).
Figure 5.40 Map showing the location of the Xiquegou site (marked with a red triangle).
Figure 5.41 1-3: grinding hammers and stone plates, surface collected from the Xiquegou site (photo by author); 4-5: stone mining tools excavated from the Xiquegou site (after Figure 10 and 11 of Neimenggu Wenwu Kaogu Yanjiusuo 2014); 6: one of the six mining pits found at the Xiquegou site (photo by author).
Figure 5.42 Calibrated radiocarbon dates for the Xiquegou site (data source from Table 1 of Neimenggu Wenwu Kaogu Yanjiusuo 2014).
Figure 5.43 Calibrated dates of coexisting animal teeth with the ore and slag from Habaqila site (after Figure 5 of Li C. Y. et al 2019.)
Figure 5.44 Inscriptions showing "金道錫行" on a bronze fu vessel of the Eastern Zhou period (475-221 BCE). (after http://www.chnmuseum.cn/DesktopModules/Museum_Show_Antique/Image.aspx?TabID=212&Image=YRzmsI55BM6rxssEPUg8bwERDuQKCbWIOw %2bHcxR5K6804BIOnZxc0O0eelnLbsGxeLuDdvrc% 2bv4lihdIlh6NPscD0WpxxIii&Url=%2fIDOprojuzV6 %2foaYwavtMA%3d%3d).
Figure 5.45 The forty-eight identified stone-built sites in the Ordos Region (after Figure 9 of Wang, X. Y, and Zhang, G. H. 2016).
Figure 5.46 Remains of the stone walls at Shimao (photo by author).

Figure 5.47 Map showing the landscape and location of the Shimao's enclosures and the Huangchengtai terrace (after Figure 3 of Sun, Z. Y. et al. 2017).
Figure 5.48 Sideview of the Huangchengtai (after Figure 7 of Shaanxisheng Kaogu Yanjiuyuan 2017).
Figure 5.49 The detail of the stone-lined platforms at the Huangchengtai terrace (after Figure 15 of Shaanxisheng Kaogu Yanjiuyuan 2017).
Figure 5.50 East Gate of the Shimao site (after Page 77 of and Shenmuxian Shimao Yizhi Guanlichu 2016 and Figure 5 of Sun, Z. Y. et al. 2017).
Figure 5.51 Two skull pits in the foundations of the East Gate at Shimao (photo by author).
Figure 5.52 Surviving stone walls at the Huangchengtai terrace (A) (after Figure 4.1 of Sun, Z. Y. et al. 2017) and the East Gate (B) (photo by author) of Shimao.
Figure 5.53 Plan of the stone houses and walls at Bicun (after Figure 20 of Shanxisheng Kaogu Yanjiusuo 2016).
Figure 5.54 Plan of the four stone houses found at Xiaoyuliang mound at Bicun (after Figure 2 and Color Plate 1 of Shanxisheng Kaogu yanjiusuo 2017).
Figure 5.55 Remains of the stone walls at Bicun (after Figure 20 of Shanxisheng Kaogu Yanjiusuo 2016).
Figure 5.56 Late Neolithic pottery assemblage in western Shanxi and northern Shaanxi (after Figure 23 of Shanxisheng Kaogu Yanjiusuo 2016, Figure 7 of Shao, J. 2016, and Figure 8 of Sun, Z. Y. 2016).

List of Tables

Table 2.1 Flad, R.'s Type Values System for the burial objects at Ddainzi (after Flad, R. 2002).
Table 3.1a Type A: Low-Platform settlements
Table 3.1b Type B: High Hillforts
Table 3.2 Radiocarbon dates for the Lower Xiajiadian culture
(based on data available till January 2020).
Table 3.3 House Diameter of Internal Space in Meters from Type B Settlements.
Table 3.4 Comparison of House Sizes between Type A and Type B Locations.
Table 3.5 Flotation Results from the Erdaojingzi site (data from Sun, Y. G. et al. 2014).
Table 3.6 Flotation Results from the Sanzuodian site (data from Sun, Y. G. 2013).
Table 3.7 Oracle bones excavated from Lower Xiajiadian sites.
Table 4.1 Fifty-three largest graves at Dadianzi and the presence/absence of selected tomb attributes in each tomb.
Table 4.2 Percentage of the presence of seven grave attributes in tombs at the Dadianzi cemetery.
Table 4.3 Tombs with five or more painted ceramics and other grave goods buried in them.
Table 4.4 Tombs with metal artifacts and other grave goods buried in them.
Table 4.5 List of tombs with Erlitou-style ceramics and their sex information.
Table 4.6 List of tombs with bronze earrings and their sex information.
Table 4.7 List of tombs with bronze rings and their sex information.

Chapter One: Introduction

1.1 Subject Matter

China's late Neolithic activities (2600-1900 BC) and subsequent massive bronze production under the Shang (1500-1046 BC) and Western Zhou dynasties (1046-771 BC) have been fully explored from multiple angles over the last sixty years. One often unconnected and overlooked issue is the shifts of archaeological landscape and major population from late third millennium BC (Longshan period 龍山時代 2600-1900 BC) to the earliest so-far-known bronze vessel casting culture—the Erlitou period 二裡頭時代 (1800-1500 BC).[1]

From two aspects, we know that there were series of social upheavals, which include a general decline of major Neolithic settlements and a great increase of population along the borderlands north of the Chinese Central Plains[2]: a) it has been recognized by both Chinese archaeologists and scholars in the West that, by 2100 BC, three large and complex Neolithic societies—Shijiahe 石家河 in the middle Yangtze[3], Liangzhu 良渚 in the lower Yangtze[4] and Shandong Longshan 山東龍山 in the lower Yellow River valley[5] had collapsed (Figure 1.1);[6] b) data from multiple

[1] Chinese archaeologists tend to use general terms of the Longshan period 龍山時代 for the centuries 2600-1900 BC and the Erlitou period 二裡頭時代 for the time span of 1800-1500 BC. These terms are used both for specific archaeological cultures found along the middle and lower Yellow Rivers and for the general time periods. For detailed discussions on the terminology of late Neolithic cultures of China, see Yan, W. M. 1981; Zhang, C. 2017a: 50-9; Zhang, C. et al. 2019: 588-603.

[2] In this thesis, the term Central Plains (*Zhongyuan* 中原) refers to the area of middle Yellow River basins and southern foothills of the Taihang Mountains 太行山, largely corresponding to present-day southern Shanxi 山西南部, southern Hebei 河北南部 and Henan 河南 provinces.

[3] Shijiahe Kaogudui 1999; Beijing Daxue Kaoguxi and Hubeisheng Wenwu Kaogu Yanjiusuo 1992.

[4] Zhejiangsheng Wenwu Kaogu Yanjiusuo 2005.

[5] Liu, L. and Chen, X. C. 2012: 217-20.

[6] Liu, L. 2004: 235; Liu, L. and Chen, X. C. 2012: 251; Zhang, C. 2017a: 50-9; Zhang, C. et al. 2019: 588-603; Wagner, M. et al. 2013: 344-57.

regional surveys and Chinese national archaeological project show that there were pronounced construction of large settlements, fortifications, and cemeteries in the crescent-shaped northern borders.[7]



Figure 1.1. Map of major Neolithic centers, the crescent-shaped borderland and northeast China (map by author).

During this period, the stark contrast of social-political circumstances between the northern borderland with traditional Neolithic centers along the Yellow and Yangtze Rivers revealed several conspicuous features that defined the borderland's different material culture: massive stone and mud-brick constructions, large-scale, well-fortified settlement and cemetery sites, the use of steppe-type small bronze artifacts and the introduction of herded animals.

[7] Zhang, C. 2017a: 50-9; Dai, X. M. 2016: 539-81.

This huge, crescent-shaped borderland area (Figure 1.1 shaded area) was first identified in the 1980s by Tong Enzheng 童恩正 as being occupied by groups of people with some shared cultural features: stone cist tombs, double-handled vessels, and animal designs.[8] In his cultural-ecological analysis, Tong also points out that the natural conditions, economic patterns, and cultural traditions were all different along the crescent-shaped territory, and there was never a single ethnic group, nor political polity.[9]

Inspired by Tong Enzheng's model, Rawson argues that during both the Neolithic and Bronze Age, communities along this crescent-shaped area were heavily influenced both by the Eurasian steppe and Central China.[10] As it wraps around the Central Plains, the northern borderlands served both as an important means of linkage and a buffer zone between southern agricultural China and the steppe communities to the north and west.[11] It has also been noted by many that the northern borderlands largely embrace three different regions, each varying in ecological environments and cultural features: the Manchurian region north of present-day Beijing, the Ordos area at the great bend of the Yellow River, and the northwestern region of Gansu and Qinghai.[12]

In order to expand these dialogues, this thesis chooses to concentrate on the eastern end of this crescent-shaped territory—northeast China (Figure 1.2). The major objective is to inquire what social, cultural, and economic characteristics had

[8] Tong, E. Z. 1987.

[9] Hein, A. 2014 provides further detailed discussions on the application of Tong's model on other parts of the crescent-shaped belt.

[10] Rawson, J. 2013a, 2013b and 2015. Examples that Rawson set out include similar grave type, weapon type and shared interest in horse, chariots, gold, beads and decorative vocabulary, between the peoples in the arc and the steppe groups of Inner Asia. These striking similarities are taken as indicators of continuous contact of border communities with the mobile pastoralists.

[11] Rawson, J. 2015 and 2017.

[12] Zhang, C. 2017a; Zhang, C. et al. 2019; Linduff, K. M. 2000; Liu, L. and Chen, X. C. 2012: 297-345.

contributed to the pronounced regional prosperity in this area during most of the second millennium BC. Corresponding to this timespan is the Lower Xiajiadian culture period (ca. 2000-1300 BC) 夏家店下層文化, which was named after the type site, Xiajiadian 夏家店, near Chifeng city 赤峰 in southeastern Inner Mongolia.

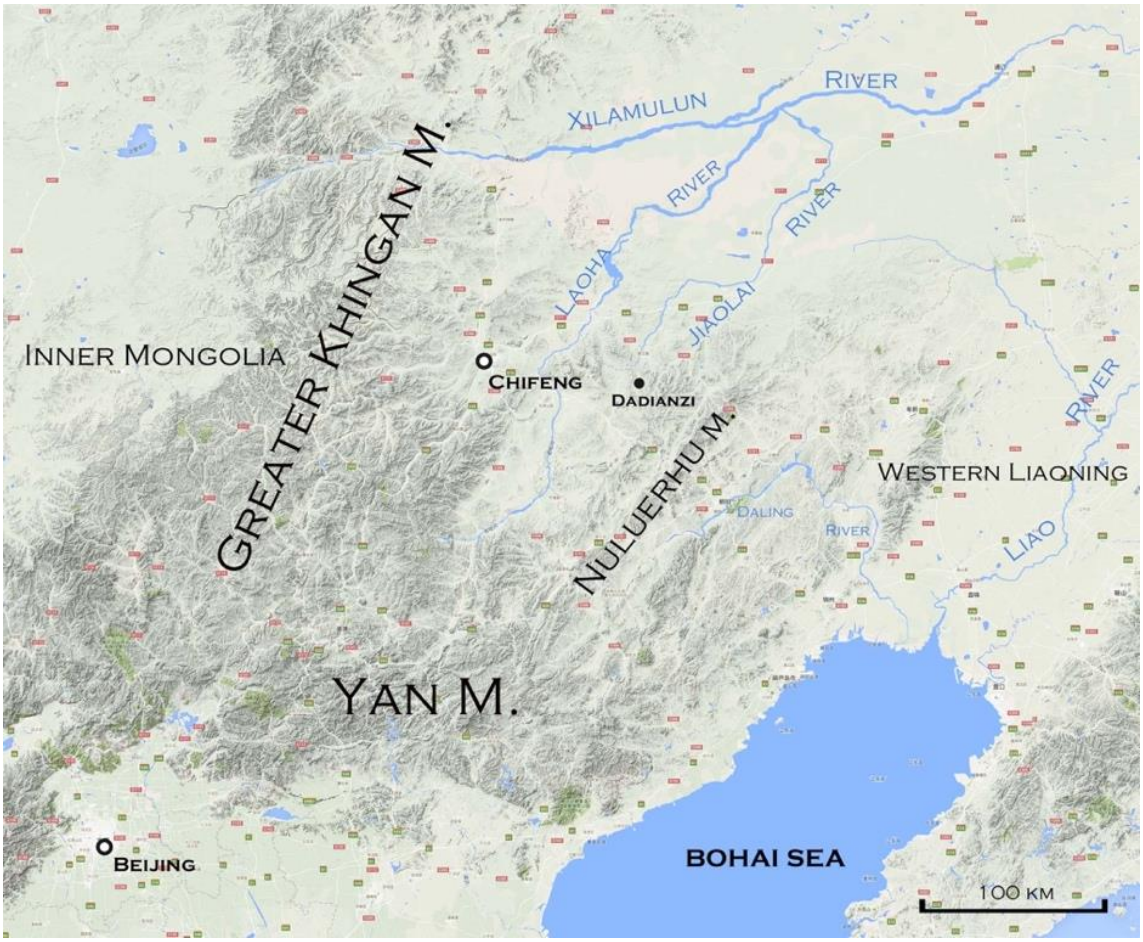


Figure 1.2. Map of Northeast China (map by author) (Background pale red and green symbols indicate the modern motor road and national highway systems).

Data collected from the second Chinese National Archaeological Survey confirms that more than two thousand Lower Xiajiadian period locations are known, and they were highly concentrated in western Liaoning and southeastern Inner Mongolia (Figure 1.2).[13] Twenty-five large settlements and one cemetery containing more than 800 burials have been excavated. A total of forty-seven radiocarbon dates have been published (detailed dates see section 3.3), including dates obtained from

[13] Zhongguo Wenwuju 2003: 54-5 and 2009: 58-9.

settlements, tombs, and stratigraphic sections. Both the stratigraphy and radiocarbon dates have placed the Lower Xiajiadian after the Hongshan culture 紅山 (ca. 4500-3000 BC), but between two major chronological periods: the Xiaoheyan 小河沿 (ca. 3000-2000 BC) and the Upper Xiajiadian 夏家店上層 culture (ca. 1000-600 BC).



Figure 1.3A Examples of painted ceramics from the Dadianzi cemetery (after Color plate 1-17 of IA CASS 1996).

During the Lower Xiajiadian period, most settlement sites were built next to water resources and arable lands, with enclosing defensive walls and dug-out ditches. At some large sites with high-density residents, an additional wall was erected outside the first interior wall. In terms of pottery assemblages, there was a huge contrast between the ceramics buried in tombs with the ones excavated from contemporary settlement sites. As a characterization of Lower Xiajiadian culture, the painted polychrome pottery vessels were exclusively excavated from burial context (Figure 1.3A), while undecorated tripod *yan* steamers (Figure 1.3B: 5 and 6) and *li* cooking tripods (Figure 1.3B: 1-3) made up the majority of settlement assemblages (Figure 1.3B).



Figure 1.3B Lower Xiajiadian ceramic assemblage from Sanzuodian site (after Color plate 6 of Neimenggu Wenwu Kaogu Yanjiusuo 2007).

Apart from ceramics, artifacts excavated from Lower Xiajiadian sites include large numbers of stone tools (Figure 1.4), which indicates their widespread use in local subsistence practices, presumably for clearing and tilling the land.[14] There was a small number of metal objects found in Lower Xiajiadian settlement sites and graves (Figure 1.5). The most-often discovered metal artifacts are copper and bronze earrings and there are a small number of tiny gold and lead objects found in the Dadianzi 大甸子 cemetery, to the east of Chifeng 赤峰 city.[15]

[14] Shelach, G. 1999: 105-6.
[15] IA CASS 1996.



Figure 1.4. Stone tool assemblage from Fengxia site in western Liaoning (after Figure 8 of Liaoningsheng Wenwu Ganbu Peixunban 1976).



Figure 1.5. Examples of the metal objects of the Lower Xiajiadian culture. (1-4: excavated from Dadianzi cemetery, after plate 56 of IA CASS 1996; 5-7: excavated from Kangjiatun site, photo by author in the Liaoning Provincial Museum; 8-9: excavated from Erdaojingzi site, after Figure 1 and 2 of Wang, Y. L. et al 2013).

As the Lower Xiajiadian material remains have been dated from as early as 2000 BC down to the 14th century BC and carried archaeological features of both Neolithic and Bronze Age, one critical topic of this thesis is to understand how the Lower Xiajiadian group was related to and different from other late Neolithic groups and early Bronze Age communities in northern China. Against the overall background of Longshan 龍山 expansion (2600-1900 BC) and the sudden Neolithic declines along the Yangtze and Yellow Rivers in the late third millennium BC, the Lower Xiajiadian community benefited from the introduction of new cultural elements from other regions. On a broad level, from the perspective of material culture, this thesis will explore how the Lower Xiajiadian material remains fit into the narrative of the Longshan cultural legacy. For individual sites and object types, this allows the current thesis to address more specific research questions: what were the local assemblages in northeast China, what types of artifacts were drawn from the Central Plains, how were they different from the local assemblages, and what role did they play in the Lower Xiajiadian context?

1.2 Research Area: Landscape and Climate

The Lower Xiajiadian culture area was centered in the Chifeng 赤峰 region of southeastern Inner Mongolia and the western part of Liaoning. This is an area drained by the Xilamulun (Xar Moron) 西拉木倫 and the Liao 遼 Rivers and their various tributaries. The Xilamulun River originates from the southwest of Hexigten County, in the Greater Khingans. Two tributaries, the Laoha River 老哈河 and the Jiaolai River 教來河 feed into the Xilamulun in southeastern Inner Mongolia (Figure 1.2). This river then goes across the western part of Liaoning province (known as the Liao River) and eventually flows into the Bohai Sea 渤海.

The whole region is around 132,000 square kilometers, in which mountains and hills comprise most of the land. The uplift of the Great Khingan Mountains 大興安嶺 on the eastern edge of the Mongolian Plateau resulted in higher topography in the west (Figure 1.2). The average elevation ranges from 2800m a.s.l in the west to less than 300m a.s.l in the east. In between the Great Khingan Mountains and the eastern coastal plains, the Yan 燕 Mountains and Nuluerhu 努魯爾虎 Mountains sub-divide the region into two major areas, the Laoha-Jiaolai intermountain basins near Chifeng city and Daling 大凌 River valley east of the Nuluerhu Mountains in the western part of Liaoning province (Figure 1.2).

Lying on the northern margin of the Pacific monsoon, the Lower Xiajiadian culture area is a transitional region between semi-humid and arid climates. With the Great Khingan Mountains dominating in the western part, precipitation is highest in the west and decreases towards the east. In the summer months (roughly from June to September), the East Asian summer monsoon from the Pacific Ocean (Figure 1.6) contributes most of the annual average rainfall, between 300 and 500 mm (Figure 1.7). With sufficient sunshine and rainfall from May to September, northeast China, therefore, has a much better environment for plant growth than the western part of north China at similar latitudes.



Figure 1.6. Major weather systems affecting the climatic conditions in China (after Figure 1 of Yi, S. 2011).



Figure 1.7. Map of annual precipitation (mm) averages in China (after Figure 5 of Shelach, G. 2015).

On the other hand, as this area is approaching the summer monsoon limit line (Figure 1.6), the environmental conditions of northeast China are extremely sensitive to climatic changes. This is a crucially important point that almost certainly influenced people's preferences for subsistence practice and residential locations.

Based on the published data from the second Chinese National Archaeological Survey, Hosner et al. (2016) offer interesting summaries of changes in site number and density across China. Their analysis shows a radical north-eastern shift of high site-density clusters from the Wei and middle/lower Yellow River region to northeast China between 2350 BC and 1750 BC (Figure 1.8).[16] Other smaller-scale regional surveys have revealed a related pattern: for the third millennium BC, site numbers are rather low in northeast China but they rise dramatically in the Lower Xiajiadian period, from 36 to 379 sites in the Chifeng 赤峰 region and from 52 to 2331 sites in the Aohan 敖漢 area.[17] Taking this issue from a climatic perspective, these fluctuations in populations occupying the crescent-shaped area from the late third to second millennium BC (Figure 1.8) were probably the consequence of a northward push of the East Asian Monsoon boundary. It is assumed that a favorable climate promoted agricultural activities during the early phase of the Lower Xiajiadian Culture and helped the resettlement of a southern population in northeast China.[18]

[16] Hosner, D. et al. 2016.
[17] Wagner, M. et al. 2013: 353.
[18] Detailed discussion see section 2.4.1.



Figure 1.8. Map showing pronounced north-eastern shift in archaeological site densities in northern China between (a) ca. 2350 BC and (b) ca. 1750 BC (after Figure 7 of Hosner, D. et al. 2016).

1.3 Archaeological Landscape of China's Late Neolithic and Early Bronze Age

The final Neolithic period of China, the Longshan period (ca. 2600-1900 BC) 龍山時代 and the rise of Erlitou 二裡頭 site (ca. 1750-1500 BC), which produced the earliest known cast bronze vessels, are extremely important for understanding the social development in the crescent-shaped area. This section lays out the archaeological background of the Longshan-Erlitou period and major culture groups that were contemporary with the rise of Lower Xiajiadian in northeast China.

1.3.1 "Longshan Culture" and the "Longshan Period"

The term, Longshan 龍山, was first used by archaeologists to name a Neolithic culture found at Chengziya 城子崖 site, Zhangqiu 章丘 county of Shandong



Figure 1.9. Egg-shell pottery from Shandong Longshan culture sites
(1: excavated from Dafanzhuang site, after Figure 56 of Shandongsheng Bowuguan 2004; 2 and 3: excavated from Liangchengzhen site, photo by author in the Shandong Provincial Museum; 4: excavated from Yinjiacheng site, photo by author in the Shandong University Museum; 5: excavated from Liangchengzhen site, after Figure 50 of Shandongsheng Bowuguan 2004; 6 and 7: excavated from Yaoguanzhuang site, after Figure 52 and 53 of Shandongsheng Bowuguan 2004).

province (Figure 1.1).[19] Identified by Wu Jinding 吳金鼎 in 1928, the site went through two seasons' excavation in 1930 and 1931. Commonly known as "eggshell" pottery 蛋殼陶 in Chinese literature (Figure 1.9), the extraordinarily thin and fine black pottery is a prominent feature of typical Shandong Longshan culture. Such pieces were extensively used in elite burials with other prestige items, presumably for funeral and afterlife feasting activities. Underhill suggests that the fine fabric pottery of Longshan was for use in serving food and drinks while coarse fabric pottery was used for cooking food.[20]

[19] Fu, Ssu-nien, 1934
[20] Underhill, A. P. 2002: 168-71.



Figure 1.10. Map showing the Shandong peninsula, Longshan type cultures (ca. 2600-1900 BC) in the middle reach of the Yellow River (dotted circles), and the location of sites associated with Longshan remains mentioned in this thesis.
(Calibrated dates for Keshengzhuang II, see Appendix I; Taosi, see Appendix II; Wangwan III, see Appendix III; Hougang II, see Appendix IV;).

Ongoing discoveries and recognition of Shandong Longshan-like black/grey pottery in a broad region across northern China in the next several decades enabled archaeologists to argue that there were multiple regional pottery forms derived from the Shandong Longshan mainstream culture.[21] Known as Central Plains Longshan cultures 中原龍山文化, these regional variants have been identified along the middle reaches of the Yellow River valley, in present-day Shaanxi 陕西, Shanxi 山西, and Henan 河南 provinces (Figure 1.10).[22]

By the 1970s, researchers had begun to recognize that the "Longshan cultures" distributed in the middle Yellow River area grew out of distinct local cultural

[21] An, Z. M. 1979: 393-403.
[22] As these discoveries were made in different regions, the local type Longshan cultures they represented were named after the modern provinces. For example, the Longshan culture found in the Shandong peninsula was referred to as the Shandong (Typical) Longshan culture 山東龍山（典型）文化; the Longshan culture found in northern Henan was named as the Hougang II culture 后崗二期文化 (radiocarbon dates see Figure 4.18); Keshengzhuang II culture 客省莊二期文化(radiocarbon dates see Appendix I) found in central Shannxi was called the Shaanxi Longshan culture. Figure 1.12 shows the distribution of major Longshan regional cultures.

sequences, but were heavily influenced by Shandong black pottery traditions.[23] In the early 1980s, Yan Wenming (1981) proposed the term "Longshan period" 龍山時代 (2600-1900 BC) as a name for the time when different regional cultures flourished.[24] Hence, the term "Longshan" 龍山 can be understood in at least three ways, the Neolithic culture in Shandong peninsula, contemporary Neolithic remains in the middle Yellow River valley, and the Late Neolithic period when these cultures flourished.

During the Longshan period, a dramatic increase in settlement numbers and social hierarchies has been recorded in the nationwide archaeological survey in Henan, Shanxi, and Shaanxi, reflecting an accelerated pace of social advancement in the third millennium BC.[25]

At least twelve fortified regional centers have been found in the Central Plains (Figure 1.11). Both located in southern Shanxi, Taosi 陶寺 (2.8 square kilometers) and Zhoujiazhuang 周家莊 (4 square kilometers) are the two largest settlements of this period.[26] The occupation of Taosi site started from the pre-Longshan era, the Miaodigou II Phase (2900-2600 BC), when a 0.56 square kilometer small rammed-earth enclosure was first built, before a much larger 2.8 square kilometers settlement was constructed during the Longshan period (Figure 1.11).[27]

[23] An, Z. M. 1972: 35-44.
[24] Yan, W. M. 1981: 41-8.
[25] Zhongguo Wenwuju 1991, 1999 and 2006. The number of sites in Henan, Shanxi and Shaanxi increased from 800, 716 and 2040 for the Yangshao period (ca. 4200-2900 BC) to 1000, 1120 and 2200 for the Miaodigou II (ca. 2900-2600 BC) and Longshan period (2600-1900 BC), respectively.
[26] IA CASS 2015; Dai, X. M. 2009.
[27] IA CASS 2015: 11.



Figure 1.11. Plan of the Taosi site and location of cemeteries
(after Figure 7.6 of Liu, L. and Chen, X. C. 2012).

However, based on the archaeological remains and published radiocarbon dates (Appendix I-IV) for the Longshan type cultures in the middle reach of the Yellow River, the overall pattern shows that the number of sites peaked during the third millennium BC and experienced a significant decline after 2000 BC, which created a cultural vacuum for the rise of Erlitou in the 18th century BC in central China and the pronounced social development in the northern arc region.[28] The chronological sequence described here is especially interesting with respect to the rise of Erlitou and the flourish of the Lower Xiajiadian culture in northeast China.

[28] Zhang, C. et al. 2019.

1.3.2 The Rise of Erlitou

Covering an area of four-square kilometers, Erlitou 二裡頭 is a Late Neolithic and early Bronze Age site on the center of the alluvial plains of the Yi 伊 and Luo 洛 Rivers (Figure 1.12). Situated in the modern Yanshi city of Henan province, the site is enclosed by mountains in three directions except for the east, where the lower Luo River converges with the lower Yi River.[29] Enclosed by the Zhongtiao 中條山 and Taihang 太行山 Mountains as the northern barriers, the Erlitou site was largely protected from the harsh weather conditions in northern China (Figure 1.12).

Deeply nourished by the fertile agricultural land and good water resources in the valley, Erlitou is a major part of the Late Neolithic archaeological landscape that does not show significant signs of decline. In contrast to other Neolithic centers, regional survey data indicate that the number of settlements in the Luoyang Plains increased continuously from the beginning of the second millennium to around 1750 BC, with the Erlitou site gradually growing to be a regional center.[30] Whereas the Longshan period is characterized by multiple competing settlements of similar size and scale, Erlitou in contrast, shows a mono-centered power system influencing a large region.

[29] IA CASS 2014: 16.
[30] Zhang, C. 2017a: 52; Liu, L. and Chen, X. C. 2011: 266; Xu, H. 2013: 301-2.



Figure 1.12. Map showing the location of the Erlitou site (after Color Plate 1 of IA CASS 2015).

In every sense enormous, more than 200 contemporary Erlitou culture sites have been found on the alluvial plains (Figure 1.13), suggesting that population aggregation took place in this area from the end of Longshan to the Erlitou period (1900-1700 BC). Two regional surveys concerning the Yi-Luo River valley and areas further east show convincing evidence that there was a rapid population increase into the Erlitou culture area before and during the early phases of the Erlitou settlement: southeast of the Yi-Luo basin, we have the Wei-Zhen River area 洧-溱水流域 survey which shows that the number of Erlitou culture sites doubled compared to previous periods.[31] More dramatic change has been revealed from the archaeological survey in the Yi-Luo River valley, where 7.4 times more sites have been identified during the Erlitou period than at the end of the Longshan period.[32] However, the full spectrum of impetuses responsible for such demographic increase remains understudied and it might be useful to look for explanations from the previous Neolithic collapse in major cultural centers in south and east China.[33]

[31] Zhang, C. 2017a: 52.
[32] Chen, X. C. et al. 2003: 167-87.
[33] Zhang, C. et al. 2019.



Figure 1.13. Distribution of Erlitou culture sites
(after Figure 15.1 of Xu, H. 2013).

The chronology of the Erlitou site is divided into four phases based on archaeological stratification and pottery typology, but the exact duration of each phase is difficult to determine.[34] Also, the temporal dimension of the Erlitou culture is a matter of ongoing investigation. Down to 2014, 78 radiocarbon dates have been reported from Erlitou, which gave a range of 1750-1500 BC.[35]

As the primary center, Erlitou shows its most pronounced expansion during the second phase when the site grew to its maximum size, 300 ha.[36] The construction and elaboration of the Erlitou palatial area (12h) at the south part of the site began in this period and lasted for approximately 200 years to the end of Erlitou Phase IV. It has been argued by the principal excavator, Xu Hong, that the palatial complex was the political and urban center of the Erlitou culture.[37]

[34] Liu, L. and Chen, X. C. 2012: 266; IA CASS 2014: 1236.
[35] Qiu, S. H. et al. 2006: 321-9; IA CASS 2014: 1215-1230.
[36] Liu, L. and Chen, X. C. 2012: 266.
[37] Xu, H. 2009: 83.

Consisting of twelve large-scale and fourteen medium-sized rammed-earth building foundations, the palatial complex includes at least two palatial compounds—the west complex that made up of foundation No.1 and No. 7, and an east complex that was constituted by No. 2, No.4, No.6, No.3 and No.5 (Figure 1.14).[38] Each with its own axis, both foundation complexes had building structures that were constructed during various episodes of the development of the Erlitou site. Through their highly consistent architectural layout, orientations, and construction techniques, we know that the whole palatial site must have been carefully preplanned and supervised as the construction went on.



Figure 1.14. Palace foundations at the Erlitou site (after Figure 15.2 of Xu, H. 2013).
Foundations 1, 2, 4, 7–9 were built in Phase III and used until Phase IV.
Foundations 6, 10–11 were built in Phase IV.

[38] IA CASS 2014: 610.



Figure 1.15. Plan of foundation No. 1 at the Erlitou site
(after Figure 6-3-1-2A of IA CASS 2014).

With a central hall built on a pounded-earth square platform and consolidated with several layers of pebbles, palace No. 1 is the largest so-far-known architecture at the Erlitou site (Figure 1.15). Encompassing an area of 9585 square meters, palace No. 1 was built during Erlitou Phase III.[39] It was equipped with a main hall, a courtyard surrounded by a roofed corridor, and the main gate facing south that only allowed restricted access.[40] Pottery drainage pipes were found north and west of the palace. Several sacrificial pits with animal and human remains were found inside the courtyard, suggesting that there were ritual activities taking place.[41] Also, during Phase III, a rammed earth wall was added to the Erlitou palatial area in all four directions, making this region an enclosed space that was ceremonially very

[39] IA CASS 1999: 138.
[40] IA CASS 1999: 138-51.
[41] IA CASS 1999: 147-9.

important. Inside the walled palatial complexes, new buildings were added (palaces No. 2, 4, and 6) and some old structures were pulled down (palaces No. 3 and 5).[42]

There was a very interesting pattern in terms of the distribution of different handicraft workshops at Erlitou. Built during Phase II of the Erlitou site and used until the end of Phase IV, bronze and turquoise workshops were located near the palatial complex (Figure 1.16).[43] However, bone workshops, pottery kilns, and other handicraft industries were found in a large workshop enclosure to the northern part of the site (Figure 1.16). This spatial arrangement suggests a high status for bronze and turquoise productions that were very likely sponsored by the elites, while other craft manufactures had a lower level of association with the central powers.[44]

[42] IA CASS 2014: 700-1.
[43] Xu, H. 2013: 312.
[44] Liu, L. and Chen, X. C. 2012: 268; Xu, H. 2013: 312-3.



Figure 1.16. Plan of the Erlitou site and location of archaeological features (after Figure 8.5 of Liu, L. and Chen, X. C. 2012)

Inside the Erlitou bronze workshop, archaeologists have identified a great concentration of furnace and crucible fragments, stone and ceramic mold remains charcoal, and slags.[45] Copper and bronze objects appeared at the Erlitou site from Phase I, in the form of small portable items, basic tools, and decorative items (Figure 1.17). This early assemblage presents a sharp contrast with the bronze inventory from Phase IV (approximately 1600 BC), when the earliest known cast bronze vessels, *ding* 鼎, *he* 盉, *jia* 斝 tripods, and *jue* 爵 tripod beakers were excavated (Figure 1.18).

[45] IA CASS 2003: 65.



Figure 1.17. Examples of metal artifacts of Phase I-III from the Erlitou site
(1 and 2: Phase I, after Plate 3.1 and 3.2 of IA CASS 1999;
3-6: Phase II, after Plate 28.6-8 and 62.11 of IA CASS 1999;
7-15: Phase III, after Plate 77, 78 and 123.2 of IA CASS 1999).



Figure 1.18. Cast bronze vessels from Phase IV of the Erlitou site (after Figure 1, 7, 13 and 19 of Zhongguo Qingtongqi Quanji Bianji Weiyuanhui 1998, volume 1).

Because of the discoveries of these cast bronze vessels, Erlitou is taken as the primary landmark as the beginning of the Chinese Bronze Age. The name Erlitou period is also given to the time of its dominance, 1750-1500 BC.[46] Largely modeled from Neolithic ceramic prototypes (except for *jue*), this new bronze inventory found at Erlitou was thought to be used for typical Neolithic type ritual offerings.[47]

It appears rather striking that some cast metal objects from the Erlitou site contain over 30% lead.[48] Leaded tin-bronze was subsequently used to cast the majority of ritual vessels in Central China during the Erligang and Anyang periods of the Shang (1500-1046 BC), and also into the Western Zhou period (1045-771 BC).

[46] Radiocarbon dates from IA CASS 2014: 1215-36.
[47] Liu, L. and Chen, X. C. 2012: 272; Zhang, C. et al. 2019.
[48] IA CASS 2014: 1515-8.

Although there have been over four hundred burials reported from Erlitou, the distribution of tombs, however, is less clear. It seems that there was no large, concentrated cemetery area and the tombs were found in small groups dispersed across the whole site through the duration of the Erlitou occupation.[49] Various locations had been employed for burial purposes, including areas near the bronze workshop and the residential sector. It has been argued by Li Zhipeng that there seemed to be a slightly closer relationship between tombs with rich grave goods and the palatial area, though high-class burials have also been identified in non-ritual-associated contexts.[50]

Located in the courtyard of palace No. 3, tomb No.2002VM3 (Figure 1.19) (2.24m by 1.19m at the opening) reveals the close connection between an elite individual and the important ceremonial space. Although the tomb was partly destroyed by a later period trash pit, it yielded a large number of exceptionally splendid artifacts, including a turquoise mosaic in dragon-serpent shape (Figure 1.20), made of more than 2000 turquoise and jade pieces. Placed on top of the deceased, this mosaic was clearly made beforehand and then brought to the burial ceremony during the funeral. Together with the prominent location and other high-quality grave goods, this dragon-serpent turquoise mosaic highlights the high social status of the tomb occupant and his position as one of Erlitou's elite members.

On the whole, the site of Erlitou is of specific relevance to the discussion of the Lower Xiajiadian as some of the vessel types specifically valued at Erlitou were also found in the Dadianzi cemetery. The explanations for these similarities are yet to be resolved in past literature but will be tackled in Chapter Five.

[49] Li, Z. P. 2008: 39.
[50] Li, Z. P. 2008: 47.



Figure 1.19. Plan of tomb No.2002VM3
(after Figure 6-4-3-4-1B of IA CASS 2014).



Figure 1.20. A turquoise mosaic in dragon-serpent shape
excavated from tomb No.2002VM3.
(after Color Plate 120 of IA CASS 2014).

1.4 Thesis Structure

With explanations of the research subject, landscape and climate, general archaeological background of the Lower Xiajiadian and Central Plain cultures, this thesis will continue as follows：

Chapter Two presents a review of the history of research (including major excavations and regional surveys), principal academic questions, and major scholarly works and arguments on the Lower Xiajiadian material culture. The aim of this chapter is to synthesize and evaluate current archaeological knowledge on the Lower Xiajiadian culture, so as to provide an intellectual context for related discussions in the following chapters.

Chapter Three focuses on the complexities of Lower Xiajiadian settlements. I will lay out the archaeological material with an analysis of the household structures, the construction techniques, and the social-economic characteristics of these settlements. Large parts of this chapter discuss the classification of different settlement types based on the topographic landscapes and their construction materials/methods. Chapter Three also reviews the climate conditions and agricultural production during the Lower Xiajiadian occupation and addresses the issue of site function with a consideration of local resources and subsistence economy.

Chapter Four moves on to an investigation of the mortuary pattern at the Dadianzi cemetery, from the perspective of how social differences were manifested, and how they can be understood regarding the distribution of different artifact types across the burial space.

Chapter Five places the Lower Xiajiadian culture against the broad background of social transformation from the Late Neolithic to the Early Bronze Age. By examining

material remains from various areas, this chapter investigates the relationship between Lower Xiajiadian and other cultures in the Central Plains and northern China.

Chapter Six brings up the main threads of the thesis together in an integrated discussion. An overview of the current research work, Lower Xiajiadian's social organization, economy, and links with foreign material cultures are presented. Following this, Chapter Seven summarizes the conclusions in each chapter and illustrates new perspectives on the frontier communities and some long-term views for future study of societies in the borderlands of China.

Chapter Two: Literature Review

In this chapter, I review the significant literature related to the Lower Xiajiadian culture and explore how existing scholarship provides a foundation for the current study. The chapter is structured into two parts: a synthesis of the research history from the first discovery of Lower Xiajiadian remains in northeast China to the latest archaeological works done in this region; and a discussion centered on specific aspects of the existing body of literature: relative chronology of the sites and the ceramics, settlement pattern, the nature of Lower Xiajiadian settlement organization and the mortuary differences of the Dadianzi cemetery.

2.1 Research History of the Lower Xiajiadian Culture

The foundations of archaeological research in northeast China first began during the 1930s and 1940s under the Japanese occupation and the so-called Manchurian state period. As early as 1929, Japanese scholars Hamada Kosaku and Harada Yoshito published their findings from sites at Pi-tzu-wo (present-day Pikou town 皮口鎮, Liaodong province).[51] This volume contains the results of excavation undertaken in 1927 when they found polychrome ceramics and some small bronzes. These ceramics showed contrasting differences from the ones excavated by Andersson, J. G. in Henan and Gansu, where usually black decorations were applied to a reddish-orange background. A group of five pottery vessels collected from Xiaokulun 小庫倫 site attracted special attention as they are steamers with baggy tripod legs.[52] Now stored in the Lvshun Museum 旅順博物館, these are the earliest identified pottery of the Lower Xiajiadian culture.

[51] Kosaku, H. and Yoshito, H. 1928.
[52] Guo, D. S. 1995: 149.

In 1935, excavations at the Hongshanhou 红山後 site, located on the outskirts of Chifeng city, were carried out by Japanese archaeologists Hamada Kosaku and Mizuno Seiichi.[53] At Hongshanhou, two major types of archaeological remains were identified—the earlier Neolithic (later known as Hongshan culture) and the later Bronze Age groups. To differentiate these two archaeological periods, Hamada Kosaku and Mizuno Seiichi labeled them Chifeng Phase I and Chifeng Phase II, respectively. Their report of the Hongshanhou site, covering the pottery and dwelling locations of ancient residents at Chifeng, provided one of the richest sets of data on the Neolithic and Bronze Age cultures of northeast China. Even today it remains an important source, serving as a starting point for stratigraphic and chronological discussion of the archaeological data in this area.

Chinese archaeologists started to explore the archaeology of this area during the Japanese occupation in World War II and soon after 1950. In 1943, Li Wenxin and Tong Zhuchen investigated the Dongbaijia 東八家 site in the eastern suburbs of Chifeng and measured the 57 house floors which were exposed.[54] This was the first report on a Lower Xiajiadian culture site by Chinese scholars. In the 1950s and 1960s, excavations and surveys on the Lower Xiajiadian site increased. These include the excavation and research on Xiajiadian 夏家店 and Yaowangmiao 藥王廟 sites in the suburbs of Chifeng city. Since then, a Late Bronze Age culture has been differentiated from the other ancient remains in northeast China and was named as Lower Xiajiadian 夏家店下層文化. In addition, other important discoveries during this period include the excavation of Xiaozhuanshanzi 小轉山子 site in southeastern Inner Mongolia, where archaeologists found a Lower Xiajiadian period house that was disturbed by a storage pit dated to early Western Zhou (ca. 10th century BC).[55] This became a piece of important evidence to establish the date of Lower Xiajiadian culture in the local cultural sequence. Also instrumental was a survey conducted by

[53] Kosaku, H. and Seiichi, M. 1938.
[54] Tong, Z. C. 1957: 15-22.
[55] Rehesheng Bowuguan Choubeizu 1955: 16-27.

Xu Guangji and Liu Guanmin in the early 1960s along the Yingjinhe 英金河 and Yinhe 陰河 rivers of southeastern Inner Mongolia.[56]

After 1970, excavations on Lower Xiajiadian sites increased remarkably. For instance, in 1972 at Fengxia 豐下 in Beipiao, Liaoning, 650 m^2 were excavated and 18 houses were found;[57] in 1973, at Dongshanzui 東山咀 site near Chifeng, 450 m^2 were test excavated and nine houses were found;[58] in 1976, 2,200 m^2 of the Shuiquan 水泉 site in Jianping County, Liaoning, were excavated and 120 houses were discovered;[59] in 1975–1978, a settlement and more than eight hundred burials from the Dadianzi 大甸子 site in Chifeng Aohan Banner, Inner Mongolia was excavated.[60]

Since the 1980s, archaeological surveys were carried out in western Liaoning and southeastern Inner Mongolia. In addition to the second Chinese National Archaeological Survey Project (1981-1985), G. Shelach investigated an area of 210 km^2 in the western part of the Songshan district 松山區 at Chifeng city, in which he identified 70 Lower Xiajiadan locations (including 64 stone fortified sites).[61] Following this, the Chifeng Project (Chifeng International Collaborative Archaeological Research Project) launched by Pittsburgh and Jilin University conducted four seasons of field surveys in the Chifeng area. A total of 1234 km^2 were systematically surveyed under this project. Through the data collected, the 2011 Chifeng Project report analyzed the cultural sequences of the Chifeng region and the emergence and development of societal complexity, including estimations on regional population and patterns of site distribution and shifts across periods.[62] This

[56] Xu, G. J. 1986.
[57] Liaoningsheng Wenwu Ganbu Peixunban 1976: 197-210.
[58] Liaoningsheng Bowuguan 1983a: 420-9.
[59] Liaoningsheng Bowuguan 1986: 11-29.
[60] IA CASS 1996.
[61] Shelach, G. 1999. With the support from Professor Yan Wenming of Peking University and local archaeologists in Inner Mongolia, Shelach was among the first generation of foreign scholars to conduct field survey in mainland China after the Cultural Revolution. His survey also involved faculty members and students at Jilin University, thus opening the possibility of the later Chifeng Project (CICARP).
[62] CICARP 2011.

data complements archaeological information from previous site excavations and non-systematical regional surveys over past decades.

Almost of the same period as the Chifeng Project, further progress has been made by Chinese archaeologists in identifying and excavating large-scale Lower Xiajiadian settlements. Sites that have been partially excavated in western Liaoning and southeastern Inner Mongolia include Dashanqian 大山前 from 1996 to 1998,[63] Kangjiatun 康家屯 from 1997 to 2001,[64] salvage excavation (for the Sanzuodian reservoir) of Sanzuodian 三座店 and Shangjifangyingzi 上机房营子 from 2005 to 2006.[65] In 2009, the Erdaojingzi 二道井子 settlement[66] and nearby burial ground were excavated, and the housing remains have been preserved in place for a site museum, which opened in 2019.

Over seventy years of research work in northeast China has revealed more than two thousand Lower Xiajiadian period sites, a clear distribution of its material remains, and distinctive cultural characteristics. Three rounds of the National Archaeological Survey Project led by the Chinese government (1956-1957, 1981-1985, and 2007-2011) and extensive regional surveys in the Chifeng region have recorded the most exposed Lower Xiajiadian locations in the field. Twenty-five of these sites have been partially excavated throughout the years (some under salvage excavations for the construction of highways and reservoirs), while others have been protected on site.

2.2 Significant Literature Related to This Study

As the scope of the current study focuses primarily on Lower Xiajiadian settlements, mortuary and material culture, the following review is thus organized into three

[63] IA CASS 1998: 43-9 and 2004: 31-9.
[64] Liaoningsheng Kaogu Yanjiusuo 2001: 31-44.
[65] Neimenggu Wenwu Kaogu Yanjiusuo 2008a: 22-6 and 2012.
[66] Neimenggu Wenwu Kaogu Yanjiusuo 2010: 13-26.

related aspects, each summarizing and evaluating existing contributions made by previous research.

2.2.1 Chronology and Pottery Typology

The main achievement of archaeological research from the 1960s to 1980s was the refinement of the chronology and stratigraphy established by Hamada and Mizuno (1938). The data excavated at Hongshanhou 紅山後 were attributed by Hamada and Mizuno to two cultural and chronological phases which they called Chifeng I and Chifeng II. Excavations at sites such as Xiajiadian 夏家店, Yaowangmiao 藥王廟, and Xiaozhuanshanzi 小轉山子 have allowed archaeologists to rearrange the new data into existing archaeological phases and establish a relative chronology.[67] New evidence obtained in fieldwork and surveys indicated that Chifeng Phase II of the Hamada and Mizuno chronology can be subdivided into two culture periods, now known as the Lower and Upper Xiajiadian; Chifeng Period I was dated to around 5th to 4th millennium BC and was later named as Hongshan culture. Stratigraphic evidence discovered at this time showed that the Lower Xiajiadian culture remains were earlier than the western Zhou period (1045-771 BC). These were important early steps in recognizing the basic chronology of northeast China.

Since the late 1970s, the material remains of the Hongshan 紅山 (ca. 4500-3000 BC) culture and the intermediate Xiaoheyan 小河沿 (ca. 3000-2000 BC) culture was identified in northeast China, which further elaborated and refined the previously known chronology sequence. With an increasing number of Lower Xiajiadian sites being found and excavated in the 1980s, the archaeological research has been devoted to the identification of different archaeological cultures—is this a Hongshan, Xiaoheyan, or Lower Xiajiadian site? With the new artifacts unearthed and their stratigraphic sequences known, excavators began immediately to

[67] Liu, G, M. and Xu, G. J. 1981: 5-14; IA CASS 1974.

investigate the stylistic changes of ceramics types found from different Lower Xiajiadian sites. Strongly object-oriented, scholarly efforts have been made to divide sub-groups of pottery within one site and to identify stylistic variations across sites/phases.[68] Under this influence, large portions of the archaeological reports are devoted to describing pottery artifacts and discussing differences and similarities among ceramics from different periods and areas. Without any radiocarbon dates available at that period, the recognition of cultural phases and dates is therefore purely based on assumptions of stylistic changes in ceramic shapes and decorations. As a result of this ceramic-based approach, opinions were divided as to whether stylistic differences represent development through time or co-existing regional/local variations.

2.2.2 Settlement Pattern and Social Organization

From the mid-1990s onward, the increase of regional archaeological surveys in northeast China and the excavations of key settlement sites revealed valuable new data that made it possible to research new aspects, such as regional settlement patterns, site organizations, social hierarchy, and economic activities of the Lower Xiajiadian society.

Systematic regional surveys west of Chifeng city conducted by G. Shelach in the early 1990s are the first generation of scholarship aiming at reconstructing Lower Xiajiadian's social and political system. As there was no burial data available at that date, Shelach (1999) was based purely on settlement evidence. Without any test excavations, settlement size and artifacts collected during the field survey are taken as the most direct proxy indicating a site's social/political position within the community. Based on the size and level of labor investment (the presence/absence/height of stone walls) observed, Shelach argues that there was a

[68] Li, G. D. and Gao, M. X. 1981; Guo, D. S. 1986; Zhang, Z. P. et al. 1987; Wu, P. 1988; Li, B. Q. 1990; Hua, Y. B. et al. 2002; Zhao, B. F. 2009.

three-tiered central-place settlement pattern in the Chifeng area. Large and central settlements were those registered in the middle of a site cluster and have an area of around nine hectares; the mid-level settlements were distributed next to the central ones and usually between 3-6 hectares, and the remaining sites smaller than 2.5 hectares are regarded as tier three.[69] In this sense, the tiered settlement pattern points to a stratified polity that invested a large number of social resources in public structures.[70] However, there is little evidence to support a movement of resources from the second or third-level sites to central settlements. Shelach has admitted that the number of arable lands immediate to smaller sites outnumbered the one next to the central-place settlement.[71] This observation, in turn, raised doubts about the paramount position of large central sites within the local settlement hierarchy, and also encouraged this thesis to question the rank-size model previously constructed. Therefore, we see that the three-tiered hierarchical settlement system, which is based on a pure rank-size analysis, is not very well integrated.

Shelach, G's approach is very much associated with the "Size-Hierarchy" methodology to interpret the socio-political implications of regional settlement data and to evaluate degrees of social complexity.[72] In this approach, settlement hierarchy and the relationship between tiers of settlements are analyzed mainly based on the distinction between site sizes (centers vs. villages) and may occasionally be accessed according to a site's particular symbolic features. On top of this, the number of hierarchical levels is frequently corresponding to the degree of social complexity (ie. band, tribe, chiefdom, and state).[73] Although this approach has been employed in many areas in the world, it is constructed and used on the basis that the given society was vertically stratified and its administrative/political (decision-making) hierarchy can be inferred correctly from the size divisions of

[69] Shelach, G. 1999: 90.
[70] Shelach, G. 1999: 121-4.
[71] Shelach, G. 1999: 130-2.
[72] Willey, G. 1953; Feinman, G. 1995 and 1998.
[73] Wright, H. 1977; Johnson, G. 1977; Earle, T. 1978, 1987 and 1991.

settlements. However, size is never a single formula in detecting the relationships between different sites, and social organizations can vary so significantly in time and across space.[74] For instance, some societies were more horizontally structured and their administrative hierarchies may not be reflected from the size of residential units.

Acknowledging that agricultural production may not be the major social function for large sites, Shelach thinks the key position of central large settlements reflected political control and the mobilization of labor forces to construct defense systems and permanent structures. He continues to argue that the grouping of different leveled settlements (site clusters), should be one social community and was coordinated for defense against neighboring site clusters. However, almost no radiocarbon dates of Lower Xiajiadian sites were available by the time Shelach wrote his 1999 book, it is impossible to say that the component of these site clusters was used at the same time, nor is there evidence to detect any diachronic pattern in the changes of settlement locations or their functions. Also, current archaeological data has not revealed clear evidence of any conflict among social groups during the Lower Xiajiadian period, and therefore, we could not say for sure at this stage that these

[74] In the study of Late Neolithic China, Liu Li follows the common practice of "Size-Hierarchy" methodology, defining Central Plains Longshan settlement hierarchy according to the breaks shown in histograms of site-size distribution, based on which she argues that chiefdom-level social organizations have emerged and developed during the third millennium BC (Liu, L. 2004: 189). Inheriting from scholarly discussion on chiefdom and state formation in and before the 1980s, Liu Li is among the first scholars to employ such a neo-evolutionary approach on Chinese material. However, in her 2004 volume, the majority of regional survey data Liu uses to construct her settlement hierarchy argument came from non-systematic survey (and some only through surface collection and observation). Only two surveys conducted in the Luoyang Basin and Yi-Luo River Basin are reliable systematic data that can be taken as indicators of settlement locations and sizes. So, in the first place, we see big issues of data quality in the available archaeological materials, as well as huge difficulties to compare settlement data across different regions. Secondly, Liu's major premise, which is based entirely on traditional Chinese historiography that the area of Central Plains was the cradle of Chinese civilization, also need to be questioned. Her final argument in Chapter Eight and Nine, that there was a trajectory towards "states" in the Longshan period, heavily dismisses the social complexity and cultural development in other regions of China in the third millennium BC. On the whole, the efforts made in Liu 2004 book to directly apply western methodology to Chinese material show us that this size-hierarchy approach may not necessarily relevant to China nor at least not valid on the large body of archaeological material in Liu Li's analysis.

different-sized settlements were all built for fortifications. On a general level, the most important contribution of Shelach 1999 is pointing out a way to shift from largely chronological and artifact-orientated research to focus on anthropological topics of the Lower Xiajiadian remains, such as settlement pattern, resource management, social structure, and subsistence methods.

Following Shelach 1999, we have the Chifeng Project's regional survey investigating a much larger geographical area (1,234 km^2) on the outskirts of Chifeng city. The primary research questions CICARP addressed concern the emergence and development of a complex sociopolitical organization in the Chifeng region from the sixth millennium BC down to the tenth century AD. Their principal research activity was a systematic regional-scale settlement survey: teams of three to five trained archaeologists walk back and forth across the landscape, with 50 to 100 m between crew members; surface scatters of ceramic and lithic artifacts are collected systematically in individual collection units, each representing an area of no more than 1 ha.[75] These collection units then became the primary units of data management and analysis. By describing the collected evidence from each period in the surveyed area, CICARP developed an artifact density-area index and this became the basis for the estimation of regional population and local community structure.[76]

For the Lower Xiajiadian period, CICARP argues that there was more clustering of closely spaced occupation zones into larger local communities than in the previous Hongshan and Xiaoheyan periods.[77] A total of 416 local communities are identified based on artifacts collection units, in which at least fifteen are regarded as supra-local communities as they probably had populations numbering over 1,000 inhabitants.[78] By grouping a fair number of roughly similar-sized local communities into these fifteen supra-local communities, the Chifeng Project suggests an overall

[75] Peterson, C. E. 2009: 33.
[76] Peterson, C. E. 2009: 32-5.
[77] CICARP 2011: 120.
[78] CICARP 2011: 120.

pattern of separate small co-equal political organization for the Lower Xiajiadian period.

This interpretation receives considerable support from the previously mentioned site size-hierarchy model, though the Chifeng Project used it differently: the units in their discussions are not “sites”, but local communities delineated in a clustering analysis based on artifacts distribution and estimated populations. Secondly, going beyond Shelach, G. 1999, the research aim of the Chifeng Project is not to find tiers in a settlement hierarchy nor to assign different societal types (chiefdoms and states) to variously sized Lower Xiajiadian settlements. Instead, the Chifeng Project estimated and discussed in what numbers, people distributed themselves across the Chifeng area at different times, though more questions need to be asked about whether the distribution of surface artifacts can reflect the real situation of the regional population and structure of the local community. On the whole, as a regional survey program, the Chifeng Project estimates changing population size and densities, together with the analysis of changing patterns of site distribution, provides a vastly enlarged archaeological context within which more detailed information from future excavations can be placed.

Apart from this, the CICARP has also contributed to the discussion of Lower Xiajiadian culture by bringing together complementary archaeological information, including new radiocarbon dates, faunal and plant remains, climate, and geomorphological change, which all give rise to a more comprehensive picture of the Lower Xiajiadian occupation.

After 2000, based on the Chifeng Project and China’s national archaeological survey, the Chinese academics were involved in a great number of discussions on the nature of Lower Xiajiadian stone fortification and their social functions. Many of the scholarly works emphasize the strong military/defensive qualities of the stone-

constructed settlements.[79] For instance, Xia Baoguo 夏保國 argues that there might be inner settlement differences in that some sites were designed for ordinary residence while others were probably used during inter-polity conflicts.[80] Despite the stone sites' basic function as defensive facilities, Xu Zhaofeng 徐昭峰 mentioned that some of the large locations may also have been involved with ritual/sacrificial activities.[81] The distribution and clustering of stone settlements around the Chifeng region remind many scholars of the famous Great Wall, later constructed along the northern edge of Central Plains. Han Jianye 韓建業, especially, argues for a narrative that the northern border had constantly been an area of conflict between the southern agricultural communities and mobile pastoral groups further north.[82] Referencing climate and ecological data within this monsoon marginal area, Han thinks that these south-north conflicts have largely resulted from economic distinctions and an imbalance of regional subsistence resources.[83] Different from others, Han's perspective addresses a general ecological background in which populations with different subsistence strategies became hostile to each other during the second millennium BC. However, we have no definite supporting evidence for inter-group violence (no data of trauma and very few remains of weapons) for the Lower Xiajiadian period. Instead, this thesis tends to argue that constructing large-scale stone settlements was based on a group-oriented ideology and may be related to managing the local population (see Chapter Three).

Taking up the idea of "prototype Great Wall" further, Zheng Shaozong 鄭紹宗 and Sun Yonggang 孫永鋼 suggest that these chains of heavily fortified Lower Xiajiadian stone fortress may be architectural remains of a northern state contemporary with the Central Plains Shang polity.[84] Although there is no specific discussion on the issue of whether or not the Lower Xiajiadian had been recorded in the historical

[79] Chen, G. Q. and Zhang, Q. C. 2012: 106-111.
[80] Xia, B. G. 2011: 35-40.
[81] Xu, Z. F. 2010: 40-5.
[82] Han, J. Y. 2008: 48-59.
[83] Han, J. Y. 2008: 52-3.
[84] Zheng, S. Z. 2003:1-6; Sun, Y. G. 2007: 4-6.

documents, some Chinese researchers have touched upon this topic and quite a few interesting viewpoints have been raised. For example, Zou Heng 鄒衡 supports the view that the Lower Xiajiadian remains is related to the Sushen 肅慎 group,[85] while Zhang Zhongpei 張忠培 thinks the Lower Xiajiadian might be the Yi 夷 tribe mentioned in Shang text.[86] Other related arguments suggest the Lower Xiajiadian community included several regional groups in the northern part of Shang frontier, such as Guzhu 孤竹[87] and Shanrong 山戎[88]. On top of this, some scholars also try to connect the defensive nature of Lower Xiajiadian stone settlements with the leadership of local community rulers, arguing that the Lower Xiajiadian might already have developed into a state-level society.[89]

In contrast, much fewer scholars have discussed the possible origin of the Lower Xiajiadian settlements. Yang Zhaoli 楊召禮 compares the morphology and distribution of stone-constructed sites in south-central Inner Mongolia and the Chifeng region, suggesting that they were built and used in different periods and reflected distinctive social practices.[90] As such, he thinks the stone settlements

[85] Zou, H. 1980: 262-71. Sushen 肅慎 indicates an ancient ethnic group of people who lived in the northeastern part of China (in the area of present-day Jilin and Heilongjiang provinces) They were active during the Zhou Dynasty period (771-221 BC) and these two characters appeared as early as the 6th century BC in Chinese documents. According to the *Guoyu* 國語 and the *Classic of Mountains and Seas* 山海經 published in the Warring States period (476–221 BC), ancient Chinese believed that the Sushen paid arrows as tribute to Chinese rulers at the Central Plains.

[86] Zhang, Z. P. et al. 1987: 58-78. Yi 夷, which means "men of the east", was a collective term for ancient peoples living in eastern and northeastern China. The earliest known records of Yi were inscribed on oracle bones of late Shang dynasty (12-11th century BC) found in Anyang, Henan province.

[87] Guzhu 孤竹 refers to a vassal state occupying northeastern part of Hebei province during the Shang and Zhou periods (mid second to mid first millennium BC). According to the oracle bone inscriptions, Guzhu was founded under the enfeoffment of early Shang King "Cheng Tang 成湯". It is known from later historian records that Guzhu was conquered in the year 660 BC by Qi state.

[88] Shanrong 山戎, literally means the Rong people living in the mountains, was a collective term for communities living in northern Hebei province during the Spring and Autumn period (771-475 BC). Shanrong did not pay tribute to the Zhou Kings and therefore was regarded a hostile group and powerful threat to the Central Plains. In 7th century BC, the Dukes of Yan and Qi states defeated Shanrong and conquered its land. Thus, the area of northern Hebei was incorporated into the Zhou regime.

[89] Zhang, X. D. and Xin, Y. 2015: 93-102; Sun, Y. G. 2007: 4-6.

[90] Yang, Z. L. 2011

found in the Lower Xiajiadian culture area might have been evolved and partially transmuted from the earlier stone sites identified in central Inner Mongolia.[91] Holding a different opinion with Yang, Chen Guoqing 陳國慶 and Zhang Quanchao 張全超 argues for an indigenous impact on the emergence of Lower Xiajiadian stone settlements.[92] By reviewing the earlier extensive use of stone as construction material for burials and ritual structures in northeast China, especially during the Hongshan culture period (ca. 4500-3000 BC), Chen and Zhang regard Hongshan as an important technological source for Lower Xiajiadian's stone fortifications and residential architectures.[93]

In recent years, with a growing number of excavation data being published (eg. Erdaojingzi, Sanzuodian, Shangjifangyingzi), more and more archaeological information is available not only for investigating the Lower Xiajiadian settlements, but also provide further research data to look at many other aspects of the Lower Xiajiadian community, such as subsistence strategy, land-use, craft specialization, and dietary patterns.[94]

2.2.3 Research Work on the Dadianzi Cemetery

As the only fully excavated and reported burial site of the Lower Xiajiadian culture, Dadianzi cemetery provides a valuable dataset for archaeological analysis. In the excavation report (IA CASS 1996), detailed contextual data including cemetery plan, burial size, tomb furnishings, grave goods, and artifacts deposition are recorded. The excavators think that Dadianzi was used by a group of Lower Xiajiadian people around 1600 BC and the whole burial ground can be divided into three major sections (North, Central, and South). In each of these three sections, sub-clusters of

[91] Yang, Z. L. 2011.
[92] Chen, G. Q. and Zhang, Q. C. 2012: 106-111.
[93] Chen, G. Q. and Zhang, Q. C. 2012: 111.
[94] Yang, J. H. 2001; Teng, M. Y. 2004; Wang, S. Z. et al. 2004; Zhao, K. L. 2009; Wang, L. X. 2007; Sun, Y. G. 2013; Sun, Y. G. et al. 2014; Zhang, Z. H. 1989; Liu, X. Y. et al. 2017.

tombs are detected based on the shared shape of tripod *li* vessels and they might represent different clans.

Flad 2001 proposed a model combing various anthropological approaches to study the burial practices and artifacts at the Dadianzi cemetery.[95] The key logic behind this approach is to conduct quantified measurements of grave goods which had been carefully deposited in different contexts within each grave: the chamber, the niche, or the fill. The type value for each grave object is calculated by dividing the total number of graves in the cemetery by the number of graves in the relevant subdivision of the frequency distribution.[96] Flad's tabulations (Table 2.1) show that real cowrie shells, jade artifacts (including turquoise and other small stone/jade beads), painted ceramics (seven or more in a single grave) have especially high type values at the Dadianzi cemetery.

Table 2.1. Type Values System for the Burial Objects at the Dadianzi Cemetery (after Flad, R. 2002).

Type Value = (number of graves) / (frequent of object)

Deceased Grave Values	
Artifact or Type Attribute Type Value	**Type Value**
Spindle Whorl	7.7
Non-utilitarian Stone Axe	7.4
Bronze/Gold in Chamber	29.7
Chamber Real Cowrie Shell	37.1
Chamber Imitation Cowrie	30.9
Shell Chamber Jade (n = 84–859)	123.7
Chamber Jade (n = 9–52)	43.7
Chamber Jade (n = 1–7)	3.7
Ceremony Grave Values Artifact or Type Attribute	**Type Value**
Total Ceramics (n = 9–12)	185.5
Total Ceramics (n = 5–8)	25.6
Total Ceramics (n = 1–4)	1.3
Painted Ceramics (n = 7–10)	117.5
Painted Ceramics (n = 4–6)	43.7

[95] Flad, R. 2002: 23-51.
[96] Flad, R. 2002: 39.

Painted Ceramics (n = 1–3)	3.4
Real Cowrie Shell	46.4
Imitation Cowrie Shell	41.2
Jade	106.0

Therefore, each type of grave good is assigned a type value and the grave value is the sum of all the grave's type values. To identify the two distinct archaeological contexts that appear to be present at Dadianzi, Flad calculates the deceased grave value from the objects in the chamber and essentially measures the social status of the deceased individual; then the ceremony grave value, calculated based on objects in the niche and fill, is taken as a measure of the degree of elaboration of the funerary activities associated with the grave. As such, two separate grave values are associated with each tomb at Dadianzi, with intention of measuring the elaboration of the deceased individual and the funeral ritual, respectively.

On top of this, Flad 2002 applied the type value data in looking at the Dadianzi cemetery in a diachronic manner. By calculating the sum of a type value in every single tomb with chronological information, he found that the burials with the highest ceremony grave values date to the early period, while the burials with the highest deceased values date to the middle-period and late period. Therefore, it is suggested that a change occurred over time from a focus on elaborating burials during the strategic, ceremonial stage of the ritual process to elaboration during the social identity stage.[97]

However, two issues need to be questioned in this "value plus chronology" approach. In the first place, using the assumptions that a "deceased grave value", calculated from the objects in the chamber, indicates the social status of the deceased individual and a "ceremony grave value" refers to objects in the niche and fill, representing the degree of elaboration of the funerary rites, are artificial.

[97] Flad, R. 2002: 43-4.

Without any textual evidence, present-day archaeologists would not know whether there was any clear division between the meanings of the grave goods at Dadianzi. As it will be discussed in Chapter Four that there are many more issues that needs to be taken into consideration in detecting the social/economic position of a deceased at the Dadianzi cemetery: the size of the tomb shaft, how a burial was constructed, by what raw material and whether or not a foot niche was equipped. It may also be the case that some grave artifacts bore important historical/social relation to value in the past but were not numerically significant in Flad's calculation framework. In this sense, the efforts to artificially assign values and divide the grave goods can be very misleading. Secondly, it is also worth pointing out that Flad's basis for labeling "early", "middle" or "late" does not cover all burials at Dadianzi, but only 344 out of the total 805 graves. The sample is also unevenly distributed across each chronological phase: 209 tombs for the early period, 99 for the middle phase, and 39 for the late period. This dating, as will be discussed in Chapter Four, is grounded on the tentative chronology offered by the excavators, who solely referred to the stylistic change of one specific type of tripod *li* vessel at Dadianzi. That is to say, the rest of 461 tombs buried without a *li* or only with other types of tripods, did not enter the IA CASS 1996 chronological system[98] nor Flad 2002's diachronic analysis.

Although the diachronic patterns seen in the Dadianzi data are not completely clear-cut nor firmly based on established chronology, they did indicate a division that some burials were featured with an elaboration of burials through the placement of objects in the niche and fill, while some other graves were more characterized by an elaboration of the tomb chamber that contains the corpse. Flad (2002)'s major contribution is to develop a heuristic device for investigating burials and grave goods, assessing the elaboration of individual tombs of an Early Bronze Age burial ground in China's borderlands.

[98] IA CASS 1996.

Wu Jui-man (2004) examines the Dadianzi cemetery from the perspective of a gender relationship.[99] As in Flad 2002, Wu applies an artificial division between grave goods placed within tomb niches (said to reflect social status) and grave goods placed in the coffin (said to reflect personal identity). Calculating the number and the distribution of grave artifacts in each object type across two genders, Wu argues that gender-associated differences occur in both sets of grave goods. Eleven graves are defined as belonging to the elite group because they contained rich burial goods and are in close proximity to each other. In terms of gender relations and the tombs' spatial distribution, Wu claims that ''the social status of an elite female was closely related to that of the male buried in proximity to her''.[100]

This conclusion privileges male status as the data might as well be interpreted as the status of an elite male was related to that of the female buried in proximity to him. Pairing the tombs spatially by linking richly furnished female graves with even larger or equally large and richly furnished male tombs, Wu suggests an association that favors male occupants and dismisses a likely independent social role of females with impressive burials at the Dadianzi cemetery.

Apart from Flad and Wu, we have a few Chinese scholars focusing on specific types of burial objects found at Dadianzi. For instance, Huang Kejia 黃可佳 looks at the deposition and stylistic feature of the jade items found in the Dadianzi graves, arguing that the Lower Xiajiadian jade decoration system was heavily influenced by previous Hongshan culture (ca. 4500-3000 BC) tradition, while at the same time, showed cultural connections with Erlitou in Central China.[101] Huang also points out that, in contrast to the Hongshan period, jades in the Lower Xiajiadian culture did not occupy a high position in local funeral rites.[102] Considering the general tomb structures, Lower Xiajiadian burials differed completely from Hongshan culture

[99] Wu, J-Man. 2004: 47-94.
[100] Wu, J-Man. 2004: 88.
[101] Huang, K. J. 2015: 61-71.
[102] Huang, K. J. 2015: 69.

graves and the two periods' burial practices clearly showed no visible similarity. Related views that Hongshan seemed to be the source of Dadianzi jades are also held by Zhou Yujie 周宇傑,[103] Zhu Naicheng 朱乃誠[104], Yang Jing 楊晶[105] , and Liu Guoxiang 劉國祥.[106] Deviating from the Hongshan influence, Deng Cong 鄧聰 pays special attention to identifying the Erlitou cultural elements exhibited in the Dadianzi jade assemblage.[107] He examines the *bi* shape jades and *yue* jade axes from Dadianzi and compares them with the Erlitou counterparts. Based on his analysis, Deng suggests that there were clear Erlitou impacts on the Dadianzi jades.[108] However, as there has been no report of any characteristic Erlitou jade items in northeast China, Deng thinks that the cultural influence from Central China was still quite limited.[109]

Dadianzi painted ceramics and their decorations are another research focuses among the Chinese academia. Liu Cong 劉聰 looks at different painted graphic patterns and classifies them into three chronological sequences.[110] He argues that these decorative patterns were associated with different vessel shapes.[111] Throughout the use of the Dadianzi cemetery, painted designs were centered with depicting local floras of northeast China and they became more and more stylized in the late periods of Dadianzi.[112] A more general study on the polychrome pottery vessels is offered by Wang Ping 王蘋, who briefly discusses the typological variations of Dadianzi painted ceramics and argues that they were important status markers in the Lower Xiajiadian society.[113]

[103] Zhou, Y. J. 2017: 52-5.
[104] Zhu, N. C. 2016: 95-110.
[105] Yang, J. 2000: 69-77.
[106] Liu, G. X. 1999: 56-70.
[107] Deng, C. 2009: 171-5.
[108] Deng, C. 2009: 174.
[109] Deng, C. 2009: 174-5.
[110] Liu, C. 2015.
[111] Liu, C. 2015: 37-8.
[112] Liu, C. 2015: 40.
[113] Wang, P. 2019: 44-8.

2.3 Chapter Summary

As regards its stated purpose to "inquire what social, cultural and economic characteristics had contributed to the pronounced regional prosperity of Lower Xiajiadian culture", all essential scholarship that is pertinent to my research question has been covered in this chapter.

From a language perspective, the above review has included all English-written literature on the Lower Xiajiadian remains. However, it should be noted that there is a large amount of Chinese scholarship on the Neolithic remains of northeast China, some of which touches upon the Lower Xiajiadian period, but has not been reviewed in this chapter nor it will be referred to in the following writing. In some cases, for comparative reasons, this literature merely gives brief descriptions of the Lower Xiajiadian materials and compares them with other cultural periods/communities. The purpose of this literature was not to address in-depth questions of why these different periods featured contrasting material cultures or how these characteristics took form. In other cases, references on specific object types—such as the stylistic tradition of Dadianzi painted pottery, or the typology of Lower Xiajiadian oracle bones, though very thought-provoking in their research subfield—are not essentially relevant to the scope of this thesis.

Chapter Three: Settlements of the Lower Xiajiadian Culture

The main aim of this chapter is to contextualize the diversity of the Lower Xiajiadian 夏家店下層 settlements in western Liaoning and southeastern Inner Mongolia and to understand the settlement pattern in the second millennium BC. The following study includes several aspects: the chronology and characteristics of different settlement types, the constructive techniques employed, the use of subsistence resources, and the social functions of sites of various sizes.

3.1 Settlement Distribution

As has been noted in the Introduction chapter, various estimates have suggested that a much higher population living in western Liaoning and southeastern Inner Mongolia during the Lower Xiajiadian period than any earlier culture periods. These estimates are based on on-site numbers and site densities in northeast China. To date, the total number of known Lower Xiajiadian period locations is more than two thousand.[114] However, only twenty-five excavated settlement sites (Table 3.1a, b) are included in the following analysis, as they are the only well-published excavated material currently available.[115]

[114] Zhongguo Wenwuju 2003: 54-5 and 2009: 58-9. Apart from the Chinese National Survey, three major body of regional survey data on the Lower Xiajiadian sites has also been referenced: Xu, G. J. 1986, Shelach, G. 1999 and CICARP 2011.

[115] Early surveys on Lower Xiajiadian settlements before 1990s were offered by two scholars: Tong, Z. C, 1946 and 1957, and Xu, G. J. 1986. Then we have Gideon Shelach's survey data near the Chifeng city (Shelach 1999) and the regional settlement survey by Chifeng International Collaborative Archaeological Research Project (CICARP) from 1999-2001, 2003, 2006 and 2007 (CICARP 2011).

Table 3.1a. Type A: Low-Platform settlements.

SITE	SITE AREA （SQM）	EXCAVATED AREA （SQM）	REFERENCE
XIDACHUAN 西大川, BEIPIAO, LN	-	1700	IA CASS 2001
FENGXIA 豐下, BEIPIAO, LN	7,500	650	Liaoningsheng Wenwu Ganbu Peixunban 1976
LUOGUODI 羅鍋地, CHAOYANG, LN	10,000	-	Liaoningsheng Kaogu Yanjiusuo 2004
REDIANCHANG 熱電廠, CHAOYANG, LN	20,000	575	IA CASS 1988
SHUIQUAN 水泉, JIANPING, LN	20,000	2200	Liaoningsheng Bowuguan 1986
KALAQIN HEDONG 喀喇沁河東, JIANPING, LN	12,000	75	Liaoningsheng Bowuguan 1983b
XIANLINGSI 仙靈寺, XINGCHENG, LN	17,550	800	IA CASS 1985a
XIAOYUSHULINZI 小榆樹林子, NINGCHENG, LN	5,670	100	Neimenggu Wenwu Kaogu Yanjiusuo 1965
XIDALIZI 西大礫子, JINZHOU, LN	8,000	1,000	Liaoningsheng Kaogu Yanjiusuo 2015
DONGSHANZUI 東山咀, CHIFENG, IM	28,000	450	Liaoningsheng Bowuguan 1983a
ERDAOJINGZI 二道井子, CHIFENG, IM	50,000	13,000	Neimenggu Wenwu Kaogu Yanjiusuo 2010
DASHANQIAN 大山前, CHIFENG, IM	-	1550	IA CASS 1998, 2004
DADIANZI 大甸子, AOHAN, IM	17,000	220	IA CASS 1996

Table 3.1b. Type B: High Hillforts.

SITE	SITE AREA（SQM）	EXCAVATED AREA（SQM）	REFERENCE
KANGJIATUN 康家屯, BEIPIAO, LN	150,000	8,500	Liaoningsheng Kaogu Yanjiusuo 2001
PINGDINGSHAN 平頂山, FUXIN, LN	-	555	Liaoningsheng Kaogu Yanjiusuo 1992
CHENGZISHAN 城子山, LINGYUAN, LN	7,900	200	Liaoningsheng Kaogu Yanjiusuo 1986
KANGJIAWAN 康家灣, CHIFENG, IM	-	1500	Neimenggu Wenwu Kaogu Yanjiusuo 2008c
SANZUODIAN 三座店, CHIFENG, IM	11,600	9000	Neimenggu Wenwu Kaogu Yanjiusuo 2006, 2007
DONGBAJIA 東八家, CHIFENG, IM	22,400	-	Tong, Z. C. 1957
SHANGJIFANGYINGZI 上機房營子, CHIFENG, IM	-	2437	Neimenggu Wenwu Kaogu Yanjiusuo 2008a, 2012
XILIANG 西梁, CHIFENG, IM	5,000	3000	Neimenggu Wenwu Kaogu Yanjiusuo 2008b, 2012
YANTAISHAN 硯台山, CHIFENG, IM	-	3000	Neimenggu Wenwu Kaogu Yanjiusuo 2002
ZHIZHUSHAN 蜘蛛山, CHIFENG, IM	20,000	100	IA CASS 1979
XINDIAN 新店, CHIFENG, IM	10,000	-	Xu, G. J. 1986
DANANGOU 大南溝, CHIFENG, IM	7,000	-	Wulanchabushi Bowuguan 2015

Shown in Figure 3.1 are the locations of these twenty-five excavated large settlements. In the western part of Liaoning province, we have several sites distributed in the Beipiao 北票 and Chaoyang 朝陽 regions, and the second group of settlements, including the Dadianzi cemetery, were located further northwest in the Aohan Banner 敖漢旗 of southeastern Inner Mongolia. The third group of sites is stone fortified settlements constructed northwest of present-day Chifeng 赤峰 city, such as Sanzuodian 三座店 and Shangjifangyingzi 上機房營子. They were

found centered along the Yin 陰 and Yingjin 英金 River valleys, where chains of stone sites have been reported.

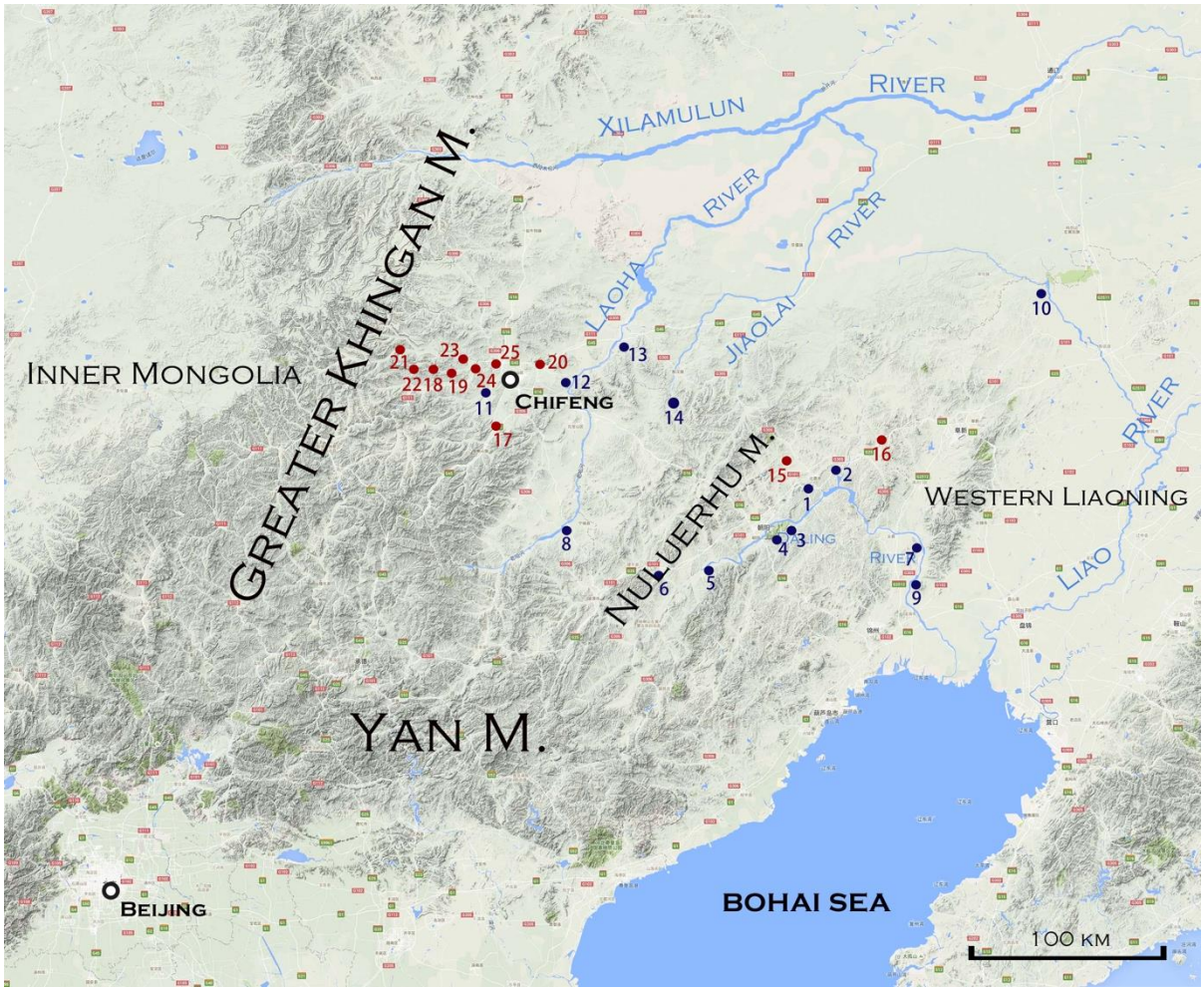


Figure 3.1. Distribution of major Lower Xiajiadian sites (Blue symbols stand for mud-brick sites and red symbols for stone constructed sites). 1: Xidachuan; 2: Fengxia; 3: Luoguodi; 4: Redianchang; 5: Shuiquan; 6: Kalaqin Hedong; 7: Xianlingsi; 8: Xiaoyushulinzi; 9: Xidalizi; 10: Nanpaozigou; 11: Dongshanzui; 12: Erdaojingzi; 13: Dashanqian; 14: Dadianzi; 15: Kangjiatun; 16: Pingdingshan; 17: Chengzishan; 18: Kangjiawan; 19: Sanzuodian; 20: Dongbajia; 21:Shangjifangyingzi; 22: Yantaishan; 23: Zhizhushan; 24: Xindian; 25: Yinjiadian (Map By author. Background pale red and green symbols indicate the modern motor road and national highway systems).

3.2 Site Classification and Relative Chronology

Although the 25 excavated settlements revealed sufficient material for archaeologists to determine the period and main character of the occupation, none of them has been fully exposed by archaeological fieldwork. Only Erdaojingzi 二道井子 and Sanzuodian 三座店 have been recently excavated and are better published.[116] The archaeological work on the other 23 sites was relatively more limited (Table 3.1a, b). They have been partially exposed, either under test excavation or, in some cases, artifacts were collected from stratigraphic sections and used to date of these locations.

The study of Lower Xiajiadian settlements first requires a thorough understanding of the landscape in which the sites were situated. This landscape viewpoint enables us to organize settlement data according to three structuring elements: the space, the size, and the method by which the site was built. In the following writing, based on each site's topographic character and constructive technique, I classify the excavated and surveyed Lower Xiajiadian settlements into three categories: Type A, the low-platform sites built with mudbricks and ditches, Type B are stone constructed high hill-forts and Type C, small hill-slop locations. Type B and a large proportion of Type C sites are built with stone walls and are thus more fortified than the low-platform settlements. The distinction between the large settlements (Type A and B) and small hill-slop sites (Type C) is also considered in terms of their socio-economic functions in section 3.5 of this chapter.[117]

The site distribution map (Figure 3.1) shows quite clearly that settlements built on low platforms were dispersed in the eastern area while the stone ones showed a

[116] Neimenggu Wenwu Kaogu Yanjiusuo 2006, 2007 and 2010.

[117] However, in fact, the topographic criteria do raise some problems resulting from the vague or no description of some small Lower Xiajiadian sites, especially those recorded by regional surveys. This situation will of course prevent a comprehensive assessment of some topographic implementation of the Lower Xiajiadian settlements.

high concentration northwest of Chifeng city. This spatial difference suggests a fundamental division of architectural methods among the Lower Xiajiadian community, which has never been recognized in past literature.

From the point of view of field archaeology, stratigraphically based chronology suggests that the stone-constructed Lower Xiajiadian sites near the Chifeng area (Type B) were built later than the mudbrick and rammed earth structures (Type A). At Erdaojingzi 二道井子, one of the Type A settlements, archaeologists found that in the last periods of its occupation, the stone started to be used for constructing walls and as a sort of repair and reinforcing material (Figure 3.2). Related chronological information has also been revealed from the Kangjiatun site 康家屯 (Type B), where excavators noted that ground-level stone constructed houses were built on top of semi-subterranean pit houses, which were made with mudbrick walls.[118]

The above evidence points to a suggestion that there was a probable chronological sequence between the Lower Xiajiadian settlements that were constructed with mudbrick/rammed earth in western Liaoning and the ones built in stones on the edge of the Mongolian Plateau. To test this hypothesis, in the next section, I bring in all published C14 radiocarbon dates and their locations for a reassessment of the Lower Xiajiadian chronology.

[118] Li, W. Y. 2015: 40.



Figure 3.2. Evidence of stones being used in constructing residential walls at Erdaojingzi (photo by author).

3.3 Radiocarbon Dates

A total of 47 ^{14}C radiocarbon dates labeled as belonging to the Lower Xiajiadian culture have been published over the years (Table 3.2), including dates obtained from settlements, tombs, and stratigraphic sections. Through calibrating and plotting them individually, one date from Dashanqian (Lab number: ZK-2934) has been excluded from the following discussion as the ZK-2934 raw date produces an uncertainty range of four hundred years and is marked as an outlier in the Oxcal model.[119]

Table 3.2 Radiocarbon dates for the Lower Xiajiadian culture (based on data available till January 2020).

LOCATION	LAB NUMBER	MATERIAL	CONTEXT	RAW DATE	REFERENCE
LOCATION 342, **CHIFENG, INNER MONGOLIA**	BA-6769	Charcoal	054(4)	3190±35	CICARP 2011: 21.
	BA-6770	Charcoal	055(5)	3335±35	"
	BA-6771	Charcoal	093(7)	3235±35	"

[119] Oxcal v4.3.2. Ramsey, B. 2009, 2017.

(42°2′54.67″N, 118°45′9.14″E)	BA-6772	Charcoal	271(24)	3280±35	“
	BA-6773	Charcoal	309(13)	3375±40	“
	BA-6774	Charcoal	420(15)	3370±35	“
	BA-6775	Charcoal	426(16)	3370±35	“
	BA-6776	Charcoal	578(26)	3260±35	“
	BA-6777	Charcoal	584(26)	3300±35	“
	BA-6778	Charcoal	585(24)	3305±35	“
LOCATION 674/DIANJIANGTAI**, CHIFENG, INNER MONGOLIA (42°12′N, 118°54′E)**	BA-2241	Charcoal	674X054	3183±60	CICARP 2011: 21.
	BA-2242	Charcoal	674X052	3230±60	“
	BA-2243	Charcoal	674X049	3100±100	“
	BA-2244	Charcoal	674X047	3220±60	“
	ZK-2651	Charcoal	90MCDT103(13)	3278±55	Zhongguo 1993: 646.
	ZK-2652	Charcoal	90MCDT104(6)	3327±58	“
DADIANZI**, AOHAN, INNER MONGOLIA (42°18′N, 120°36′E)**	ZK-0402	Wooden remains	Tomb M454	3390±90	Zhongguo 1991: 56.
	ZK0480	Wooden remains	Tomb M759	3420±85	“
DASHANQIAN **HARQIN, INNER MONGOLIA (41°54′N, 118°36′E)**	ZK-2934	Charcoal	96KD I H12	3834±400	Zhongguo 1997: 35.
	ZK-2935	Charcoal	96KD I H34	3157±75	“
	ZK-2938	Charcoal	96KD I T111(2)	3418±70	“
	ZK-2939	Charcoal	96KD I T408(4)	3403±83	Zhongguo 1999: 80.
	ZK-2941	Charcoal	96KD I T434 F18	3462±79	“
	ZK-3017	Charcoal	98KD IV M1	3141±51	Zhongguo 2000: 70.
	ZK-3025	Charcoal	98KD IV H210(3)	3374±55	Zhongguo 2000: 71.
	ZK-3032	Charcoal	98KD IV H246(4)	3140±56	“
	ZK-3033	Charcoal	98KD IV H306	3180±57	“
	ZK-3034	Charcoal	98KD IV H294(1)	3027±55	“
	ZK-3035	Charcoal	98KD IV F62(2)	3164±57	“
	ZK-3036	Charcoal	98KD IV F66(2)	3184±77	“
FANZHANGZI**, AOHAN,**	WB82-38	Wooden remains	Tomb M78	3180±90	Zhongguo 1991: 56.

INNER MONGOLIA (42°17′N, 119°55′E)	ZK-1208	Wooden remains	Tomb M79	3545±95	"
	ZK-1209	Wooden remains	Tomb M84	3510±75	"
FENGXIA, **BEIPIAO, LIAONING (41°54′N, 120°37′E)**	ZK-0153	Charcoal	T9, 10(3)	3550±80	Zhongguo 1991: 68.
REDIANCHANG, **CHAOYANG, LIAONING (41°35′0.00″N, 120°27′0.00″E)**	ZK-2222	Charcoal	T13(2)	3535±55	Zhongguo 1991: 67.
	ZK-2223	Charcoal	T6(3)	3430±250	Zhongguo 1991: 68.
	ZK-2224	Charcoal	T6(4)	3580±75	"
	ZK-2225	Charcoal	T6(4) F20	3725±135	"
SANZUODIAN, **CHIFENG, INNER MONGOLIA (42°21′47.49″N, 118°36′47.08″E)**	BA-6837			3025±35	CICARP 2011: 21.
	BA-6838			3240±30	"
	BA-6839			3265±30	"
SHUIQUAN, **JIANPING, LIAONING (41°17′25.34″N, 119°54′36.77″E)**	ZK-0695	Charcoal	T26(4) F41	3540±75	Zhongguo 1991: 66.
	ZK-0699	Charcoal	T15(5)	3780±90	"
ZHIZHUSHAN, **INNER MONGOLIA (42°20′N, 118°57′E)**	ZK-0176	Charcoal	H42	3965±90	Zhongguo 1991: 55.
XIANGLUSHAN, CHIFENG INNER MONGOLIA	Beta-382772	Broomcorn millet		3340 ± 30	Jia, X. et al. 2016: 5.
	Beta-383366	Foxtail millet		3360 ± 30	"
BAOGULUXI, **NINGCHENG LIAONING**	Beta-394222	Foxtail millet		3450 ± 30	"

The remaining 46 radiocarbon dates are taken as reliable to indicate the potential range of the Lower Xiajiadian culture and incorporated into a Bayesian model in OxCal (Figure 3.3a).[120] As noted above, the landscape and location of a site mattered remarkably in the site's position in the relative chronology within the Lower Xiajiadian occupation. Therefore, following the previous discussion, the sites

[120] Oxcal v4.3.2. Ramsey, B. 2009, 2017.

in Table 3.2 can be divided into two distinct groups based on the location and how each site was constructed. Type A sites include Zhizhushan, Fengxia, Shuiquan, Baoguluxi, Redianchang, Fanzhangzi, Xianglushan, Dadianzi, and Dashanqian; and the others belong to the Chifeng area stone locations: Dianjiangtai, Chifeng Location 342, and Sanzuodian.

As shown in Figure 3.3a, Type A-related sites generally suggest a date range from ca. 2000 BC to 1500 BC, representing the early to middle occupation period of the Lower Xiajiadian culture in northeast China. Each sequence indicates the date range of a location-based on calibration using a probability range of 95.4%. As most of the dating samples for these locations were collected during archaeological excavations before 1990, it seems unlikely that they were systematically sampled from the bottom layer all the way contiguously up to the very surface of a site's stratigraphy. Therefore, we cannot assume that the date range of each sequence shown in Figure 3.3a represents the entire occupation period of an archaeological site. In this case, as we are not able to determine the relationship between each sequence (site), a general sequential or contiguous phasing cannot be adequately applied in the OxCal model. As such, I treat each Sequence (the group of the date for one Lower Xiajiadian site) independently, taking into consideration that some of them might overlap with each other to some extent. Both before and after each model sequence, I apply "Sigma Boundary" functions in OxCal to determine the start and end date, which allows the events to spill beyond the dates of the boundaries themselves (Figure 3.3a).[121] Within each of the sequences, the 14C data are included using the "R_Date" function.

[121] Ramsey, B. 2009: 346-7.

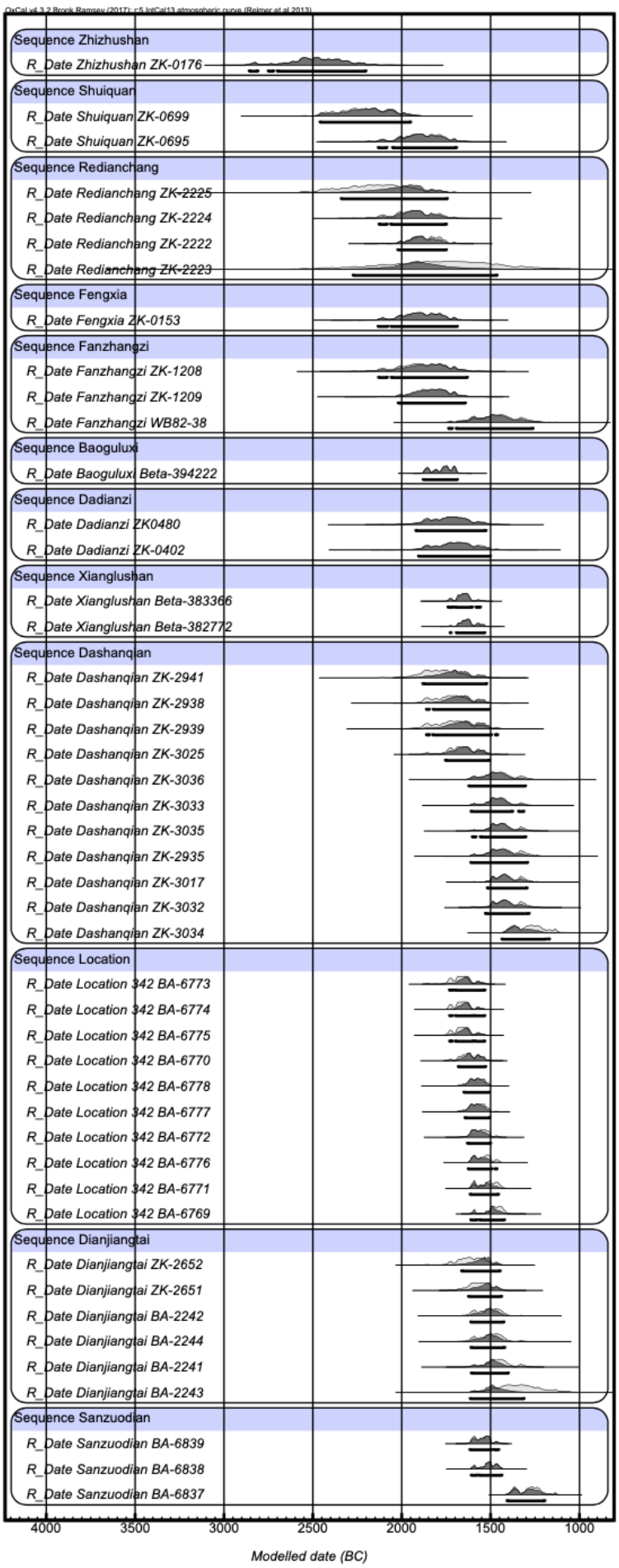


Figure 3.3a. Figure 3.3. Radiocarbon dates for the Lower Xiajiadian culture (data source see Table 3.2).

It can be seen in Figure 3.3a that, except for Dashanqian, all other Type A sites built with rammed earth and mudbricks produced a date range no later than ca. 1500 BC. Clearly, till around 1600 BC, Dashanqian was still in use. However, it was also in 1600 BC that we begin to have radiocarbon dates for sites, for example, Location 342, in the Chifeng region, indicating that part of the Lower Xiajiadian population started to move into southeastern Inner Mongolia. Figure 3.3a also shows that there was a long overlapping period between the latest known Type A site, Dashanqian, and the earliest known Type B locations, Location 342, from ca. 1600 to 1400 BC.

Knowing the relative order and archaeological background of Type A and Type B sites, we can then regard them as two groups of events. Using the Bayesian mathematics as a tool for combining radiocarbon dating results on findings from one archaeological context, in this sense, Type A and Type B respectively, we can arrive at a more precise and accurate date. To operationalize this combination, the dates of Type A and Type B are presented in Oxcal as two individual "Phases" within a broader collective "Lower Xiajiadian Sequence", and the Type A Phase is constrained to lie earlier than the Phase of Type B sites. Within each Phase, all the ^{14}C data were included using the "R_Date" function. Meanwhile, the "Summary Date" function has also been applied to provide summary statistics for the time ranges of Type A and Type B occupation in northeast China. Additionally, the "Sigma Boundary" function is applied to represent the start and end date of both Phases.

Figures 3.3b and 3.3c show the probability distribution and modeled start and end dates of the construction and occupation of Type A and Type B sites. Firstly, we understand precisely the relative order of Lower Xiajiadian site use, that it was during 1656-1557 BC (95.4% probability) that Type A sites were gradually abandoned and Type B locations were constructed from 1632 to 1546 BC (95.4% probability). Secondly, compared with Figure 3.3a, the model with constraints also facilitates the visualization of both types of Lower Xiajiadian sites and their occupational periods (Figure 3.3c). We now have a clear idea that Type A sites were used by the local

community for a longer span than Type B locations and there is no visible interval or gap between the two phases. The end date range of Type A locations (1656-1557 BC, 95.4% probability) highly overlaps with the start date range of Type B sites (1632-1546 BC, 95.4% probability), indicating that both types of settlements were used in mid-second millennium BC. This also underscores a possibility that the remains of stones discovered from the upper deposition layers at several of the Type A settlements were constructed contemporarily with the stone episode seen in the Chifeng region.

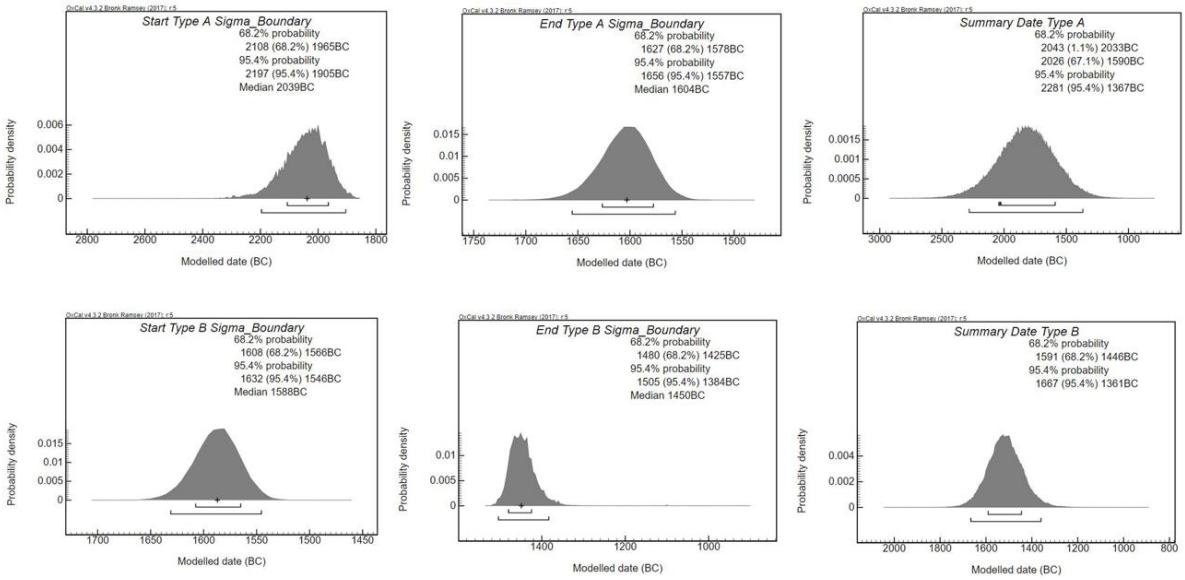


Figure 3.3b. Modelled start and end date probability, and summary dates of Type A and Type B settlements.

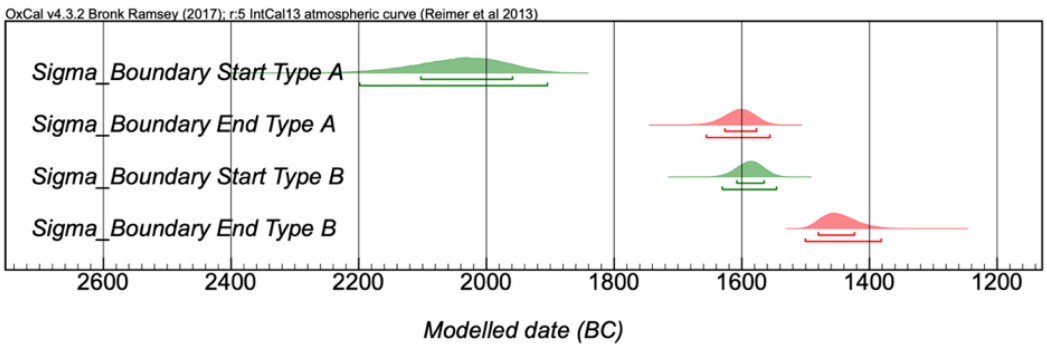


Figure 3.3c. Modelled start and end date of Type A and Type B sites.

On the whole, the probability distribution of the period for Type A and Type B sites have reaffirmed my previous argument that stone sites of the Chifeng region were chronologically later than rammed-earth and mud-brick settlements found in western Liaoning province. That is to say, as the Lower Xiajiadian people gradually moved to the northwestern highlands, they started to use stone, instead of mudbricks or rammed earth to build their residential houses. Based on the OxCal modeling, we know it more precisely that it was from around 1600 to 1500 BC that stones replaced mudbrick and rammed earth, becoming the major constructive material in the Lower Xiajiadian culture.

3.4 Habitation Sites and Settlement Patterns

3.4.1 Type A: Low-Platform Settlements

This thesis includes in this category a total of thirteen reported sites that are located on a tableland near a river. As shown in Table 3.1a, the average size of known Type A sites is 17,800 sqm and most sites are more than 10,000 sqm. Erdaojingzi 二道井子 site in western Liaoning, with a size of 50,000 square meters, is the largest one currently reported.

The following features characterize the Type A settlements:
—Extensive in area, ranging from 5,600 to 50,000 square meters.
—Distributed near the valley bottom on low tablelands, with convenient access to the water resource.
—Built with mudbrick and rammed earth technology
—Especially rich in cultural accumulations with dense housing constructions.
—Some with ditches, rammed earth enclosures, some without.

Typical sites of this type include Fengxia 豐下,[122] Shuiquan 水泉,[123] Dashanqian 大山前[124] in Liaoning and Dongshanzui 東山咀,[125] Erdaojingzi 二道井子 near Chifeng.[126]

A common characteristic that differentiates Type A from Type B sites is the rich cultural accumulations. At Type A settlements, multiple tiers of housing remains can usually be observed, overlaying one another from the very bottom to the current floor surface. A preponderance of arable land is found surrounding large Type A sites

[122] Liaoningsheng Wenwu Ganbu Peixunban 1976.
[123] Liaoningsheng Bowuguan 1986.
[124] IA CASS 1998; IA CASS 2004.
[125] Liaoningsheng Bowuguan 1983.
[126] Neimenggu Wenwu Kaogu Yanjiusuo 2010.

in western Liaoning. For example, Dongshanzui 東山嘴, Fengxia 豐下, and Shuiquan 水泉 sites are reported to be built on secondary terraces.[127] These sites are all located less than 50 meters from waterways and agricultural lands, suggesting that dry-land farming very likely formed the most important component of the subsistence economy of these Lower Xiajiadian communities.

Inner Structure

The settlement plan of Type A sites can be discerned from the excavated areas in the 13 published locations. The houses were largely round or square, either built as semi-subterranean pit houses or ground-level dwellings. The latter type—surface houses—constituted most housing types.

Facing south, the semi-subterranean pit houses found at Type A settlements are mostly round and small (3.5 meters in diameter on average). Equipped with a stepped doorway, a pit was first dug into the ground with the floor usually coated with lime plaster powder (mixed with staw). Occasionally, post holes are identified in the house floors. In a few round pit houses, for example, F1 and F2 of Dongshanzui, there are two larger post holes located at symmetrical positions in the middle to support the roof (Figure 3.4a, b).[128]

[127] Liaoningsheng Wenwu Ganbu Peixunban 1976; Liaoningsheng Bowuguan 1986; Liaoningsheng Bowuguan 1983.
[128] Liaoningsheng Bowuguan 1983a: 421-2.

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 3.4a. Plan of house F1 at the Dongshanzui site (after Figure 3 of Liaoningsheng Bowuguan 1983a).

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 3.4b. Plan of house F2 at the Dongshanzui site (after Figure 4 of Liaoningsheng Bowuguan 1983a).

An identical arrangement of double post holes is also reported from F86 at the Dashanqian site, each with a diameter of 25 centimeters (Figure 3.5).[129] At the bottom of these post, holes is usually a layer of potsherds.



Figure 3.5. Plan of house F86 at the Dashanqian site
(after Figure 3 of IA CASS 2004).

The walls of Type A semi-subterranean houses can be varied. Fourteen houses at Fengxia 豐下 site were found with double walls—mudbricks making the inner wall and stone constructing an outer wall. Rammed earth technology has also been found at Fengxia in constructing the inner side of house walls (house F5).[130] At Xidalizi 西大礫子 site, the only excavated house, F1, was built with a single-panel stone structure.[131] Several sites yielded burnt-soil deposits in the middle of a house and these might be indoor cooking areas.[132] Dongshanzui 東山嘴 house F1 (Figure 3.4a), F2 (Figure 3.4b), and F5 (Figure 3.6) were equipped with niches against the wall.[133] Smoke marks and ash remains inside and around these niches encouraged the excavators to think they were not purely ventilation openings, but fireplaces. As it can be very humid to live in these semi-subterranean pit houses, Lower Xiajiadian

[129] IA CASS 2004: 33.
[130] Liaoningsheng Wenwu Ganbu Peixunban 1976: 200.
[131] Liaoningsheng Kaogu Yanjiusuo 2015: 3-4.
[132] Liaoningsheng Wenwu Ganbu Peixunban 1976; Liaoningsheng Bowuguan 1986; Neimenggu Wenwu Kaogu Yanjiusuo 2010.
[133] Liaoningsheng Bowuguan 1983a: 421-2.

residents had probably made a fire against the wall to keep moisture away and increase the indoor temperature during winter times. The large physiographic zone in which northeast China situate belongs to a semi-arid, continental monsoon climate region. The yearly average temperature in most parts of the Lower Xiajiadian area is between 0°C and 7°C, with a very low January mean temperature of -18°C to -22°C.[134] Therefore, retaining heat in the houses during winter was essential for the Lower Xiajiadian residents.



Figure 3.6. Plan of house F5 at the Dongshanzui site
(after Figure 5 of Liaoningsheng Bowuguan 1983a).

Excavation at the Xianlingsi 仙靈寺 site revealed eight semi-subterranean circular pit houses, of which three have been well-preserved.[135] They range from 15 to 20 square meters, bearing identical inner structures to those found in Dongshanzui and Dashanqian: inside two enclosing stone walls, archaeologists found two large postholes symmetrically arranged on the floor, and a middle cooking area with a hard floor surface and some pellets of burnt soil.

Traces of intensive repairs on indoor floors have been identified at many Type A settlements. When a house was first built, the floors were usually paved carefully

[134] CICARP 2010: 37.
[135] IA CASS 1985a: 124-5.

with a mixture of mud and straw before a layer of lime powder was applied for a white and smooth ground. Sometime later, people would clear and level the floor. These ground-leveling activities repeatedly happened throughout the use of these Type A settlements. At house F5 in Fengxia site for example (Figure 3.7), six layers of new floors were laid down on top of the former ones, and the bottom layer is the original living surface when the house was first constructed.[136] The total thickness of floor layerings found at another Fengxia house, numbered F2, is nearly two meters.[137]



Figure 3.7. Plan of house F5 at the Fengxia site
(after Figure 5 of Liaoningsheng Wenwu Ganbu Peixunban 1976).

[136] Liaoningsheng Wenwu Ganbu Peixunban 1976: 200.
[137] Liaoningsheng Wenwu Ganbu Peixunban 1976: 199.

Similarly at Kalaqin Hedong site 喀喇沁河東, five houses were found overlaying one another and the entire housing foundation is 2.4 meters in depth.[138] Observing the cross-section, we see that sometimes when the side wall of a house collapsed, new earth and mudbricks were brought in for building new walls and floors, which would be superimposed on the leveled ruins of the old ones. The continuous layering found at many Type A Lower Xiajiadian settlements made the whole residential ground level rise. Therefore, in the later period of the occupation, due to the accumulation of consecutive layers of deposits over their long history, Type A sites gradually rose in height.[139]

Apart from semi-subterranean houses, ground-level dwellings are also widely seen in the Lower Xiajiadian archaeological literature, accounting for the major house type in both Type A and Type B settlements. Below I take Erdaojingzi as an example to illustrate the construction features of a long-occupied Lower Xiajiadian residential area.

[138] Liaoningsheng Bowuguan 1983b.

[139] This sort of build-up is not yet found in other parts of China but is very commonly seen in Western Asia (Garfinkle, S. 2013). The walls of many Near East city states rose to great heights and are visible at far distances. The great height difference represented the landmark of human activities in the Near East, and also guaranteed its residents safety from an often flat and hostile Mesopotamia environment, in a sense that the raised platform increased the force (via gravity) and accuracy (a much better view) of defenders' weapons while decreasing those of their attackers. Similar with the cases in Western Asia, large Type A settlements of the Lower Xiajiadian culture remained in use and were rebuilt on their original locations over a long period of time. However, based on current data, archaeologists do not know which forms of defensive facilities and constructive features were used in these low-platform Lower Xiajiadian sites. As will be discussed in Section 3.4.2, there is no clear evidence of inter-group conflict during this period, the purpose of these raised platforms/foundation in Type A sites requires further investigation. One possibility might of course be that they were the result of unintentional anthropogenic behavior as people have their houses rebuilt and repaired.

Erdaojingzi 二道井子

Situated on the eastern border of Inner Mongolia, Erdaojingzi is a recently discovered well-preserved Lower Xiajiadian walled settlement, which includes a wide range of settlement structures: ditches, walls, ground-level dwellings, storage pits, and roads (Figure 3.8a,b).



Figure 3.8a. Erdaojingzi site before excavation
(photo by author at the Erdaojingzi Museum).

Enclosure walls and a moat defined the sectors of a concentrated residential area at Erdaojingzi. With a six-meter deep irregular V-shape profile (Figure 3.9), the trench has a length around the site of 660 meters. The width at the top is 11.8m and the narrow bottom width ranges from 0.2 to 0.5 meters.[140] Very few archaeological remains have been found inside the trench and there is no report of any evidence for it being filled with water during the Lower Xiajiadian period.

[140] Neimenggu Wenwu Kaogu Yanjiusuo 2010: 5.

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 3.8b. Erdaojingzi site during excavation
(after Color Plate 5-1 of Neimenggu Wenwu Kaogu Yanjiusuo 2010).

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 3.9. Section view of the Erdaojingzi moat
(after Color Plate 6-3 of Neimenggu Wenwu Kaogu Yanjiusuo 2010).

Against the inner side of the trench, rammed earthen walls were erected. Archaeologists have identified seven layers of piled soils on the sides and top of the original wall body. At some vulnerable sections, mud bricks were further used to improve the stability (Figure 3.10). The surviving height of the walls is more than six meters, with a base as wide as 9.6 meters.[141] So, the current drop between the bottom of the trench and the top of the walls is nearly 12 meters. These numbers show that Erdaojingzi is a site with strong defensive features, though it is still controversial whether these walls and trenches at Erdaojingzi were constructed for defense against attackers, or to protect the residents from flood events and wild animals. As the site is located no more than 100 meters from a river in the south and west, the trench and wall were likely designed for preventing water from ruining the settlement. However, the cross-section of the trench did not seem to be very effective to hold water and there is no recovery of any evidence that there was water or silt at the bottom of the ditch.

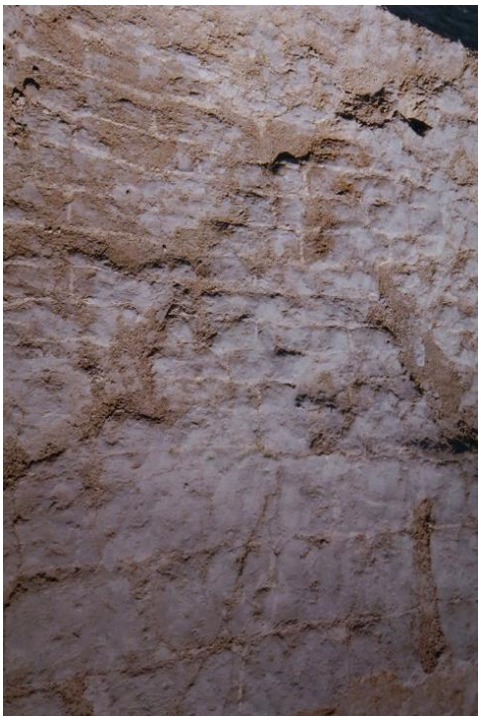


Figure 3.10. Remains of mudbricks on the Erdaojingzi wall (photo by author).

[141] Neimenggu Wenwu Kaogu Yanjiusuo 2010: 5. There has not been any report of residential structures outside the Erdaojingzi enclosure.

Another possibility would be that the wall and ditch arrangement was designed to protect against wild animals. It should be noted that the stone artifacts reported from the Erdaojingzi site are too large to be considered as hunting implements but more likely as agricultural tools.[142] Four bone arrowheads (no more than eight centimeters long) have been reported from Erdaojingzi, suggesting that some hunting activities existed during the Lower Xiajiadian period, but not likely on a large scale.[143] A similar situation has also been noted by Wang Lixin in his 2007 review of the Lower Xiajiadian animal resources, the proportion of wild animal remains in Lower Xiajiadian settlements is very rare—no more than 1%—in which Cervidae and hare were most common.[144]

[142] Neimenggu Wenwu Kaogu Yanjiusuo 2010: 22-3. The major stone objects found at the Erdaojingzi site include axes, shovels, adze, grinders, mortar and pestles, none of which seems to be a helpful device to capture wild animals.
[143] Neimenggu Wenwu Kaogu Yanjiusuo 2010: 24.
[144] Wang, L. X. 2007: 353-354.

A total of 149 housing remains have been found within the earthen wall (Figure 3.11).[145] The typical dwelling unit at Erdaojingzi consists of a round ground-level house with an average area of 15 square meters, and an adjacent walled area of up to 100 square meters.



Figure 3.11. Remains of Erdaojingzi houses (photo by author).

Five houses have been fully published in the brief report and they range from 7 to 22 square meters (Figure 3.12).

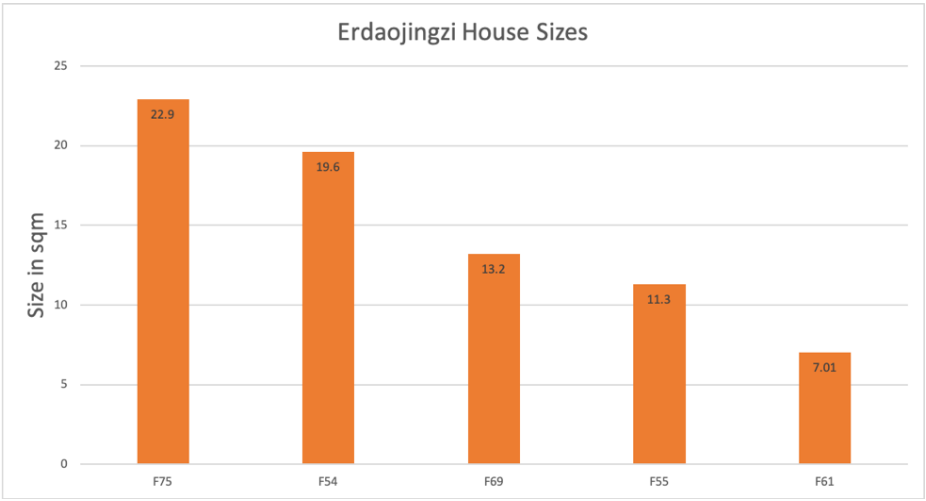


Figure 3.12. Sizes of reported Erdaojingzi houses.

[145] Neimenggu Wenwu Kaogu Yanjiusuo 2010: 5-8.

Storage pits and attached side houses are usually identified near the main chamber and are further enclosed by an outer wall. Within the walled area, internal walls sometimes further subdivided the courtyard into a few functional zones (Figure 3.13)—presumably for storing different things or for small domestic animals. A total of three pits have been reported at Erdaojingzi and they range from 0.5 to 7.9 square meters. Such a combination of the main room with associated facilities forms a rather self-sufficient residential sector.



Figure 3.13. Subdivision of courtyard at Erdaojingzi (photo by author).

This is best exemplified by the house Unit no.3 at Erdaojingzi (Figure 3.14a, b).[146] Covering an area of 75 square meters, Unit no.3 is rectangular in outline and has in the middle a central house F69. As the major component, F69 was carefully built with mudbrick walls and painted with silt paints on the inside (Figure 3.14c). The inside floor is 12 centimeters higher than the outside and a hearth has been identified in the center. The hard surface of the indoor stepped area shows that the floor had gone through a firing process. Outside F69 on the other side of Unit no.3 are two ground-level annex structures, house F61, and pit H153. Both are built with

[146] Neimenggu Wenwu Kaogu Yanjiusuo 2010: 16.

the rammed earth technique. Together with a further side wall, Q3, three subdivided areas can be identified very clearly from the unit plan (Figure 3.14a, b).





Figure 3.14a, b. Plan of house Unit 3 at Erdaojingzi (after Figure 4 and Color Plate 6-2 of Neimenggu Wenwu Kaogu Yanjiusuo 2010).

On all four sides, Unit no.3 was enclosed by walls, of which some sections were constructed by rammed earth with stone.[147] With an entrance facing the south, Unit no.3 was separated by narrow alleys from nearby housing units (Figure 3.14a, b). In

[147] Neimenggu Wenwu Kaogu Yanjiusuo 2010: 16.

Figure 3.14a, letter A represents a dirt road north of the house Unit no.3 wall, beyond which is another residential complex, house Unit no.2. To the east of Unit no.3, there is house Unit no.1. At Erdaojingzi, many irregular paths, like the dirt alleys between Unit no. 1, Unit no.2, and Unit no.3, became naturally walled corridors that passed through the whole settlement. They not only separated the residential areas into many sectors but also allowed transport across and between different housing units.



Figure 3.14c. Remains of silt paints at house Unit 3 (photo by author).

Although the exact plans of each unit are diverse, the primary arrangement: one to two houses with side storage/trash pits and enclosure walls, was widely shared. Therefore, it can be argued that the construction and layouts of each housing unit at Erdaojingzi were properly planned. Deviating from the pit houses of the Hongshan (ca. 4500-3000 BC) and Xiaoheyan (ca. 3000-2000 BC) periods, Erdaojingzi courtyard structures are significantly larger and more complex.

Some houses found at Type A settlements are worth more academic attention because of their special architectural features and location within the settlement. Erdaojingzi house no. 8 was in the northern part of the excavated area (Figure 3.15). Built on the highest ground of Erdaojingzi, house no. 8 has a double-walled

enclosure; the preserved inner walls are more than 2 meters high (Figure 3.16).[148] An open area of 300 square meters has been found to the south of house no. 8, which looks like a small public space rather than a purely residential area. These features give house no. 8 a special position within the entire settlement and we might suggest they it is the central building of the Erdaojingsi site.



Figure 3.15. Overview of house no. 8, Erdaojingzi (photo by author at the Erdaojingzi Museum).

[148] Neimenggu Wenwu Kaogu Yanjiusuo 2010: 18.



Figure 3.16. The surviving inner wall of house no. 8, Erdaojingzi (photo by author at the Erdaojingzi Museum).

Archaeological work on-site has also recognized a rather complex structure of a multi-room house.[149] House no. F54 is composed of one large main chamber, a cloister surrounding half of the main chamber, a side chamber, and an exterior wall (Figure 3.17). Multiple walls had been erected outside parts of the main chamber during the residency period. The complex house plan conveys a strong visual impression that the main room F54, as the central residential part, gradually expanded in the area throughout time.

[149] Neimenggu Wenwu Kaogu Yanjiusuo 2010: 17.



Figure 3.17. Plan of house no. 54 at Erdaojingzi
(after Figure 5 of Neimenggu Wenwu Kaogu Yanjiusuo 2010).

Evidence of repair and expansion has been found at the corners of these earthen walls surrounding house F54. This surely suggests that the different sections of the F54 housing complex were constructed at different dates. The fact that new walls were built, and houses were reconstructed in their original location, suggests people lived in the same location at Erdaojingzi and presumably, enjoyed a high level of economic and social stability.

Sizes of Dwellings at Type A Locations

In all currently published Type A settlements, 18 semi-subterranean houses and 15 ground-level dwellings have been fully reported with size information (Appendix V and VI). Larger houses are unevenly distributed in a few sites: four out of the five semi-subterranean dwellings larger than 10 square meters are seen in Kalaqin Hedong (Appendix V), and the Xiaoyushulinzi site was reported to have two houses larger than 27 m^2 (Appendix VI). The following observations have been made on Type A dwellings: a) the average size of the 18 semi-subterranean houses is 8.2 m^2 while ground-level dwellings are averagely as large as 15.7 m^2; b) the coefficients of variation for semi-subterranean and ground-level houses were 60% and 55%, respectively. These data suggest that, as the main architectural form evolved from semi-subterranean to ground-level structures, the size of Lower Xiajiadian houses increased, indicating that the residents put in more investment in residential structures. However, the differences in internal size deviation (60% and 55%) did not change very much during the process, indicating similar inter-community wealth distribution.

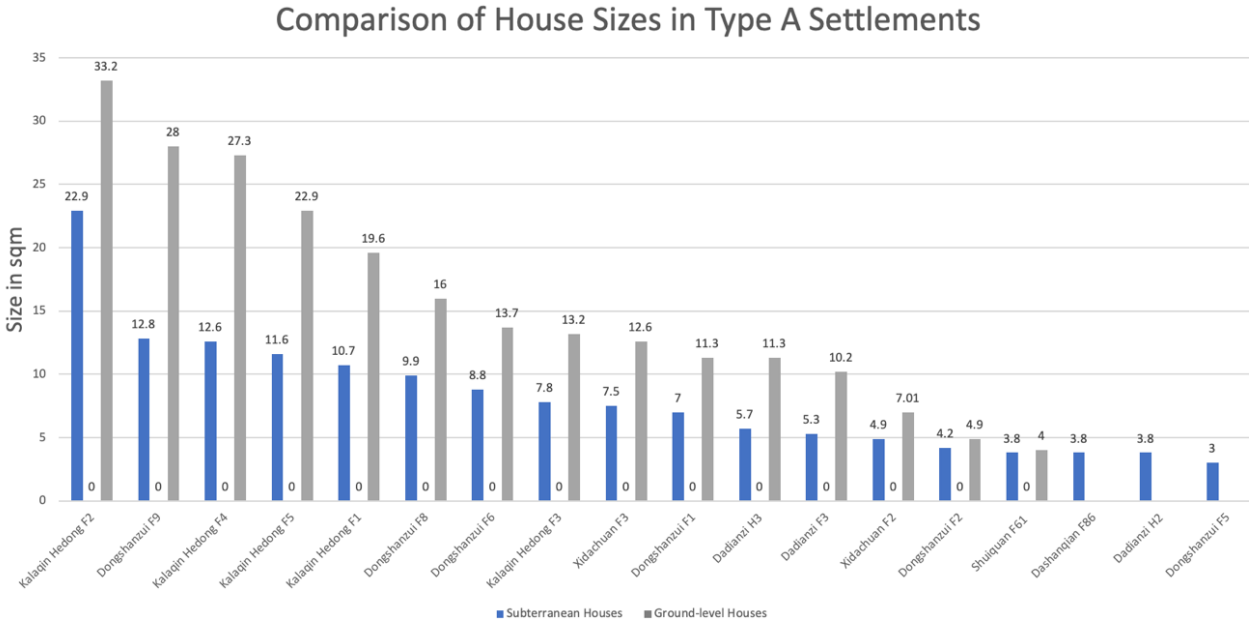


Figure 3.18. Comparison of house sizes at Type A locations.

New Technologies

As has been briefly touched upon in the previous section, mudbricks and lime-plastered floors were two construction techniques extensively exploited in Type A settlements. They were used both for semi-subterranean pit dwellings and ground-level houses. Before the Lower Xiajiadian period, subterranean pits were the only house type during the Hongshan (ca. 4500-3000 BC) and Xiaoheyan (ca. 3000-2000 BC) periods, when people used the natural sides of the pit as interior walls and floor area. This thesis argues that the sudden appearance of such new technical changes, or advancements, were introduced/brought in from elsewhere outside northeast China.



Figure 3.19. Remains of mudbricks at Erdaojingzi (photo by author).

The production of mudbricks requires firstly an idea of standardization of construction materials and this may have its root in integrated settlement planning. The size of each mudbrick found at Lower Xiajiadian settlements is fairly uniform (40-50 centimeters long, 20 centimeters wide, and 15-20 centimeters thick) (Figure 3.19).[150] They were arranged in neat rows to construct site enclosures, inner walls for houses, as well as storage pits (Figure 3.10 and 3.17).

[150] Neimenggu Wenwu Kaogu Yanjiusuo 2010: 16.

Important cultural signals embedded within the exploitation of mudbricks[151] and lime plastered floors can be attributed to Longshan cultural remains (ca.2600-1900 BC) in the middle Yellow River regions.[152] Sun-dried mudbrick is suitable for constructing houses in areas with relatively dry climates. The earliest mudbrick so-far reported in China is from the Dahecun site 大河村 Phase IV (early third millennium BC) in central Henan province (Figure 3.20).[153] Mudbrick construction of later dates appeared in north Henan near present-day Anyang, where a 30-ha Longshan walled site known as Hougang 後崗 (2600-2100 BC) was identified (Figure 3.21 and 3.22).[154]

[151] Li Min (2018) suggests that there was a North and East Asian Interaction Sphere converged along China's northern border in late third millennium BC, through which the mudbrick technology might have transmitted. This northern highland contact zone facilitated the introduction of Western Asian domesticate animals and plants (Flad, R. et al. 2009, Jones, M. et al. 2011), ideas about stone (Rawson, J. 2017) and mudbrick construction (Li, M. 2018), and metalwork (Mei, J. J. 2009, Linduff 2000, 2015 and Chen, J. L. 2014). It is also suggested by Rawson, J. that different configurations of physical and cultural landscape in the crescent-shaped borderland structured the pattern of interaction in different parts of China. If one sees the introduction and use of mudbricks as a western contribution, the presence of mudbrick techniques at sites in the northern borderlands might suggest the possible association with a resident population from Central Asia or eastern steppe. However, more archaeological evidence in the northern areas and concrete radiocarbon dates are needed to argue for this line. For now, the available examples and dates seemed to likely to suggest the middle Yellow River region as one major source area of mudbrick construction in China.

[152] Mudbrick adobe structures have also been identified at two Longshan sites in the Shandong peninsula: Yaowangcheng 堯王城 and Donghaiyu 東海峪 (both in the western part of Shandong, near the Central Plains), where mudbricks were used for constructing large-scale platforms and surface residential houses (see Linyi Diqu Wenwu Guanli Weiyuanhui and Rizhao Tushuguan 1985 and Shandongsheng Bowuguan 1976).

[153] Zhengzhoushi Wenwu Kaogu Yanjiusuo 2001: 241.

[154] IA CASS 1985b.

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 3.20. Mud-brick walls of F34 at Dahecun site
(after Figure 143.2 of Zhengzhoushi Wenwu Kaogu Yanjiusuo 2001).

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 3.21. Plan of house F8 at the Hougang site
(after Figure 12 of IA CASS 1985b).

As with mudbricks, a very similar distribution pattern of early lime-plaster pavement can be observed in the Chinese Neolithic record. At Ruicheng 芮城 county of southern Shanxi, house F201 of the Dongzhuangcun site 東莊村 yielded traces of lime powder.[155] Based on pottery typology, this site is dated to early Yangshao culture (ca. 4000 BC). Lime-plastered floors of later dates were then reported from sites in all directions: in the Central Plains, south in the Yangzi River valley, and also north and west into Gansu and the Ordos region.[156] The great advantage of paving with a general layer of lime-plaster has been discussed by several Chinese scholars.[157] They suggest that having such indoor pavement could improve the houses' moisture resistance ability and thus the whole structure became stronger and more visually attractive.[158]

When it came to the Longshan period (ca. 2600-1900 BC), the Hougang 后崗 area continued to be the center of a site cluster on the northern edge of the North China Plains,[159] where 39 housing structures and a few burials dated around 2300 BC were found.[160] Houses at Hougang and many nearby Longshan sites, for example, Balizhuang 八里莊, Nangang Dahancun 南崗大寒村, Chaiku 柴庫 and Baiying 白營 all exhibited an interesting technological combination of lime-plastered floors with mudbrick walls (Figure 3.22 and 3.23).[161] There is no doubt that this region was exceptionally active in the use of new technologies for settlement construction. An interesting fact is that the Hougang site cluster and Longshan culture variations of southern Hebei, all declined or collapsed by the end of the third millennium BC.[162] This decline, coupled with the clear similarity of Hougang and Lower Xiajiadian's pottery assemblage (detailed discussion in Chapter Five) and house construction

[155] IA CASS 1973: 20.
[156] Pei, X. S. 2017.
[157] Li, N. S. et al. 2011; Pei, X. S. 2017.
[158] Pei, X. S. 2017: 8-10.
[159] Jing, Z. C. et al. 1998: 17.
[160] IA CASS 1985b.
[161] Anyang Diqu Wenguanhui 1980a, 1980b; IA CASS 1990a; Anyangshi Wenwu Kaogu Yanjiusuo 2017.
[162] IA CASS 2010: 549.

techniques, may bring some interesting explanations for the source or origin of the sudden population increase observed in northeast China.



Figure 3.22. Plan of house F12 at the Hougang site
(after Figure 11 of IA CASS 1985b).

In northeast China, the use of mudbricks and lime-plastered floors required much more complex sets of technological advancements and social organization than building the previous simple pit houses. Both technologies represented an increase of social energy put into improving the people's residential facilities. Considering the early dates and the high concentration of mudbricks and lime-plastered floors in the Central Plains Yangshao and Longshan archaeological records, this thesis argues that the technological similarities between the settlements of the Lower Xiajiadian area and central China are unmistakable. From a technological perspective, they are crucial components of a shared techno-cultural horizon, that could very well link the third millennium BC late Neolithic societies with the Lower Xiajiadian groups in northeast China. However, when and under what circumstances did the Yangshao-Longshan cultural legacy widely influence the borderlands beyond the Yellow River

valley is a question that has long puzzled archaeologists and is given more detailed discussion later in Chapter Five.



Figure 3.23. Remains of lime-plastered floor and mud-brick walls at house F1 of the Dahancun site (after Color Plate 1 of IA CASS 1990a).

3.4.2 Type B: High Hillforts

This thesis includes in Type B settlement a total of 12 excavated sites (Table 3.1b). There are some smaller ones of this type identified in past surveys, but none of them have been properly excavated or published as the ones listed in Table 3.1b. These stone-constructed hillforts are found in the large west of the Chifeng city. The survey results of Xu Guangji (1986) show that there are at least three clusters of stone-constructed Lower Xiajiadian settlements along the Yin River 阴河 valley (Figure 3.24).[163] The Chifeng International Survey Project has also revealed that stone sites are numerous on the south-facing sloped region in the Chifeng area.[164]



Figure 3.24. Map of Xu Guangji's survey in the Chifeng region (after Figure 1 of Xu, G. J. 1986).

The following features characterize the Type B settlements:

—Covering an area ranging from 5,000 to 150,000 square meters.

—Features well-preserved stone enclosures and houses.

—Sharing a privileged position within the surrounding landscape and registering a significant canyon-margin location, overlooking major rivers and high on the slopes.

—Less rich in cultural deposits compared with Type A sites but shows a strong sense of fortification.

[163] Xu, G. J. 1986: 83-4.
[164] CICARP 2011: 93.

Besides the heavy use of stone, two other differences between Type A and Type B are settlement size and topography. The average size of Type B sites is 32,400 square meters, which is considerably larger than that of Type A settlement (17,800 sqm). This could be interpreted as Type B sites were intended for residential purposes for a more gathered population and together with other public-use functions. Type B high hillforts were naturally enclosed by their locations on valley margin areas with steep slopes. They were further protected by stone walls at places where natural cliffs were unavailable, suggesting a stronger sense in using topography as part of the site protection in Type B settlements.

Based on the 12 excavated sites, we have learned that the general internal structure in Type B sites shows a great deal of consistency with that of Type A settlements: house remains circular with ovens and storage pits, divided courtyards and residential zones separated by roads and drainage systems (Figure 3.25). As the two so far known best-preserved stone settlement sites of the Lower Xiajiadian period, Kangjiatun 康家屯 and Sanzuodian 三座店 yielded abundant archaeological data for academic analysis.[165]

[165] Liaoning Sheng Kaogu Yanjiusuo 2001; Neimenggu Wenwu Kaogu Yanjiusuo 2006, 2007; Li, S. G. 2007.



Figure 3.25. Sanzuodian site during the excavation of 2006, showing circular-shaped house remains and divided courtyards (after Figure 6 of Liu, X. Y. et al. 2017).

Kangjiatun 康家屯

Situated in the Daling River 大凌河 basin in western Liaoning, Kangjiatun features a square stone enclosure around the site (Figure 3.26). Excavations at Kangjiatun revealed a clear chronological sequence of three material culture phases, with stratigraphic layers I to III from bottom to the top, indicating the site had been used as a long-term residential space. In Phase I, semi-subterranean houses was constructed together with a few ground-level dwellings. Archaeologists discovered that all these semi-underground structures were relatively small compared with ground-level houses of the same period.[166] The site's stone enclosure was enlarged with bigger walls on the east, west, and south sides in Phase II. Also, during Phase II, there was a three-meter-deep moat constructed outside the stone walls. In the

[166] Li, W. Y. 2015: 40.

meantime, two more stone D-shaped external bastions, known in later literature as *mamian* 馬面, were attached to the eastern wall after phase I (Figure 3.27).[167]



Figure 3.26. Plan of the Kangjiatun site (after Figure 1 of Li, W. Y. 2015).



Figure 3.27. Bastion no. 4 at the Kangjiatun site (after Figure 5 of Liaoningsheng Kaogu yanjiusuo 2001).

[167] Neimenggu Wenwu Kaogu Yanjiusuo 2006: 4-6 and 2007: 18-9; Li, S. G. 2007: 22-3.

Within the Kangjiatun site, stone partitions were identified from the surface by which several different courtyard zones were divided (Figure 3.26). Each courtyard zone is further divided into several house units by stone enclosures and slab-paved roads (Figure 3.28). On one side of most roads, there was usually a shallow ditch connected with nearby house units, which formed a cross-settlement water drainage system (Figure 3.29).[168] Within each housing unit, there are one or two ground-level stone houses with storage pits nearby.



Figure 3.28. Slab-paved roads at the Kangjiatun site (after Color Plate 6-3 of Liaoningsheng Kaogu yanjiusuo 2001).

[168] Liaoning Sheng Kaogu Yanjiusuo 2001: 43.



Figure 3.29. Stone constructed drainage facilities at the Kangjiatun site (after Color Plate 6-4 of Liaoningsheng Kaogu yanjiusuo 2001).

Stones were widely used in constructing houses and lining up the inside wall of storage pits, which ranged from 1 to 2 meters in diameter and 1.15 to 1.9 meters deep.[169] These pits were dug into the ground and have either a straight cylindrical shape or a bell shape. Located between house F24 and F25, pit No.18 of Kangjiatun was dated stratigraphically to Phase II. It has a capacity of 2.55 m^3 and two layers of archaeological deposits: the top layer yielded some pottery sherds of *li* tripods and *guan* jar; in the bottom layer, excavators found 22 stone tools and 21 undisturbed ceramics, including *guan* jar, *zun* (ring-foot cooking vessel) and *dou* (high-stem serving vessel).[170]

House F19 (Figure 3.30a, b, c) is a big round house in the northern part of the Kangjiatun site. The size of the interior room is 30.25 square meters, the remaining internal earthen wall is 75-centimeter-thick, and the doorway is facing south.[171] Outside the internal earthen wall is a stone enclosure. There is a 33-centimeter-thick layer of the stepped floor inside the room. In the middle and northwest sections of the room, archaeologists found two round-shaped hard surface areas which are dark red. They have presumably gone through multiple episodes of burning and are

[169] Li, W. Y. 2015: 41.
[170] Liaoning Sheng Kaogu Yanjiusuo 2001: 37-8.
[171] Liaoning Sheng Kaogu Yanjiusuo 2001: 35-6.

interpreted as the hearths of House F19. Unfortunately, as the upper parts of House F19 have been destroyed, no pottery or animal remains were found near the hearth areas. It is assumed that such a walled stone house, with its courtyard and associated storage and oven installations, formed an individual unit and each of the units served as a family household.

A more populated Phase II has been confirmed by the settlement structure at Kangjiatun when the site developed to its peak. Forty-seven houses were found dated to this period and they were all built on the ground. It is also in Phase II that clear traces of housing maintenance were commonly seen.[172] New stone walls were erected, and similar to what we see in the Type A site, floors were paved in their original location on top of the earlier house remains.



Figure 3.30a. Plan of house F19 at Kangjiatun (after Figure 11 of Liaoningsheng Kaogu yanjiusuo 2001).

[172] Li, W. Y. 2015: 41.



Figure 3.30b. Overview of house F19 at Kangjiatun (after Color Plate 6-1 of Liaoningsheng Kaogu yanjiusuo 2001).



Figure 3.30c. Photo of house F19 from the southern entrance at Kangjiatun (after Color Plate 7-1 of Liaoningsheng Kaogu yanjiusuo 2001).

After its peak period, Kangjiatun seemed much less populated in Phase III, with no clear signs of new houses or walls being built. Archaeologists could only see that 75 more storage pits were stratigraphically dated to this period.[173] No measurement information has been published on these 75 storage pits in the Kangjiatun brief

[173] Li, W. Y. 2015: 41-2.

report, but it did state that these pits were dug in a simpler way and generally shallower than those of the previous period. As there is no new house or stone enclosure identified in Phase III, it could be argued that Kangjiatun was under continued use but was less populated. Residents of Phase III at Kangjiatun may still be those who used this site during Phase II, but clearly, they were reducing their investment (both in terms of manpower and construction materials) on-site construction and fortification. It seems more likely that the number of residents dropped gradually, and the remaining group consciously stopped building new residential structures and thinking of leaving the Kangjiatun site to new locations. The number of pottery sherds and stone tools also dropped compared with Phase II,[174] suggesting that Kangjiatun had been gradually abandoned and people moved elsewhere.

Sanzuodian 三座店 and the Fortification Systems

One of Type B sites' major characteristic features was a strong sense of settlement defense. The sites were constructed with a strong dependence upon the topography and there was extensive use of stone as the construction material for walls and towers. Below I will take Sanzuodian as an example to illustrate the basic features of the Lower Xiajiadian stone fortification system.

Sanzuodian is located on the eastern bank of Yin River 阴河 with a twin-settlement plan: a large settlement (ca. 14,000 sqm) situated adjacent to the river cliff and a much smaller one (ca. 2000 sqm) attached to the larger one in the northeast (Figure 3.31). The two settlements were divided by a narrow row of standing stones (Figure 3.32). Both the large and the small sites were enclosed to the fullest extent: on the eastern and southern sides, there is a steep canyon and natural cliffs; on the other two sides where the natural defense was not available, an artificial defense system had been built to protect the site. This consisted primarily of stone walls, and, in

[174] Liaoning Sheng Kaogu Yanjiusuo 2001: 43.

some cases, semi-circular watchtowers were added to the outer side of the stone wall (Figure 3.33).The widest part of the main body of Sanzuodian stone walls can reach three meters.[175]



Figure 3.31. Overview of the Sanzuodian site
(after Color Plate 5-1 of Neimenggu Wenwu Kaogu Yanjiusuo 2007).



Figure 3.32. Sanzuodian site from the south
(photo by author at the Erdaojingzi Museum)

[175] Neimenggu Wenwu Kaogu Yanjiusuo 2007: 22.



Figure 3.33. Semi-circular stone bastions enclosing the Sanzuodian large settlement (after Color Plate 5-2 of Neimenggu Wenwu Kaogu Yanjiusuo 2007).

The impressiveness of the Sanzuodian stone enclosure and twin-settlement arrangement makes us wonder what the relationship between these two sites was. Judging from the archaeological stratifications, the stone walls of the larger site were among the earliest generation of structures at Sanzuodian, followed by the construction of inner supporting walls and house complexes inside.[176]

The houses at Erdaojingzi, Kangjiatun, and Sanzuodian were almost the same in terms of inner arrangements and general residential plans. Houses are quite dense in the Sanzuodian large settlement. There are more than 20 courtyard zones identified, among which a courtyard consisting of Houses F7 and F9 has been preserved very well (Figure 3.34a, b).[177] Sharing the same wall as the northern enclosure, Houses F7 and F9 were built from the ground surface and separated from each other by a short wall. Sharing a similar design, F9 is slightly more complex than F7, in that F9 has two sets of circular walls surrounding the central room.

[176] Neimenggu Wenwu Kaogu Yanjiusuo 2006: 4.
[177] Neimenggu Wenwu Kaogu Yanjiusuo 2007: 23-4.



a



b

Figure 3.34a, b. Plan and overview of house F7 and house F9 at the Sanzuodian site (after Figure 8 and Color Plate 5-3 of Neimenggu Wenwu Kaogu Yanjiusuo 2007).

Considering the small site was built immediately next to the large one and their consistent internal organization, the community living in the Sanzuodian smaller site should very likely be the same social group as the population living in the large settlement. It seems that the outer small site was added later, possibly due to demographic pressure in the large settlement.

The case of Sanzuodian twin-settlement has presented us two conspicuous features of the defensive structures in Type B settlements:

Firstly, before the construction of massive stone walls, the location of each site was carefully chosen to maximize the effect of natural protection. Xu (1986) noted in his Yin River survey that the distribution of stone-walled sites on the landscape is uneven, with settlements clustered into three major groups, where the best "natural fortification" using the topography could be achieved.[178] The north slope was much more preferred, and in most cases, at least one side of the site is naturally fortified by being next to a cliff or steep slope. A site known as Xindian 新店 was recorded in Xu's 1986 publication, which was built adjacent to the southern cliff and had huge stone walls on the northwestern side (Figure 3.35).[179] It is evident from the shape and density of the contour lines in the Xindian area that the northwestern side of the site has the minimum slope of all four directions (Figure 3.35).

[178] Xu, G. J. 1986: 85.
[179] Xu, G. J. 1986: 83.



Figure 3.35. Plan of the Xindian site, southeastern Inner Mongolia
(after Figure 2 of Xu, G. J. 1986).

The second fundamental feature of these fortified Type B sites is the ubiquity of stone enclosures and external tower structures. External walls have been found in all the reported Type B settlements. Facilities with a strong sense of defense have also been found added onto the outer surface of the original enclosure as a sort of reinforcement. Known as bastions, or *mamian* 馬面 in Chinese sources, the circular-shaped watchtower is a type of outer shell structure outside the existing wall body. They were constructed with a pounded-earth core attached to the main walls and a stone semi-circular structure facing outwards (Figure 3.33, 3.35, and 3.36). The average size of Sanzuodian and Kangjiatun bastions can reach 5m by 5m, regularly spaced at intervals of no more than seven meters.[180]

[180] Neimenggu Wenwu Kaogu Yanjiusuo 2007: 19; Neimenggu Wenwu Kaogu Yanjiusuo 2006: 22; Liaoning Sheng Kaogu Yanjiusuo 2001: 33.



Figure 3.36. Stone bastion no. 7 at the Sanzuodian site, with an earthen core (after Figure 3 of Neimenggu Wenwu Kaogu Yanjiusuo 2007).

A great advantage of these circular-shaped towers is that they can provide extra attacking space for the defenders on the walls. Along the 200-meter long stone walls of the Sanzuodian large settlement, 15 such circular-shaped towers can be identified and 10 towers have been found attached to the external side of the small settlement (Figure 3.31).[181] The surviving wall and towers can be as high as four meters, constituting quite an impressive landscape on top of the loess platform (Figure 3.33).

Although there has been abundant archaeological data for fortification in Lower Xiajiadian residential remains, there is no evidence that these fortified structures were ever used. One suggestion might be that these fortifications were largely symbolic. Stone walls, external towers, and trenches may all have been used as a visual symbol of communal integration.

Given that there were no pack animals to carry loads and no plowing available at that period, controlling labor power was crutially important in a society of the scale like the Lower Xiajiadian.[182] It seems reasonable to connect higher social status (and

[181] Neimenggu Wenwu Kaogu Yanjiusuo 2007: 18.

[182] Rawson, J. has suggested that an absence of herded animals in Neolithic China must have had a huge impact on social organization and leadership formation, especially in Northeast

perhaps leadership) in Lower Xiajiadian society to the ability to mobilize labor and other resources for the construction and maintenance of defensive architecture. Building the scale of fortifications found in Type B settlements must require a social mechanism that could organize such work, and this thesis tends to think it should be related to managing the population.

What is also surprising is that there has been very little archaeological evidence concerning trauma, or individuals killed by violence in northeast China during the Lower Xiajiadian period. There are stone and bone arrowheads discovered from LXJD burials (34 male tombs, 31 buried near the legs, and 3 with animals) and settlement sites, and they may have been used in conflicts, but we have no other supporting evidence for violence during this period. It is interesting to note that there is more evidence of violence and the use of weapons during the Upper Xiajiadian period (ca. 1000-600 BC)[183] when there are no signs of construction of large-scale fortifications.

China where dry-land farming constituted the major subsistence economy. The control and management of large agricultural population has been a Chinese social feature archaeologically visible since, early 3th millennium BC, when a great number of enclosed sites were built along the Yangtze River and Eastern China (See Priewe, S. 2012; Liu, L. and Chen, X. C. 2012: 236-46; Zhang, C. 2013: 510-34; Qin, L. 2013: 574-96; Renfrew, C. and Liu, B. 2018: 975-90).

[183] Such data includes not only stone, bone and bronze weapons (arrowheads, knives, daggers and axes), but also evidence of trauma from a few Upper Xiajiadian graves (ca. 1000-600 BC).

Size of Dwellings in Type B Locations

Stone-built houses identified from Type B settlements varied greatly in size. Three groups of data are synthesized here for cross-site comparison: a) the dimensions of 335 best-preserved houses at 10 sites recorded in Shelach 1999 field survey; b) the dimensions of 46 houses at Dongbajia site from Tong, Z. C.'s 1957 survey (Appendix VII.); c) houses with detailed numerical description reported from excavations at Sanzuodian, Kangjiatun, Danangou and Shangjifangyingzi sites (Appendix VII). As can be seen from Table 3.3, the size of the internal house space varied considerably. However, most houses are ranging from three to five meters in diameter. Two main types of circular stone houses were observed in past regional surveys: houses with one stone wall and houses with two parallel stone walls. The second type is made of two concentric stone circles, usually with the external wall located about 1.5 to 3 meters from the internal wall.[184] We can see from Table 3.3. that the average diameters reported from sites that were partially excavated are larger than the ones reported from field surveys (Shelach 1999 and Dongbajia site). This may be because local excavators tend to dig and record larger houses that are better preserved and visible on-site, and this is probably true as the minimum diameters reported from excavated locations are also generally larger than the ones reported from regional surveys (Shelach 1999 and Dongbajia site).

The observed size difference (maximum-minimum) may indicate functional variations that some of the larger structures were designed for communal purposes while the smaller ones for private/residential use. It may also be the case that the size variations attest to their association with the owner's prestige and economic power. In this sense, increases in labor investment and house size are probably correlated with increased status within the Lower Xiajiadian community.

[184] Shelach, G. 1999: 98-99.

Table 3.3. House Diameter of Internal Space in Meters from Type B Settlements.

	Shelach 1999[185]	Dongbajia[186]	Sanzuodian[187]	Kangjiatun[188]	Danangou[189]	Shangjifang yingzi[190]
No. of Houses	335	46	6	4	6	3
Minimum (m)	1.8	1.5	2.54	3.2	4.5	4.3
Maximum (m)	13	10	8.12	6.2	8.1	10.7
Mean (m)	3.58	4.59	5.55	4.48	5.87	6.8
Standard Deviation	1.102	1.66	2.48	1.47	1.34	3.42

Unfortunately, Shelach 1999 did not give out the diameter for every single house that was identified and recorded in his survey. As such, we cannot use his data to calculate the exact size of the 335 houses. Therefore, I put the house size data from Type A settlements (both semi-subterranean and ground-floor dwellings)[191] (Appendix V and VI) against the sizes of Type B stone-constructed structures (calculated based on the diameters reported from Dongbajia, Sanzuodian, Kangjiadun, Shangjifangyingzi, and Danangou sites) (Appendix VII) (Table 3.4).

[185] Shelach, G. 1999: 99.
[186] Tong, Z. C. 1957: 17-20.
[187] Neimenggu Wenwu Kaogu Yanjiusuo 2006: 2-4. and 2007: 23-4.
[188] Neimenggu Wenwu Kaogu Yanjiusuo 2008c: 34-6.
[189] Wulanchabushi Bowuan 2015: 54-5.
[190] Neimenggu Wenwu Kaogu Yanjiusuo 2008b: 391-3.
[191] Chapter 3.4.1, Figure 3.18.

Table 3.4. Comparison of House Sizes between Type A and Type B Locations.

	MINIMUM (SQM)	MAXIMUM (SQM)	MEAN SIZE (SQM)	COEFFICIENT OF VARIATION
TYPE A (HOUSE NO.=33)	3	33.2	10.9	72.5%
TYPE B (HOUSE NO.=65)	2.3	89.9	22.5	82.2%

As shown in Table 3.4, the maximum house size in Type B locations is substantially larger than the largest house reported from Type A sites. We also note that the number of houses and the average size of Type B stone structures are both twice those of Type A houses. Therefore, the relative standard deviation is used to assess the extent of variability of house sizes in relation to the mean size in Type A and Type B settlements. Table 3.4 suggests that much more labor, energy, and construction material were invested at Type B locations. The growing size of the individual house from Type A to Type B settlements also shows the change of scale in Lower Xiajiadian households. In this account, it seems that the regional population during the occupation of the Type B settlements was significantly higher than that of the Type A period.

At the same time, inter-group differentiation, represented by the coefficient of variation, reveals that houses at Type B settlements had a wider size distribution (Coefficient Variation=82.2%) than houses in Type A sites (Coefficient Variation =72.5%), though only by a small amount. Taken from the comparative perspective, we can see that great house variation might be correlated with growing vertical social diversity and inequality in the late half of the Lower Xiajiadian period. We note from the size and deviation of residential structures that, as the community moved from western Liaoning to the Chifeng area, the degree of social differentiation became more and more prominent.

Reuse of the Stones

Another type of stone structure that is reported in Type B Lower Xiajiadian settlements is stone terraces (or stone platforms) 石檯. As very few such stone terraces have been excavated, their use and function are still debated.

A total of 11 stone platforms are reported at Sanzuodian and on the east side of one platform, a 0.4-meter high stone stele was recorded.[192] Such a combination of a round or square stone platform with a standing stone on the east has also been reported from other contemporary settlements. At Shangjifangyingzi 上機房營子 and Xiliang 西梁 sites, 14 similar stone terraces have been found.[193] The largest one at Xiliang has been excavated: it measured 5 to 5.5 meters in diameter (Figure 3.37).[194] In the middle part of the terrace, archaeologists found an Upper Xiajiadian period (ca. 1000-600 BC) stone cist tomb, M2 (Figure 3.38), in which red pottery sherds and human bones were scattered. The burial chamber, measuring 2.1 meters long, 0.9 meters wide and 0.6 meters deep, was marked above the ground on four sides with several standing stone slabs.[195] The shape of the tomb and the construction technique with vertical slabs were both very typical of the Upper Xijiadian period (ca. 1000-600 BC) and exhibited striking similarities with those found in southeast Mongolia, suggesting that many of the stone platforms found in Lower Xiajiadian settlement sites may be graves of the succeeding Upper Xiajiadian period (ca. 1200-700 BC).[196]

[192] Neimenggu Wenwu Kaogu Yanjiusuo 2006: 7.
[193] Li, S. G. et al. 2007: 23-4; Neimenggu Wenwu Kaogu Yanjiusuo 2012: 150.
[194] Neimenggu Wenwu Kaogu Yanjiusuo 2012: 155.
[195] Neimenggu Wenwu Kaogu Yanjiusuo 2012: 155.
[196] Shelach, G 1999:148-51; Dashtseveg, T. et al. 2013: 43.



Figure 3.37. Stone terrace at the Xiliang site (after Figure 149 of Neimenggu Wenwu Kaogu Yanjiusuo 2012).



Figure 3.38. Tomb M2 at the Xiliang site (after Figure 150 of Neimenggu Wenwu Kaogu Yanjiusuo 2012).

3.4.3 Type C: Hill-Slope Sites

The third type of settlements, which were built in high-altitude locations, belong to a category that this thesis regards as hill-top sites, as they were located on high lands or even on steep hill ridges. In contrast with Type B sites, they are identified with much fewer stone walls and located away from major water channels and river valleys. However, most Type C sites are still unexcavated and apparently neglected in most academic writing concerning the Lower Xiajiadian culture. This and the next section, therefore, begins with a brief examination of these small-size Lower Xiajiadian hill-slope sites, before proposing a discussion on the nature and function of various sized settlements.

The following features characterize the Type C Hill-slope sites:
—Covers a small area (ca. 500-1000 sqm) but constitutes the greatest number of Lower Xiajiadian settlements. Unfortunately, no accurate data of Type C sites numbers is available in the whole of Lower Xiajiadian area. What we currently know is that, in the Chifeng survey area alone (ca. 1234 km^2), altogether of 416 small-scale stone sites have been identified.[197]
—Located far from major river valleys, but near to small upland ravines.
—Usually use stones to construct both walls and houses.
—Only yields sparse occupational debris.

During all periods of Lower Xiajiadian occupation, there was a strong tendency to group settlements in clusters, with one to two large sites in the middle and smaller settlements distributed around them. Systematic regional surveys (Chifeng International Collaborative Archaeological Research Project and the Chinese National Archaeological Survey), Xu (1986), and Shelach (1999) have all reported the clustering pattern of Lower Xiajiadian settlements of various sizes.[198] On top of this

[197] CICARP 2011: 2 and 120.
[198] CICARP 2011: 118-23; Teng, M. Y. 2009: 74-5; Xu, G. J. 1986: 85; Shelach, G. 1999: 122.

general observation, the present study also suggests that there are two contrasting patterns of fortification between Type C sites located in western Liaoning and southeast Inner Mongolia.

For the Chifeng area, Shelach's 1999 survey data suggests that sites smaller than two and a half hectares were arranged in groups and located further away from the main river system. Built with stone, these hillside sites have smaller but denser houses than large fortified settlements, surrounded by quite simple and narrow walls. Stone enclosures found at these sites are much less labor-intensive in comparison with those at large and central settlements. Made purely out of stone, this sort of wall structure cannot endure very well. Archaeologists have also identified much thinner cultural deposits in these small sites, normally are a few potsherds inside the houses or near the wall foundations. It seems that these hill-slide sites were all dwelling locations for agricultural populations and might only be used on a seasonal basis.

Along the Daling 大凌河 and Xiaoling 小凌河 Rivers in western Liaoning (Figure 3.1), besides the mega-size settlements such as Dadianzi 大甸子, Fengxia 豐下 and Shuiquan 水泉, there were many medium and small sites built facing each other across the river or on the secondary terrace on the same side of the river banks.[199] Built with rammed earth walls and ditches, these sites were constructed in pairs or with several settlements located in a linear pattern along the creek near the main river. Near the Shengli 勝利 village of Chaoyang 朝陽 city, we have three contemporary sites (Figure 3.39): Nantaizi 南檯子, Beichengzi 北城子 and Sandaoliangzi 三道梁子 located on the eastern bank of the Xiaohezi 小河子 tributary, while Pingdingshan 平頂山 and Pomiaozi 破廟子 were found on the opposite bank of the Xiaohezi.[200] Considering the identical structure and

[199] Zhang, X. D. and Xin, Y. 2015: 97-8.
[200] Zhang, X. D. and Xin, Y. 2015: 98.

archaeological remains in these locations, it seems that they were being occupied at the same time.



Figure 3.39. Distribution of the Lower Xiajiadian settlement sites, near Chaoyang city of Liaoning province (after Figure 4 of Zhang, X. D. and Xin, Y. 2015).

To sum up, steep rocky slopes of the western part of the Lower Xiajiadian culture area provide good topography and raw materials for the practice of fortifying small hilltop sites with stone walls. In the east and southeast region of the Lower Xiajiadian occupation, the slopes are less steep, and the soils are often deep. Therefore, medium and small sites in western Liaoning did not appear on high locations, and their fortifications more often take the form of ditches and earth-built walls.

3.5 Lower Xiajiadian Occupation: Site Function and Evidence of Subsistence Economy

We have discussed the residential and defensive features of the three major types of Lower Xiajiadian sites. The appearance of variously sized settlements throughout the second millennium BC in northeast China requires multiple explanations concerning how they functioned. To address this issue, the following section takes into consideration of agricultural productivity and local subsistence resources.

Gideon Shelach suggests that Lower Xiajiadian settlements exhibit relatively high levels of regional integration and there were two hierarchical tiers in terms of site sizes.[201] However, considering the contrasting landscapes, fortification systems, and house densities in different settlements, this thesis suggests a re-examination of the Lower Xiajiadian settlements and comprehensive reading of the site size, distribution, and function. Diverging from Shelach's site size/hierarchy-oriented theory, the present study argues that the different sizes, spatial distributions, and archaeological deposits of Lower Xiajiadian sites reflect a functional variation, rather than a pure hierarchical stratification.

This interpretation receives considerable support from Lewis Binford's discussion of the "Logistical Subsistence-Settlement" system, which describes a situation that special task groups leave a large central residential location and establish a field camp or station where food-procurement operations took place (Figure 3.40a). These organized task groups are generally small and composed of skilled and knowledgeable individuals. They are not groups out "searching" for any resource encountered, but to procure specific resources in specific contexts (Figure 3.40a).[202] Therefore, there would be two types of locations in this residential system: the high

[201] Shelach, G. 1999: 137.
[202] Binford, L. 1980: 10-2.

archaeological visibility residential centers as opposed to the low-visibility locations commonly generated by small task groups.[203] At large and highly visible sites are usually residential deposits for long occupation and storage facilities for consumption over considerable periods. In this sense, the "functional variation" interpretation does not conflict with Shelach's size-rank pattern, in that those archaeologically highly visible Lower Xiajiadian settlements can be viewed at the same time as central locations for high-order groups with a larger population and more complex social organization.



Figure 3.40a. Characterization of a Logistical Subsistence System
(After Figure 3 of Binford, L. 1980)

[203] Binford, L. 1980: 11.

The Bronze Age tell-based settlement system of Upper Mesopotamia offers us a more relevant model to investigate the site distribution pattern of the Lower Xiajiadian culture. The site of Tell al-Hawa (ca. 3100-1900 BC) in northern Iraq covers approximately 80 hectares and consists of a 30-meter-high central fortified mound and several surrounding lower ring mounds.[204] These surrounding sites are highly nucleated around the main mound, resulting in landscape features such as linear hollows and field/pasture scatters (Figure 3.40b). It is particularly noteworthy that these landscape characters seem to have functioned altogether to support the main mound: linear hollows (water channels and roads) either radiate from the central site and/or run between the smaller sites (Figure 3.40c).[205] Multiple cultivation zones are located around the main settlement and surrounding sites, and the size of the farming area is proportional to the area of each site, with the land beyond cultivated areas probably supplying pasture resources (Figure 3.40b).[206] Although the size difference seems to exhibit a scalar hierarchy, there is no evidence of a paramount central settlement system that sets out above all other smaller locations.[207] Smaller low ring mound site capable of agricultural production provided the basic food supplies for the central mound at Tell al-Hawa but did not constitute a socially administrative affiliation to the main site.

The case of Tell al-Hawa and multiple other similarly structured Bronze Age site clusters in Upper Mesopotamia can be perceived as a model to illustrate the land-use strategy observed in the Lower Xiajiadian settlements. In northeast China, we see analogous features in site distribution that the landscape is zoned, with large settlements being surrounded by smaller sites. The functional variation, as observed at Tell al-Hawa, encourages us to look at the Lower Xiajiadian settlements from the

[204] Ball, W. et al. 1989: 3.
[205] Wilkinson, T, J. 1993: 584-62.
[206] Wilkinson, T, J. 2003: 120-4.
[207] Wilkinson, T, J. 2003: 125.

perspective of food production, and offers an answer to the question: “how did different settlements function?” based on subsistence-oriented explanations.



Figure 3.40b. Agricultural territories reconstructed from regional surveys. Intensive and less-intensive cultivation zones are based on field-scatter densities (after Figure 6.17 of Wilkinson, T. J. 1993).



Figure 3.40c. Satellite image showing the sites and linear hollows/wadis around Tell al-Hawa (marked in red and green respectively) on a CORONA satellite image from December 1967 (after: http://eamena.arch.ox.ac.uk/impact-risks/channel-irrigation/).

3.5.1 Climatic Conditions

Environmental archaeological studies show that the warm and humid climate might have promoted the early expansion of the Lower Xiajiadian community in northeast China. Carbonized wood remains from western Liaoning[208] and two Lower Xiajiadian sites in eastern Inner Mongolia (Dashanqian 大山前 and Dadianzi 大甸子), all suggest a primary vegetation type including Chinese pines (*Pinus tabuliformis*), Castaneas and elms (*Ulmus pumila*).[209] This vegetation system indicates a noticeably higher temperature and annual rainfall during the Lower Xiajiadian occupation than present-day.[210]



Figure 3.41. Location of the Dali lake and the major weather systems influencing China (after Figure 1 of Xiao, J. et al. 2008).

An 8.5m-long sediment core has been extracted from Dali Lake 達里湖 (Figure 3.41), on the eastern edge of the Mongolian Plateau.[211] The core was analyzed at 1-cm intervals for total organic and inorganic carbon concentrations, which shows that

[208] Li, Y. Y. et al. 2003.
[209] Wang, S. Z. et al. 2004; Kong, Z. C. et al. 1991.
[210] CICARP 2011: 42.
[211] Xiao, J. et al. 2008: 519-28.

the water level of Dali Lake reached its highest stand from 7,200 to 4,600 cal. yr BC (Figure 3.42).[212] The lake level then exhibits high-frequency, high-amplitude fluctuations after 4,600 cal. BC (Figure 2.34).[213] From ca. 1,450 cal. BC, the lake level has displayed a notable declining trend and fell to the lowest stand at three intervals of ca. 1,150– 650 BC, AD 350–850, and AD 1450–1800.[214] The high lake levels during the early to middle Holocene, according to the author, marked the influence of the East Asian summer monsoon over the lake region when the monsoonal rainfall belt pushed to its northern limit. Conversely, lower and highly variable lake levels after 4,600 BC, especially after ca. 1,450 BC, suggests that the monsoonal precipitation was reduced, and the summer monsoon was dramatically weakened in the late Holocene.

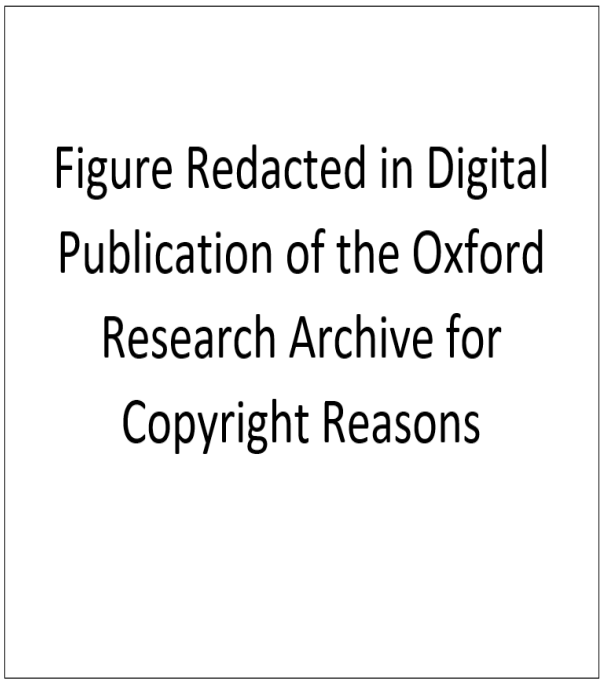


Figure 3.42. TOC (total organic carbon) and TIC (total inorganic carbon) concentrations of the Dali sediment core. Shaded bars indicate the drought events occurring during the middle and late Holocene. Three horizontal solid lines bracket the early, middle and late Holocene (after Figure 4 of Xiao, J. et al. 2008).

[212] Xiao, J. et al. 2008: 527. The chronology for Dali Lake sediment core was derived from the age–depth model with the surface-intercept age subtracted. Eighteen radiocarbon samples from the core were dated with an Accelerator Mass Spectrometry (AMS) system (Compact-AMS, NEC Pelletron) at Paleo Labo Co., Ltd., Japan and were determined with a half-life of 5,568 years (Table 1 of Xiao, J. et al. 2008). The conventional ages were converted to calibrated ages using OxCal3.1 radiocarbon age calibration program with IntCal04 calibration data.

[213] Xiao, J. et al. 2008: 525.

[214] Xiao, J. et al. 2008: 525.

A few other climatic reconstructions have, in a similar way, characterized northeast China as subject to decreasing precipitation after the mid-second millennium BC, to a degree that might have substantially depleted subsistence resources.[215] That is to say, favorable climate promoted agricultural activities during the early phase of the Lower Xiajiadian culture, followed by a noticeable environmental deterioration, in the form of climate instability with periodic drought events after the mid-second millennium BC.

3.5.2 Millet Cultivation

Excavation and flotation results from several Lower Xiajiadian sites indicate that dry-land farming was the primary subsistence strategy practiced during this period. Sun, Y. G. et al. (2014) reported that 181,685 carbonized foxtail millet 粟 and 41, 266 broomcorn millet 黍 seeds have been identified from the 435 L of soil in 77 samples at the Erdaojingzi site 二道井子, Inner Mongolia (Table 3.5).[216] Both types of millets, together with a small number of soybeans and cannabis, accounted for 89.10% of the total plant remains (Table 3.5).[217] A total of 314 carbonized foxtail millet seeds and 98 carbonized broomcorn millet seeds were identified from 100 samples at the Chengzishan 城子山 site in Lingyuan County, Chaoyang, Liaoning Province.[218] However, an archaeobotanical study of the 103 soil samples from the later Sanzuodian 三座店 yields a contrasting result from the earlier Lower Xiajiadian settlements: 9,665 carbonized foxtail millet seeds and 99,348 carbonized broomcorn millet seeds were identified, accounting for more than 99% of the total floated plant remains (Table 3.6).[219] As Sanzuodian is the only large stone constructed site that has produced flotation results, without further archaeobotanical study, we can not know for sure whether the proportion of

[215] Kong et al. 1991; Teng, M. Y. 2004; Yang, Z. R. and Suo, X. F. 2000: 81-8.
[216] Sun, Y. G. et al., 2014: 1-9.
[217] Sun, Y. G. et al., 2014: 6.
[218] Zhao, K. L. et al., 2009: 720.
[219] Sun, Y. G. 2013: 48.

broomcorn millet grew dramatically from the early to the late period of the Lower Xiajiadian occupation.

Broomcorn millet, with relatively stronger drought and saline-alkaline resistance than foxtail millet,[220] was popular outside central China. It was more often associated with farming groups in the crescent-shaped territory and pastoralists of the Eurasia steppe, who could not afford high-investment agriculture. The overwhelmingly high proportion of broomcorn in Sanzuodian's archaeobotanical profile suggests that, with decreasing precipitation and climate instability after 1500 BC, Lower Xiajiadian farmers probably had to give up foxtail millet, shifting their priority to the more drought-tolerant broomcorn millet.

Table 3.5. Flotation Results from the Erdaojingzi site (data from Sun, Y. G. et al. 2014).

Species	Quantity	Proportion (%)
Setaria italica	181685	72.55
Panicum miliaceum	41266	16.48
Glycine	179	0.07
Cannabis sativa	3	0.001
Echinochloa crusgalli	1	0.0004
Poa annua	1	0.0004
Setaria viridis (L.) Beauv.	8532	3.41
Chloris virgata Swartz	3	0.001
Lespedeza davurica	18152	7.25
Melilotus Miller	2	0.0008
Artemisia annua	2	0.0008
Xanthium sibiricum	1	0.0004
Achyranthes bidentata	2	0.0008
Viola prionentha Bunge	27	0.01
Salsola collina	239	0.10
Corispermum hyssopifolium L.	54	0.02
Chenopodium album	155	0.06
Malva crispa Linn.	67	0.03
Rumex L.	4	0.0016

[220] Hunt, H. V. et al., 2011: 4757; Yang, X. Y. et al. 2018: 2-3.

Humulus	1	0.0004
Duchesnea indica	15	0.006
Cerasusjaponica	1	0.0004
Unknown species	27	0.01
Total	250419	100

Table 3.6. Flotation Results from the Sanzuodian site (data from Sun, Y. G. 2013).

Species	Quantity	Proportion (%)
Setaria italica	9665	8.87
Panicum miliaceum	99348	91.09
Glycine	16	0.01
Echinochloa	1	<0.01
Setaria viridis (L.) Beauv.	24	0.02
Panicoideae	6	<0.01
Pooideae	1	<0.01
Leguminosae	3	<0.01
Unknown species	3	<0.01

In the past decades, a large number of archaeobotanical records have been recovered from northeast China, which reveals that millet had been the principal cereal in agricultural production since the middle Neolithic period (ca. 5000-3000 BC).[221] Closely related to this issue is the discussion of the origin of millet in Eastern Asia. It has been argued by many that northeast China was a significant center where rain-fed millet agriculture started (Figure 3.43).[222]

[221] Zhao, Z. J. 2004 and 2011.
[222] Jones, M. and Liu, X. Y. 2009: 731; Liu, X. Y. et al., 2012: 284-6; Zhao, Z. J. 2011: S300-1.

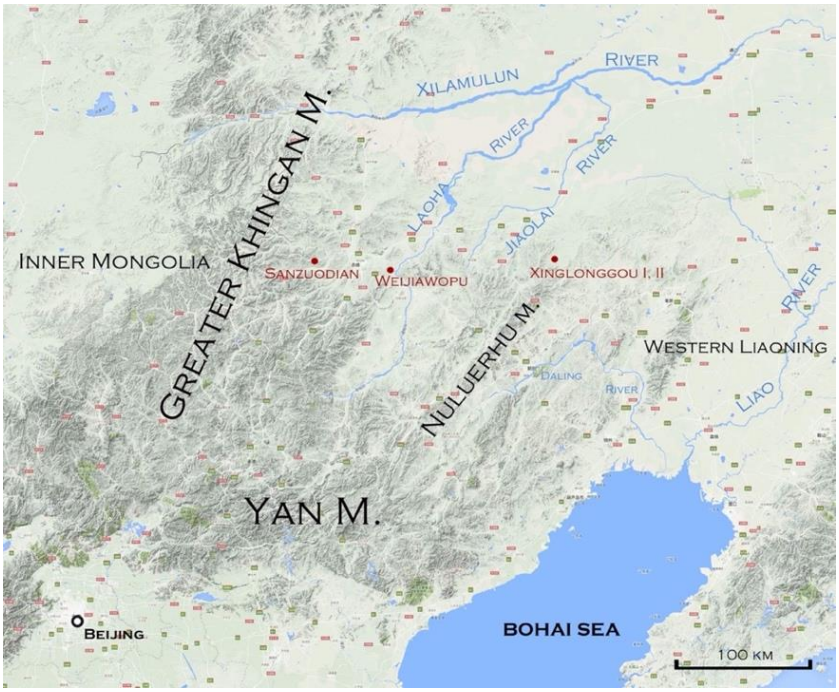


Figure 3.43. Location of Sanzuodian, Weijiawopu and Xinglonggou Location I and II.

Carbonized broomcorn millet grains from Xinglonggou Location I 興隆溝第一地點 (ca. 6200-5200 BC) produced the earliest so-far known direct dates (5,670-5,610 cal. BC) in the world, which make northeast China one of the key areas capable of supporting relatively large populations by the Late Neolithic.[223] Foxtail millets became the main crop during the Hongshan 紅山 period (ca. 4500-3000 BC): for instance, Weijiawopu 魏家窩鋪 and Xinglonggou Location II 興隆溝第二地點 both yielded more foxtail millet remains than broomcorn millet.[224] Not only in northeast China, at this period, foxtail millets also dominated the crop pattern across the semi-arid zones in central and northern China.[225] However, for the third millennium BC, we do not have any data for grain remains during the Xiaoheyan culture period (ca. 3000-2000 BC). Foxtail millet's dominant position clearly continued into the early second millennium BC, before it was completely overturned in the last phase of the Lower Xiajiadian occupation.

[223] Zhao, Z. J. 2011: S300.
[224] Sun, Y. G and Zhao, J. Z. 2013: 1-5; Sun, Y. G. and Jia, X. 2016: 130-1.
[225] Qing, L. 2012: 304.

To investigate the role of millet in human and animal (species that were living in close relationship with humans) diets, we have data from several Neolithic sites in northern China, which showed various connections between millet use and $\delta^{13}C$ values. In far northeast China during the Xinglongwa 興隆窪 period (ca. 6100–5200 BC), for example, high $\delta^{13}C$ values in human skeletal elements indicate that people consumed primarily C_3 plants, in this case, millet.[226] By contrast, in the lower reach of Yellow River, Houli culture sites (ca. 6000 BC) like Xiaojingshan 小荊山 and Yuezhuang 月莊, $\delta^{13}C$ values suggest that C_4 plants were a minor component of a diet dominated by C_3 plants,[227] despite the presence of both rice and millets.[228] With a clear chronological sequence, the Dadiwan site in northwest China revealed two distinctive periods of C_3 plant consumption: the first phase (ca. 5900-5200 BC) was characterized by people harvesting and storing broomcorn millet to feed themselves and their dogs; By ca. 3900 BC, at Dadiwan site both broomcorn and foxtail millets were intensively cultivated and made significant contributions in the diets of people, dogs, and pigs, in whose isotopic profiles a simultaneous high $\delta^{13}C$ and $\delta^{15}N$ are observed.[229]

In around 2000 BC, isotopic evidence presented in the Wei River valley and the Ordos region indicated that humans living in this area were heavily dependent on millet for their subsistence.[230] This period is interesting from cultural and environmental perspectives, as around this time the Ordos region was undergoing a population and site expansion when mega-size settlements, such as Shimao, were flourishing (detailed discussion in Chapter Five).[231]

As millets can grow and thrive under difficult conditions, even producing some seeds in years with minimal rainfall, they have become an essential food in areas where

[226] Zhao, Z. J. 2005.
[227] Hu, Y. et al. 2008.
[228] Crawford, G. et al. 2006.
[229] Barton, L. et al. 2009: 5523-528.
[230] Atahan, P. et al. 2014: 171-7.
[231] Shaanxisheng Kaogu Yanjiuyuan 2013: 15-27; Shao, J. 2016.



Figure 3.44. Map showing location of sites yielded millet remains of 1st millennium BC, and 2nd millennium BC or older (after Figure 1.a of Miller, N. F. et al. 2016).

the major cereals fail to give sustainable yields.[232] More importantly, in terms of proteins, minerals, and vitamins, millets have higher nutritional value than either of the common cereals of wheat, rice, or maize.[233] As early as the fourth millennium BC, the cultivation of broomcorn millet has spread rapidly through the mountain foothills of Central Asia (Figure 3.44).[234] Proposed by Michael Frachetti as the 'Inner Asian Mountain Corridor', the mountain foothill region roughly coincides with the mountain foothills between northwest China, Kazakhstan, and Uzbekistan (Figure 3.45).[235] Compared to Central Asia and Xinjiang, the Mountain Corridor area enjoys the benefit of lower lands, more precipitation, and easier access to water. Due to its modest water requirements and fast maturation, millet was an ideal cereal for steppe communities and therefore, transmitted along the mountain corridors by people with high mobility levels. Being an opportunistic plant, millet can supplement the low food supplies for pastoralist groups in bad seasons, when other subsistence choices failed.

[232] Weber, S. A. and Fuller, D. Q. 2008: 4.
[233] Weber, S. A. and Fuller, D. Q. 2008: 20.
[234] Miller, N. F. et al. 2016: 1568; Liu, X. Y. et al. 2016: 1560; Spengler, R. N. et al. 2016: 1529-1531; Lightfoot, E., Liu, X. and Jones, M. K. 2013: 578-90.
[235] Frachetti, M. D. 2008; Frachetti, M. D. et al., 2017: 194-5.



Figure 3.45. Map of the location of the Inner Asian Mountain Corridor (after Figure 5 of Frachetti, M. D. 2012).

By tracing the spread of millet beyond China, we know that the characteristic traits of millet make it especially suited for mobile pastoralists, and therefore, it enjoyed a quick spread into the steppe region. Looking at the other way around, northeast China with its early and successful millet agriculture might have drawn steppe populations eastwards into the Xilamulun-Liao River valley.

3.5.3 Site Functions

Pertinent to dry-land millet farming is the issue of agricultural resource management. As has been touched upon in the beginning of section 3.5, a matter of principal importance to our understanding of Lower Xiajiadian culture is the variance in size and location of different settlements: what were the relationships between large and smaller sites? How does their spatial distribution and size differentiation contribute to our understanding of the Lower Xiajiadian community? With the previous discussions on the on-site arrangement and dry-land millet farming, the current section aims to argue that the distribution of Lower Xiajiadian settlements was organized to procure subsistence resources.

First, the significance of agriculture in Lower Xiajiadian society can be seen from the general preference of settlement location. Located at the transitional zone from the Mongolian Plateau to the Manchurian Plain with considerable amounts of loess deposit, the Lower Xiajiadian settlements are distributed with a clear preference for locating sites and large populations by water resources and fertile farmlands on the loess tableland. Therefore, selecting the locations with the best access to subsistence resources is predictable. Systematic regional field survey results produced by the Chifeng International Project (CICARP) reveal that Lower Xiajiadian sites are more numerous on the south-facing sloping areas where large arable lands were available.[236] Such locations are favored in northern latitudes where they receive more sunlight and are less windy compared with the north-facing slopes. The tight packing of settlement sites in northeast China, especially the Chifeng region, together with intensive dry-land agriculture, raised the possibility that subsistence resource scarcity was a fact of life in the Lower Xiajiadian period.

However, being built next to cliffs and steep slopes plus heavy defensive structures, would have restricted the ability of large settlements to expand into agriculturally

[236] CICARP 2011: 93.

productive land. Due to the vertical fluvial incision process, the flat river valleys where modern cities and villages are situated were covered by water in the second millennium BC. This means that agricultural fields in the Lower Xiajiadian period were located on the loess highland away from the riverbanks.

According to the survey data of the Chifeng Project, the distribution pattern of Lower Xiajiadian settlement sites exhibits a strong consistency: all the large sites, with no exception, are located right next to the rivers for natural defense, while smaller sites are situated further away from the main river systems up on the hill slope.[237] Sometimes, small settlements are located along the tributaries where the land is precipitous but closer to arable ground. A general positive correlation can be drawn between a site's distance to the main river systems and its agricultural productivity.

One shortcoming of the existing scholarship on the distribution of small Lower Xiajiadian settlements is a failure to appreciate the great advantage of agricultural productivity and convenience of high-hill small water streams associated with upland small locations. Being the major crop of the Lower Xiajiadian period, millet responds well to irrigation and can survive in arid and semi-arid areas of limited rainfall (30-40 mm annually) during their very short growing period (three to four months).[238] This basic characteristic, therefore, required the farming population to choose their land on the region's prime irrigable farmland but also less flood-prone valley bottom areas. Hydrological and physiographical data obtained in the Chifeng International Archaeological Project points out that the major rivers in northeast China are shallow and frequent flooding occurred during the second millennium BC.[239] Valley floor farming would have been considerably inhibited in ancient times because of poor drainage and the risk of flooding. In contrast, land and soils on the hillslopes dry out more quickly after rainfall.[240] Archaeobotanical evidence also suggests that the

[237] CICARP 2011: 89-93.
[238] Weber, S. A. and Fuller, D. Q. 2008: 3.
[239] CICARP 2011: 36.
[240] CICARP 2011: 36.

earliest location for human agriculture took place on transitional slopes of foothills rather than the river valleys.[241] This observation fits into the distributional pattern of Lower Xiajiadian sites very well and provides strong support for this thesis to argue that the upland zone was preferred over river valley locations for local dry-land farming practice, as it offered people the chance to manage small water streams in ravines for irrigation purpose. On the other hand, the soils on the hillslopes were thinner and less agriculturally productive in the long run. So, people would have to switch land from time to time and probably use the upland areas as grazing territory for sheep, goats, and cattle.[242]

However, as mentioned earlier, the climate instability of the later phase of the Lower Xiajiadian occupation might have meant an increased risk of flooding in the river valleys and drier conditions on the high lands. Unlike the early period, lower agricultural productivity after 1500 BC could hardly support a large regional population. This may have triggered regional social unrest and the final demise of the Lower Xiajiadian culture.

In the Lower Xiajiadian settlement system, large central sites surrounded on two or three sides by cliffs were significant in their defensive advantages rather than agricultural productivity. Like the tell-based settlement system in Upper Mesopotamia, large Lower Xiajiadian settlements might be supported by those smaller sites in their respective areas for food and other living supplies.

Large central settlements, with more houses, storage facilities, handicraft production, and public structures are regarded as the residential base of high archaeological visibility in Binford's Logistical System. As has been shown in the previous section, in large excavated Type A and Type B sites, excavators reported greater varieties of constructive features, which were not seen in small sites of lower

[241] Jones, M. lecture 24/10/2018 in Oxford
[242] CICARP 2011: 123.

archaeological visibility. Structures such as well-constructed bastions and wall enclosures, storage facilities, and large open spaces are found only at large settlements, indicating that they might act as centers of defense, religion, and economic resources. For example, the empty spaces identified in the large central sites may have served for social functions involving large aggregates of people.

By comparison with large sites, the smaller Lower Xiajiadian settlements were built as temporary operational and seasonal residential areas for small task groups. Without any report of storage pits or evidence for long-term use, there is only sparse occupational debris in these upland small locations, suggesting either that they were not used for long periods or they were only sporadically occupied for specific purposes. With dry-land farming as the most important subsistence strategy, the smaller sites likely served similar functions (agricultural outposts and satellites) as the ones surrounding the major mound at Tell al-Hawa. Their functions were economically important, and they were more likely created for agricultural populations to live and practice subsistence activities in nearby cultivation lands. As the climate got worse after 1500 BC and cultivation became difficult, it is assumed that more individuals would be drawn into the agricultural system as labor, a situation that would further reinforce population dispersing away beyond the center and become more specialized agricultural suppliers.

In the meantime, some small sites also had their own defensive constructions, though much less effective than those of the larger sites, which means they could also serve as temporary refuges from attack. Evidence of maintenance has been recorded in many large habitation sites and this undoubtedly implies that large sites were under continuous occupation, while small sites appeared to be used only for a brief period with much fewer traces of subsequent housing repair.

To sum up, with consideration of the contrasting locations, inner structures, and defensive systems, the large and well-fortified settlements of the Lower Xiajiadian

culture have a different social function from the small upland sites. Built in most easily defended valley-margin locations with steep canyons and natural cliffs, large Lower Xiajiadian settlements were important as centers of multiple social functions, serving for residential, defensive, artifact production, and possibly administrative purposes. Located around these large central settlements, the small-sized sites on hillslopes had more essential roles for subsistence activity and short-term residency for small task groups. Based on the currently available Lower Xiajiadian settlement data, this chapter argues for an alternative comprehension of the mechanisms of the local society and suggests that it was structured, organized, and operated largely to maximize agricultural production.

3.5.4 Animal Resource

With a success in agricultural production, the flourishing of Lower Xiajiadian culture also benefited from the development of animal husbandry. Pig bones comprised the majority of animal remains from all reported Lower Xiajiadian sites, which suggests that agricultural production was sufficient not only for human consumption but also for raising livestock.

Pigs

Zooarchaeological evidence suggests that domesticated pigs were available in northern China at around 6000 BC and constituted a major part of people's meat intake till today.[243] Pigs accounted for 47.65% of the animal remains at Dashanqian 大山前 site, two times more than cattle, sheep, or dog.[244] At the Dadianzi 大甸子 cemetery, a total of 166 tombs were found with buried animals and all of them yielded pig bones.[245] Around half of these 166 burials (Number=81) each had a whole pig in the fill and eleven tombs yielded two.[246]

[243] Yuan, J. and Flad, R. 2002: 724-5; Larson, G. et al., 2010: 7686.
[244] Wang, L. X. 2007: 353-4.
[245] IA CASS 1996: 194.
[246] IA CASS 1996: 194.

Lower Xiajiadian period fauna has a high $\delta^{13}C$ signal indicating a strong C_4 food input.[247] At the same time, there was a concomitant increase of C_4 signal in humans. We could argue that during the Lower Xiajiadian occupation, high agricultural output promoted a dramatic increase in the local population and the food surplus enabled people to feed their animals with C_4 crops, most likely millets. As has been noted by Shealch (1994), the overwhelming importance of pig husbandry to Lower Xiajiadian culture indicated a relatively stable and sedentary way of living, which is also reflected in other aspects of the material culture, such as settlement organization, the construction of permanent structures, and the continued use of large-scale graveyards.[248]

Herded Animals

Excavations at many Lower Xiajiadian settlements also indicate that cattle, sheep (or goats) have already entered the local dietary structure. The recovery of herded animals has been reported from Xiajiadian 夏家店, Zhizhushan 蜘蛛山, Nanshangen 南山根, Shuiquan 水泉, Shangjifangyingzi 上機房營子, Yaowangmiao 藥王廟, and Fengxia 豐下. Among these locations, Dashanqian 大山前 and Shangjifangyingzi 上機房營子 are the only two sites with systematic zooarchaeological data. In both datasets, the proportion of sheep and cattle accounted for roughly 40% of the total number of identified specimens per taxon (NISP).[249] In Shangjifangyingzi, pigs only occupied 25% of the NISP while sheep and cattle accounted for 37.5% of the identified animals.[250] In the faunal assemblage of the Chifeng survey project (CICARP), cattle are 7% (Number=10); sheep and goats 26% (Number=39), and pigs make up 67% (Number=101).[251] All these available zooarchaeological evidence suggests a pattern of settled farming life based on a mixed subsistence economy of plant cultivation and animal husbandry.

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[247] Liu, X. Y. et al. 2012: 285-8.
[248] Shalach, G. 1994: 277.
[249] Wang, L. X. 2007: 353; Xiao, X. M. and Tang, Z. W. 2014: 141; Neimenggu Kaogu Yanjiusuo 2012: 249-52.
[250] Xiao, X. M. and Tang, Z. W. 2014: 141; Neimenggu Kaogu Yanjiusuo 2012: 249-52.
[251] CICARP 2001: 124

Contemporarily in the Chinese Central Plains, the scapula of cattle and sheep/goat was the most desired material for making oracle bones for ritual purposes.[252] Apart from being a contributing factor to local diets, cattle and sheep/sheep were also used in a more sophisticated context in northeast China. Archaeologists have found remains of drilled oracle bones from 13 Lower Xiajiadian sites (Table 3.7), which showed similar craftsmanship as those reported from the Erlitou site (ca. 1750-1500 BC) and metropolitan Shang culture (1500-1046 BC). There are very few oracle bones identified to species, and of those that have been, pig seems to be as common as cattle and sheep/goat in northeast China.

Table 3.7. Oracle bones were excavated from Lower Xiajiadian sites.

SITE	NUMBER	SPECIES	REFERENCE
YAOWANGMIAO INNER MONGOLIA CHIFENG 内蒙古赤峰药王庙	1	-	IA CASS 1974
XIAJIADIAN INNER MONGOLIA CHIFENG 内蒙古赤峰夏家店	1	-	IA CASS 1974
ZHIZHUSHAN INNER MONGOLIA CHIFENG 内蒙古赤峰蜘蛛山	4	Pig, Sheep	IA CASS 1979
DONGSHANZUI INNER MONGOLIA CHIFENG 内蒙古赤峰东山咀	2	-	Liaoningsheng Bowuguan 1983a
SANZUODIAN INNER MONGOLIA CHIFENG 内蒙古赤峰三座店	-	-	Neimenggu Wenwu Kaogu Yanjiusuo 2006, 2007
XIAOYUSHULINZI LIAONING NINGCHENG 辽宁宁城 小榆树林子	2	-	Neimenggu Wenwu Kaogu Yanjiusuo 1965
INNER MONGOLIA KHORCHIN DASHANQIAN 内蒙古科尔沁大山前	-	-	IA CASS 1998, 2004
INNER MONGOLIA AOHAN DADIANZI	4	-	IA CASS 1996

[252] Keightley, D. 1999: 236-7; Flad, R. 2008: 403-10.

内蒙古敖汉旗大甸子			
LIAONING BEIPIAO FENGXIA 辽宁北票丰下	7	-	Liaoningsheng Wenwu Ganbu Peixunban 1976
LIAONING BEIPIAO KANGJIATUN 辽宁北票康家屯	1	-	Liaoningsheng Kaogu Yanjiusuo 2001
LIAONING CHAOYANG LUOGUODI 辽宁朝阳罗锅地	1	-	Liaoningsheng Kaogu Yanjiusuo 2004
LIAONING JIANPING SHUIQUAN 辽宁建平水泉	-	Pig, Sheep, Cattle	Liaoningsheng Bowuguan 1986
LIAONING JINZHOU SHANHEYINGZI 辽宁锦州山河营子	4	-	Liu, Q. 1986

The ones at Yaowangmiao 藥王廟, Xiajiadian 夏家店, Dongshanzui 東山咀, Xiaoyushulinzi 小榆樹林子, Dashanqian 大山前, Fengxia 豐下, Kangjiatun 康家屯, Luoguodi 羅鍋地, Shuiquan 水泉 were drilled before they were subjected to heat (Figure 3.46). On the other side of some scapulars, archaeologists observed cracks, though no oracle bone script has been found. This shows a very close tie with later Shang culture remains in Zhengzhou 鄭州 and Anyang 安陽, where divination was carried out in a similar fashion (Figure 3.47).[253]

[253] Keightley, D. 1999: 236-7; Keightley, D. and Rosemont, H. 2014: 237-43; Flad, R. 2008: 411-4.



Figure 3.46. Examples of drilled oracle bones from the Lower Xiajiajiadian sites. (1: excavated from Erdaojingzi site, after Figure 20 of Neimenggu Wenwu Kaogu Yanjiusuo 2010; 2: excavated from Yaowangmiao site, after Plate 4.10 of IA CASS 1974; 3: excavated from Dashanqian site, after Figure 7 of IA CASS 1998; 4: excavated from Dadianzi site, after Figure 21.15 of IA CASS 1996).



Figure 3.47. Examples of drilled oracle bones in Shang period (1: excavated from Yanshi Shang city, after Figure 388.2 of IA CASS 2013; 2: excavated from Yuanqu Shang city, after Figure 157.12 of Zhongguo Lishi Bowuguan Kaogubu and Shanxisheng Kaogusuo 1996; 3: excavated from Zhengzhou Shang city, after Figure 560.2 of Henansheng Wenwu Kaogu Yanjiusuo 2001; 4: excavated from Yinxu site, Anyang, Henan province, photo by author; 5: excavated from tomb No. 5 at Yinxu site, Anyang, photo by author).

Horses

It is more interesting to note that there are horse remains reported from Dashanqian 大山前 and Shuiquan 水泉 in northeast China.[254] As one of the earliest horse findings in China, the horse bones from the Dashanqian site were recently studied using the mitochondrial DNA D-loop sequences. Cai, D. W. *et al*. (2007) shows that

[254] Wang, L. X. 2007: 354 and Zhang, Z. H. 1989: 57-61. At Dashanqian location I, 18 pieces of horse remains have been found and analyzed by Cai, D. W et al (2007). However, only one horse molar has been recovered from Shuiquan without any further scientific analysis been published.

three samples (K433, K410, and K420) of Dashanqian shared one mutation with the cluster (A2), to which the *Equus caballus przewalskii* 普氏野馬 sequences belong.[255] Another sample (K316) has been grouped into cluster F1.[256] Based on the phylogenetic network established by Jansen, T. *et al.* (2002), Cai argues that the presence of multiple horse types in northeast China shows that they were coming from different genetic sources. If we go back to Jansen et al's original database, both clusters A2 and F1 correspond closely to the Mongolian steppe.

In Jansen's database, all horses with mtDNA type A2 are *Equus caballus przewalskii* horses (14 horses, 100% of this variety) (Figure 3.49).[257]



Figure 3.49. Geographic distribution of horses with mtDNA type A2 (*Equus caballus przewalskii* horses). Circled symbols represent the locations of the 652 horse mtDNAs sampled in Jansen, T. et al. 2002 and data previously published. The size of the dot signals the sample size in each location. Pie charts stand for the occurrence of a specific mtDNA type in the local sample. According to Jansen, et al. 2002, all 14 horses in mtDNA type A2 are Przewalski's horses. As shown in the map, they are exclusively geographically related to Russian Far East and Mongolia, accounting for 74% of the local sample size (a total of 19 horses) (after supporting Figure 5 of Jansen, T. et al. 2002).

Due to their untamed behavior, *Equus caballus przewalskii* (commonly known as the Mongolian horse or Dzungarian horse) have traditionally been considered as a wild and endangered horse breed native to the steppes of the East Asian steppe.[258] They

[255] Cai, D. W. et al. 2007: 385-90.
[256] Cai, D. W. et al. 2007: 388-9.
[257] Jansen, T. et al. 2002: 10909.
[258] Do, K. et al. 2014: 86-91; Goto, H. et al. 2011: 1096-1106.

have also been found in large numbers in Chinese archaeological remains since the late Shang period (ca. post-1200 BC).[259] A recently published paper by Gaunitz et al. (2018) noted that Przewalski's horses are not the direct progenitors of domestic horses, and they are the feral descendants of horses herded at Botai, where we have the first archaeological evidence of horse husbandry (ca. 5500 kya).[260]

In terms of documented horses with F1 mtDNA types, their geographic distribution displays more varieties, but with an especially high proportion of horse types originating from Mongolia (47%).[261] Therefore, both strands of evidence point to the argument that the horse remains found in the Lower Xiajiadian context were not local species but imported from regions further north and west. As yet we do not have data to show whether there was any social importance of horses in northeast China, it is significant to point out that the horse, as a foreign animal, appeared in northeast China hundreds of years before they were used for draught purposes in central China (11th century BC), and riding/mounted warfare within this region in the Upper Xiajiadian period (late second to mid-first millennium BC).[262] Acknowledging the large body of pre-Shang petroglyphs found across China's northern borders, it is more likely that horses were used in the borderlands for herding and riding before they were incorporated with chariots/carriages and further introduced into the central Chinese culture systems.[263]

[259] Vilà, C., Leonard et al. 2001; Wilson, D., & Reeder, D. 2005. *Equus caballus przewalskii* found in Chinese archaeological records see Deng, T. 2000: 28-33 and Zhang, C. S. 2004: 252-4.
[260] Gaunitz, C. et al. 2018: 111-114.
[261] Jansen, T. et al. 2002: figure 18.
[262] Wu, H-Y. 2013; Yang, J. H. et al. 2013: 243-5.
[263] For the use of horse and chariots in Bronze Age Central China, see Wu, H-Y. 2013.

3.6 Chapter Summary

This chapter has illustrated the great complexities of Lower Xiajiadian settlements through contextual analysis of the archaeological evidence from the angle of chronology, site distribution, constructive technology, settlement pattern, and subsistence economy.

For the first time, this thesis classifies the Lower Xiajiadian settlements into three categories based on their distinctive landscape and construction method: Type A low-platform sites built with rammed earth and mudbricks, Type B stone constructed high hillforts, and Type C hillslope sites both constructed with stones. By examining the locations of large excavated sites and their constructive material and technologies, we know that the Type A sites built on low-platforms were dispersed in the eastern part of Lower Xiajiadian culture area, while the Type B large stone-constructed sites showed a very high concentration in the area northwest of Chifeng city. Stratigraphically based chronology further confirms that these stone-built settlements in Inner Mongolia were constructed on top of the previous mudbrick and rammed earth structures.

Combining the available radiocarbon dates with the locations of 25 large-scale excavated sites, this chapter highlights a northwestward movement of large settlements and major populations from the early to the middle occupation of the Lower Xiajiadian culture.

Although constructed with different materials and methods from early to late phases, the general settlement structures (circular houses, pits, courtyards, walls, and ditch enclosures) remained largely the same across the whole Lower Xiajiadian occupation. Erdaojingzi 二道井子 site has been taken as a key example of Type A sites to demonstrate that the use of mudbricks and lime-plastered floor were two advanced construction techniques extensively exploited. The sudden appearance of

these new technological changes in the Lower Xiajiadian context indicates important cultural signals that can be well attributed to Longshan cultural remains in the Central Plains and the Shandong peninsula.

Sanzuodian 三座店 and Kangjiatun 康家屯 were two major representatives of Type B high hillforts. They tend to be more naturally enclosed by their positions on south-facing valley margin areas with steep slopes. They were further protected by stone walls at places where natural cliffs were unavailable, suggesting a stronger sense of using topography as part of the site protection. The ubiquity of man-made stone enclosures and external tower structures characterize the second feature of Type B settlements. Featuring these defensive characters, Type B sites were carefully designed and constructed to hold large groups to the population.

The third type of Lower Xiajiadian settlements (Type C) is located on mountain tops or hill slopes. They are small (500-1000 square meters) but constitute the greatest number of Lower Xiajiadian settlements. Compared with Type A and B settlements, these high hill-slide sites were much less populated and are more likely used as short-term dwelling locations for small agricultural groups.

Diverging from Shelach's site size/hierarchy-oriented theory, this chapter argues that the different sizes, spatial distributions, and archaeological deposits of Lower Xiajiadian sites reflect a functional variation, rather than merely hierarchical stratification. This interpretation receives considerable support from Lewis Binford's notion of the "Logistical Subsistence-Settlement" system and the land-use strategy of Bronze Age Upper Mesopotamia settlements, both of which describe a situation that special task groups disperse from the large central residential location and establish smaller sites in surrounding areas where major food-procurement operations took place.

Chapter Four: An Analysis of the Dadianzi Cemetery

Burial practices and funeral assemblages constitute an important aspect of the social dimension, both for current and past societies. By its nature, mortuary data provide the material and ritual behavior in a burial space. Through a given burial space, archaeologists can analyze the mortuary data and investigate the burials to see the society's economic activities, cultural traditions, and social structure.

Large cemeteries of the Lower Xiajiadian culture have been identified at Dadianzi 大甸子, Fanzhangzi 范杖子, and Erdaojingzi 二道井子.[262] However, Dadianzi 大甸子 is the only site that has been fully excavated and reported.[263] The site consists of a residential area (approximately 7 h) surrounded by rammed-earth walls, and a nearby cemetery (roughly 1h) containing 804 rectangular shaft burials (Figure 4.1 and 4.2), 745 of which have not been disturbed and are hence available for our analysis. Radiocarbon dating of the decayed wooden coffins recovered from tomb M454 and M759 has generated two calibrated dates: 1777-1394 BC (ZK-0402, 3290±90 BP) and 1779-1425 BC (ZK-0480, 3320±85 BP) which place the site in the middle of the Lower Xiajiadian occupation, around ca.1700 -1500 BC (Figure 4.3).[264]

[262] Fanzhangzi cemetery has only been briefly reported in Neimenggu Wenwu Kaogu Yanjiusuo 1983. Compared with Dadianzi, the mortuary data at Fanzhangzi is very fragmentary, so it will not be included in this thesis. Another cemetery containing 268 simple pit graves, is also found nearby the Erdaojingzi settlement, of which no data has been published.

[263] IA CASS 1996.

[264] IA CASS 1991: 56.



Figure 4.1. Map of the Dadianzi settlement and cemetery (after Figure 2 of IA CASS 1996).



Figure 4.2. The northern section of the Dadianzi cemetery
(after Plate 5.2 of IA CASS 1996).

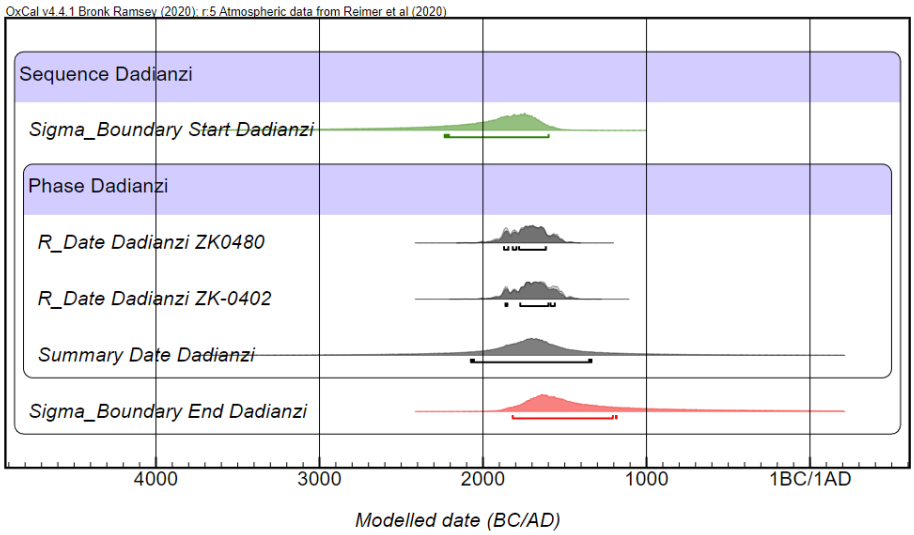


Figure 4.3. Radiocarbon dates for the Dadianzi cemetery (data from Zhongguo 1991: 56).

4.1 The Layout and Chronology of the Dadianzi Site

The Dadianzi cemetery is referenced in past literature as the only fully excavated location of Lower Xiajiadian culture and is thus isolated in most academic work from the nearby residential area. The residential area at Dadianzi is located on a low and flat platform with its southern and eastern sides naturally defended by cliffs and overlooking a streambed. A regularly arranged cemetery area is constructed beyond the rammed-earth wall of the residential site to the northeast (Figure 4.1).[265]

It was through test excavations on three cross-sections (north, east, and south) along the edge of the platform that local archaeologists confirmed there were ancient residential structures. They further identified rammed earth walls and a contemporary moat underneath the current agricultural layer in the northern and eastern sides of the platform. The stratigraphic layers of the wall and moat also

[265] IA CASS 1996: 7.

suggest that the Dadianzi cemetery area was used largely at the same period as the settlement site.[266]

Due to limited time and financial support, archaeologists did not fully excavate the residential site. Given what they have revealed from the test trenches, we can know the approximate chronological date of the Dadianzi site. As has been intensively discussed in Chapter Three, the landform and architectural type are highly indicative of the date of a Lower Xiajiadian settlement. Two house foundations were reported from test excavations in the residential area and both are single-structured semi-subterranean houses, equipped with a chimney flue on the western side. They were built with rammed earthen walls coated with mud and straw. The floors were rammed as well. Several pits were also identified nearby, the inner surface of which was carefully lining up with sun-dried mudbricks. All these architectural elements allow us to place the date of the Dadianzi settlement and cemetery to the early and middle periods of the Lower Xiajiadian culture. This suggestion is supported by the two radiocarbon dates generated from the decayed wooden coffin remains of tombs M454 and M759, suggesting that the Dadianzi cemetery was being used in the mid-second millennium BC.[267]

Unfortunately, archaeological work at the cemetery has not recovered stratigraphy overlying nor cutting between any two of these 804 burials (Figure 4.2). Therefore, it is extremely difficult, indeed almost impossible to date the 745 non-disturbed tombs by stratigraphic seriation. The methods for assigning relative dates of "early" and "late" in the IA CASS 1996 report are purely based on the stylistic differences of a Type a tripod *li* vessel, A 型陶鬲. The excavator claimed that this sequence had been referenced with other Lower Xiajiadian sites and should be suggestive of diachronic change on site. However, it should be pointed out that this chronological assumption did not comprehensively characterize the Dadianzi tomb assemblage, in that the

[266] IA CASS 1996: 7-17.
[267] IA CASS 1991: 56.

Type a tripod *li* vessel did not even occur in more than half of the burials, nor was it the most numerous ceramic type excavated in Dadianzi. Therefore, this chapter suggests that dividing the cultural sequence of the Dadianzi cemetery by *li* vessels is not reliable, and it is more appropriate to regard the date of the residential area and the cemetery site as both belonging to the early-mid second millennium BC.

4.2 Organization of the Cemetery

Located in the northeast to the residential area, the cemetery area of the Dadianzi site is much smaller in size, extending 150 meters from north to south and 70 meters from east to west (Figure 4.4). It appears to consist of three distinct areas separated by avenues of unused space: the north, the middle, and the south sectors, with 496, 140, and 109 undisturbed burials, respectively (Figure 4.4). The excavators suggest that these may have been deposition areas used by different contemporaneous social groups.[268] The northern sector, especially, contains neat rows of graves, and the cemetery is overall very well organized.

A total of 661 skeletons have been preserved across the Dadianzi cemetery and 461 of them can be identified osteologically, including 233 males, 228 females, and the other 200 individuals whose sex could not be determined. The sex ratio of adults at Dadianzi comes out to in percentages 100 males to 102 females. Based on the ages of identified individuals provided in the 1996 IA CASS report, we know the mean age at death for the entire population buried at Dadianzi is 27.72 years.[269] However, with the under-representation of children and infants, the real figure is considerably lower.

[268] IA CASS 1996: 223.
[269] IA CASS 1996: 224-5.

Although constructed with different tomb furnishings, the 745 undisturbed tombs at Dadianzi were integrated into a coherent burial landscape, which was archaeologically visible in two ways: in the first place, the cemetery was on the whole very well organized and largely followed certain prescriptive frameworks. Eight hundred and four burials were dug within a confined area of 10,000 square meters, enclosed by a moat and sand-gravel hillock.[270] Although less than a meter often separates the burials from one another, there is no overlap among the graves. Secondly, all the burials at Dadianzi were extremely consistent in their orientation, varying from approximately 40-60 degrees north by west;[271] with only 22 exceptions, 97% of the Dadianzi graves contained single, extended individuals on their sides. All of this points to the users of the cemetery generally following a few prescriptive rules and coordinating the layout over a long period.

[270] IA CASS 1996: 39.
[271] IA CASS 1996: 42.



Figure 4.4. Plan of the Dadianzi cemetery (after Figure 22 of IA CASS 1996).

4.3 How Social Differences were Manifested at the Dadianzi Cemetery

4.3.1 Theoretical Background

Are mortuary data suitable for inferring social significance? Initially outlined by Binford and Saxe, proponents of the New/Processual Archaeology regard the features of burial goods and practices recovered from ancient cemeteries as direct reflections of past social structures.[272] In order to build robust inferences about past societies, Binford and Brown encouraged archaeologists to develop methods of quantitative analysis and argument by which more information could be extracted from the disposal of the dead.[273] It is noteworthy that this whole approach was framed to center on the expenditure of energy or resources, that is, Processual archaeologists interpret mortuary variability as linked to social differentiation, arguing that the more wealth accumulated in a tomb, the higher the status of its occupant. By contrast, Post-processual archaeologists criticize the materialist approach of Processual Archaeology as failing to take sufficient account of object symbolism and cultural meaning.[274] In terms of mortuary analysis, for example, Parker Pearson, argues that the burial was manipulated by the living, which included quite a long list of funerary rituals that may have served to exaggerate or diminish the actual social position of the deceased.[275] For this reason, the energy spent in the burials, as shown in archaeological evidence, might bear little or no relation to the wealth or rank of the deceased in past.[276] On the whole, Post-processualists were less interested in the entire question of "energy expenditure". To them, the relationship between the expenditure in the burial and funerary, as opposed to that

[272] Binford, L. 1971: 6-29. Saxe, A. 1970.
[273] Binford, L. 1968; Brown, J. A. 1971.
[274] Hodder, I. 1982.
[275] Parker-Pearson, M. 1982: 112 and 2000: 72-81.
[276] Parker-Pearson, M. 1982: 112

witnessed in the archaeological record, need not be direct.[277] However, with different sorts of criticism on the basic assumption of "energy expenditure", O'Shea demonstrated that there had yet to be matching robust arguments in Post-processual Archaeology that could link the disposal of the dead with the archaeological investigation.[278] Further, responding to the critiques of Hodder and Parker-Pearson to New/Processual Archaeology, Brown argued that, although the central part played in the treatment of the dead and construction of burials was by the living, their decisions were made within the same contemporary social environment as the dead, which were equally constrained by the ideological, political and economic aspects of that context.[279]

In the scope of this chapter, I largely follow the Processual approach of mortuary analysis and conduct a cemetery-specific investigation on the data excavated from the Dadianzi burial ground. The key research question is how social differences were manifested through burials and grave objects, and special attention will be placed on interpreting the distribution of different burial goods and its implication.

Flad and Hruby suggest that certain utilitarian goods, prestige goods, and wealth goods depend "on culturally specific values."[280] This perspective brings to our attention the conceptual ideas underpinning some specific mortuary practices, which were closely related to contemporary social values and attitudes towards death. For instance, Aubrey Cannon noted that the use of gravestones in 19th century Cambridge Shire demonstrates that wealthy and high-status social groups adopted modest burial furnishings to mark their difference.[281]

[277] Braun, D. P. 1981.
[278] O'Shea, J. M. 1981 and 1984.
[279] Brown, J. A. 1995.
[280] Flad, R. and Hruby, Z. 2007: 10.
[281] Cannon, A. 1989: 437-58.

Apart from discussing how differences in burials can reflect social stratification, mortuary analysis is also firmly focused on the negotiation of status and social privilege, as well as the materialization of power and status. The term "prestige goods" figures very prominently in archaeological research that seeks to reconstruct past societies through mortuary assemblages. In Neolithic China, the production and possession of prestige goods, especially jade ornaments and jade-decorated weapons, are agreed among archaeologists to represent wealth and political power. Some individuals actively used prestige goods, it is thought, to exert power over people who were not in possession of such objects. This understanding of prestige goods dates back to 1899 (reprinted in 1934) when Thorstein Veblen published *The Theory of the Leisure Class*.[282] The book introduced the concept of conspicuous consumption, which refers to members of stratified societies spending large amounts of money on things and displaying them ostentatiously. In reaction to such behavior, members of lower social levels often attempt to emulate higher-ranking members of society in order to enhance their own social positions.

Apart from prestige objects, the current chapter envisages that social power at Dadianzi is distinctively embodied and materialized through different funerary aspects: the size of tomb shaft, the way a burial was constructed, the grave goods inside the niche, what was buried next to the deceased and how the body was decorated. In this process, elite individuals of the Lower Xiajiadian community effectively valorized the exclusive practices and expensive artifacts and expressed them through their burial assemblages. As these practices and artifacts gradually become concretized within a society, wealth plays a significant role to sustain existing burial practices and values attached to certain expensive objects. That is to say, the embodiment of social stratification requires wealth.[283] Under such circumstances, the assessment of wealth cannot only be understood in a purely

[282] Veblen, T. 1899 (1934).
[283] Richards, J. and Van Buren, M. 2000: 4.

economic sense, but also as a means of asserting and expressing social power.[284] Renfrew, C. suggests that the possession of rare objects carries with it more than the ability to exchange some of them in return for goods and services. The ownership implies access to social networks and to other resources that are closed to those lacking such prestige.[285] This includes many different forms: by controlling foreign trade/having a political relationship, thus restricting access to exotica; by commanding the labor of specialized or attached craftworkers, and consequently acquire the sought-after products they create. In this sense, the ownership of expensive and rare artifacts implies access to social networks and other resources that are closed to those lacking such prestige.

Noting the relationship between the procession of expensive and rare artifacts, and one's power/social authority would largely suggest unequal access to scarce resources and human labor. However, in the discussion of burial objects, there is also a need to distinguish expensive objects from prestige artifacts with power/status indication. As noted above, Flad and Hruby's suggestion that certain expensive goods depend on "culturally specific values", indicating the displayed features of some labor-intensive objects were associated with local contextual cultural tradition, instead of representing social power. For example, elaborately decorated painted ceramics are found from nearly one-third of the tombs at Dadianzi, seeming to be high-status artifacts associated with the elites. But looking at the distribution of painted ceramics against their tomb sizes, it seems that the burials with one to five painted pottery per grave did not show any observable size difference (figure see section 4.3.4). Rather than simply acknowledging the wealth/energy/labor put into the production and acquisition of painted ceramics and saying that they are status markers, this approach is comparison-oriented, emphasizing the comparison of one burial attribute against other mortuary

[284] Richards, J. and Van Buren, M. 2000: 4.
[285] Renfrew, C. 1986: 160-1.

dimensions. By synthesizing and cross-comparing multiple grave goods with burial practices, we are more likely to distinguish between burial attributes, to see which type is more status-related, whereas the other types, though numerically rarer or more elaborately decorated (as the case of Dadianzi painted ceramics), bear less association with social differentiation, but as Flad and Hruby suggest, reflect contextual cultural traditions.

In addition, there is also a need to distinguish some very rare and labor-intensive grave objects from prestige artifacts that bear wider social significance. Similar cross-comparisons can be done to look at a series of burial goods, especially those found in the same burial context. Such a comparison can help identify the association, if any, between different artifact types. Grave goods buried next to the deceased that are rarely found across the whole burial ground, especially one's apparel, accessories, personal ornaments, which include expensive material, complex production techniques, or exclusive/individual styles, are more likely to be valuable personal items. Different from the more generally defined prestige goods, these exclusive personal objects do not have clear associations with other mortuary dimensions, thus cannot be regarded as prestige objects with wider social significance in the local community. Because of their rareness and high quality, these expensive artifacts have greater importance for the tomb occupant him/herself, enhancing the social profile of the deceased, but less universal significance in society.

This thesis is theoretically influenced by Processual approaches of burial analysis, with a materialist framework to identify evidence of social differences in mortuary records of the Dadianzi cemetery. I envisage that the community using the Dadianzi burial space deployed multiple strategies through meaningful use of material culture to signify different aspects of social differences. In the following section, this thesis explores the marked differences among burials at Dadianzi with respect to the sizes

of tomb shaft, construction of graves, quantity, and distribution of objects buried across the cemetery.

4.3.2 Grave Types and Constructions

There are 745 undisturbed graves at the Dadianzi cemetery. All of them include shaft pits, in which 470 tombs contain a niche in the wall above the feet of the corpse. Three different grave constructions can be observed across the cemetery: wooden chamber tombs (Number=210, 28%), pits with mud-brick lining (Number=5, 1%), and simple pits (some with earthen second-level ledges) (Number=530, 71%) (Figure 4.5) (Appendix IX). Figure 4.6 shows the distribution of three tomb constructions on the Dadianzi cemetery plan.

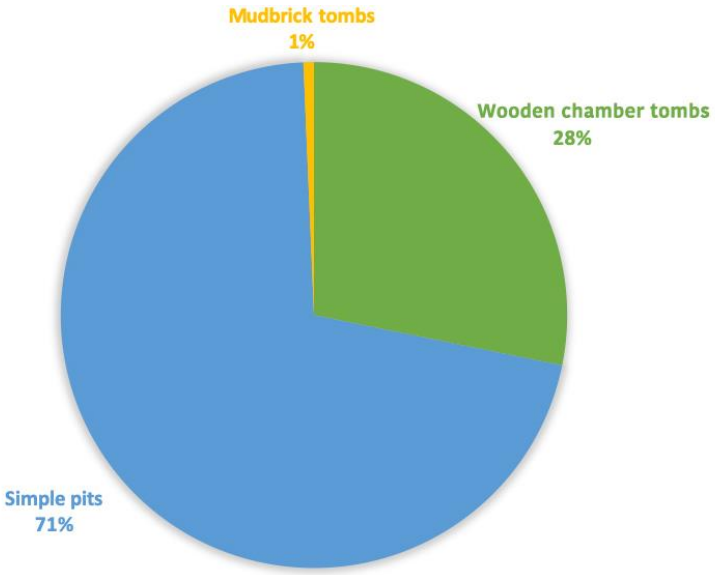


Figure 4.5. Pie chart showing the distribution of grave constructions at Dadianzi.

Binford notes that differences in grave forms can symbolize either difference in social affiliation, condition of death, or social status.[286] The inner association and division between the various tomb construction groups at Dadianzi may exhibit possible social affiliations within the Lower Xiajiadian community. Possibly, this wide

[286] Binford 1971: 149.

assortment of grave structures is traceable to various sources and suggests the local population was made up of people from different places with their burial practices. The number and proportion of each construction type in the north, middle and south burial area are:

	North	Central	South
Simple pit	338 (68%)	106(76%)	86(79%)
Wooden chamber	153(31%)	34(24%)	23(21%)
Mudbrick	5(1%)	0(0%)	0(0%)

The south sector of the Dadianzi cemetery has the highest percentage of simple pit graves, though the proportion is only 3% less in the central burial area. Except for mudbrick tombs, one hundred percent of which appear in the north sector, the association of simple pit and wooden chamber tombs with three burial areas needs to be tested statistically. A Chi-square test produces an X^2 of 5.86 with a p-value of 0.053, which is slightly larger than the selected significance level of 0.05. While hinting at a possible difference, the null hypothesis cannot be formally rejected, so we conclude that the distribution of simple pit and wooden chamber graves is independent of the sector in the Dadianzi cemetery.

However, the distribution of the five mud-brick tombs is worth special attention (Figure 4.6). Like all the other wooden chamber tombs and simple pit graves, they were built firstly by digging a vertical shaft into the ground, then mudbricks were lined on the floors and along the four sidewalls in the pit. After the corpse was deposited in the brick “box”, a final layer of the ceiling was then carefully placed on the top to cover the opening. These five mud-brick burials are exclusively found in the northeastern corner of the cemetery, indicating that this was a very unusual burial practice that was acknowledged by the local community. As it was only

employed by 1% of the total population and distributed in a restricted space, this thesis argues that using mud-bricks for grave furnishing seemed to be a household-scale preference/tradition that was not attractive to the majority of individuals at Dadianzi, but was carefully preserved and maintained within a small social group.



Figure 4.6 Distribution of different tomb constructions at Dadianzi (Blue: simple-pit tombs; brown: wooden chamber tombs; purple: mudbrick graves)

Figure 4.7 shows the percentage of each grave construction type in male and female tombs, and Figure 4.8 provides the actual numbers among all 661 skeletons preserved at the Dadianzi cemetery. The proportion of male individuals (88 out of 233, 38%) who could afford a wooden chamber is not significantly higher than the female group (74 out of 228, 32%). Meanwhile, the percentages of using simple-pit graves are only 6% higher in the female group.

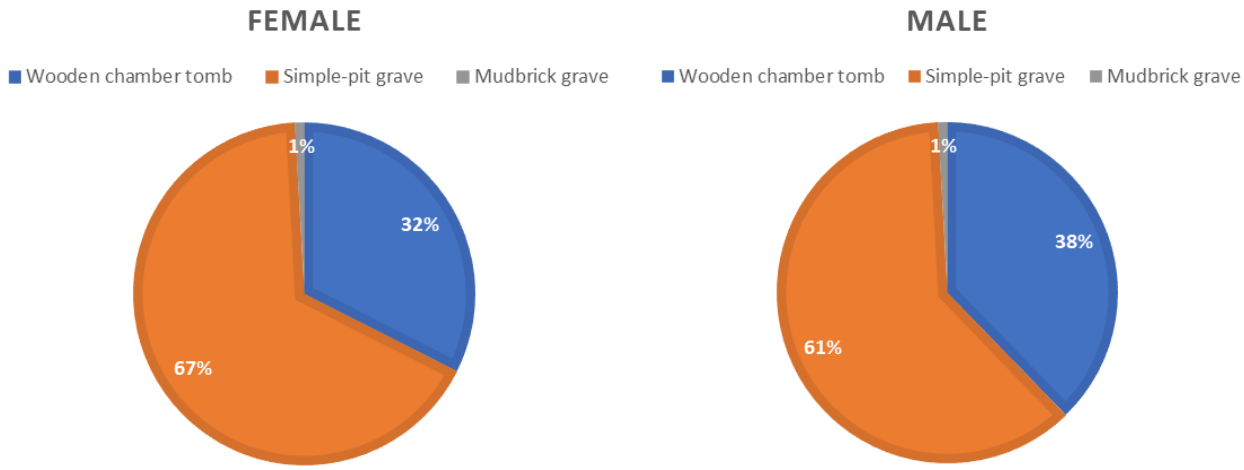


Figure 4.7 Pie charts showing the percentage of each grave construction type in female and male tombs.

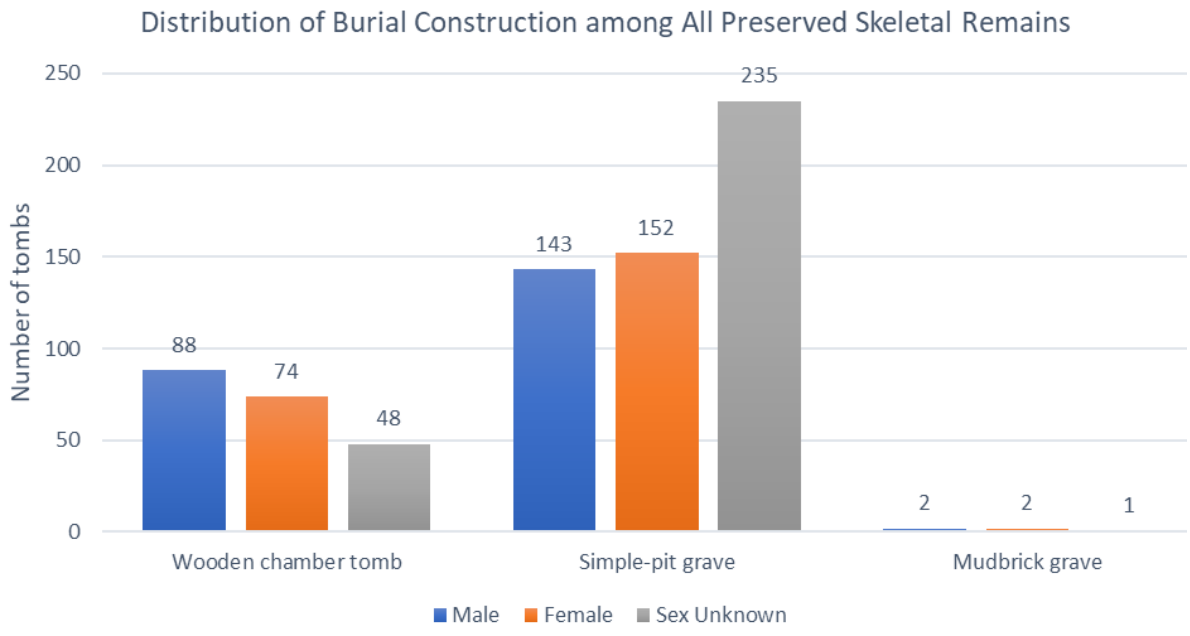


Figure 4.8 Distribution of burial construction type among all preserved skeletal remains at Dadianzi.

Entering the numbers shown in Figure 4.8 for a Chi-square test produces an X^2=1.43 and the p-value is 0.23. The result is not significant at p<0.05, indicating that the sex of tomb occupant was not associated with the type of tomb construction at Dadianzi.

4.3.3 Grave Sizes

In the IA CASS original report, the excavators divided the graves into three size groups based on the length of the pit.[287] However, in the Dadianzi cemetery, the depth of graves varies from 0.03 to 7.8 meters, and the length ranges from 0.6 to 4 meters, showing that the depth varies more dramatically than the length and was, therefore, a more important indicator of social status. Following the previous discussion on the variation of Dadianzi tomb construction forms, I calculated the size of all 745 grave-pits at Dadianzi by multiplying the figures of length, width, and depth (Appendix IX).[288] Histograms are made to show the distribution of the volume for different tomb types (Figure 4.9a, b, and c).

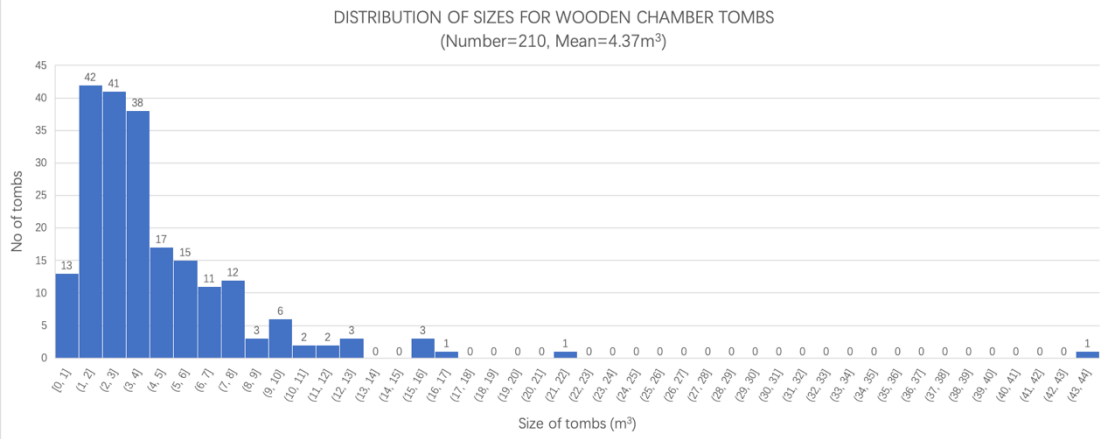


Figure 4.9a Distribution of the size for wooden chamber tombs (data from IA CASS 1996).

[287] IA CASS 1996: 39-43.

[288] The depth of graves at Dadianzi is based on the data offered in IA CASS 1996, which regards the ground level of modern landscape as the starting point for calculation. It is worth noting that surface erosions overtime since the second millennium BC might have changed the overall level of the Dadianzi burial ground. In the IA CASS 1996 report, the excavators classified Dadianzi tombs into large (number=143, 18%), medium (number=434, 54%) and small (number=175, 22%) categories, based on the size of the opening of each grave. Most of them are 1.7-2.3 meters long and less than 1 meter wide. However, variations are much more pronounced in the depth of the burial shaft: some large graves can be as deep as 7.8 meters, while the average is 1.4 meters (see Appendix IX).

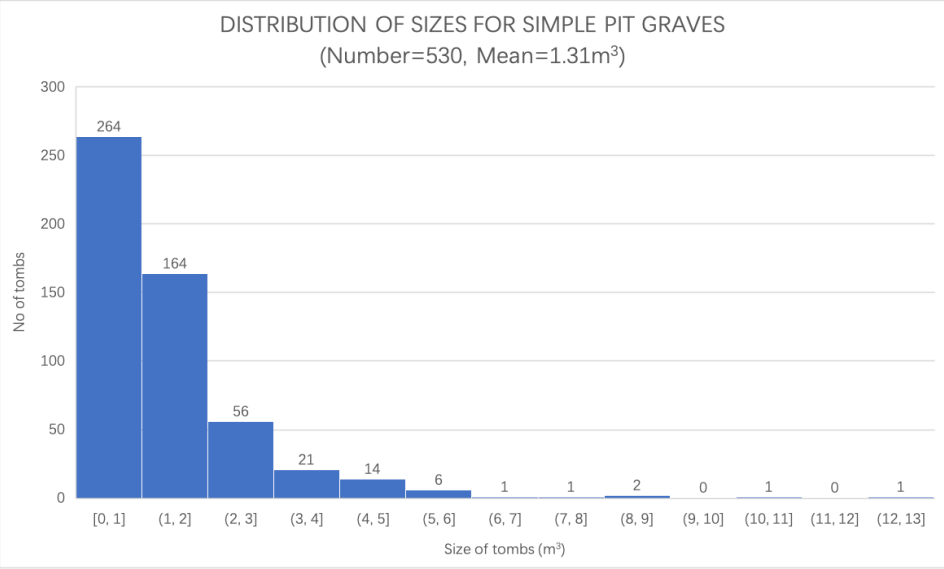


Figure 4.9b Distribution of the size for simple-pit graves (data from IA CASS 1996).

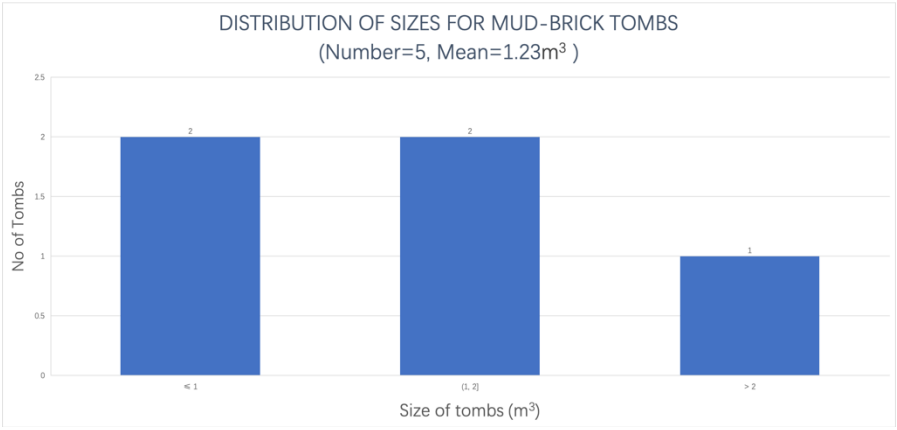


Figure 4.9c Distribution of the size for mudbrick tombs (data from IA CASS 1996).

Through Figure 4.9a, b, c, we see strong correlations between the degree of labor expenditure in grave construction material and grave size in the Dadianzi cemetery. The average grave size for wooden chamber tombs, simple shaft tombs, and mud-brick tombs are 4.37, 1.31, and 1.23 m^3. This shows that the size of the shaft for wooden chamber tombs was generally more than three times larger than the other two burial types.

A box-plot graph of the distribution of shaft sizes across the three burial types (Figure 4.10) gives us a more straightforward idea that wooden chamber tombs are larger on average than simple pits and mudbrick burials. It shows that the sizes for wooden chamber tombs are larger than 75%, if not more, simple pit graves and mudbrick tombs. On top of this, the different median values (represented as the horizontal line in the three boxes) also suggest that the larger half of wooden chamber tombs were actually much bigger than over 75% of the simple-pit graves, while the interquartile range for simple-pit tombs is almost the same value as that of mudbrick burials.

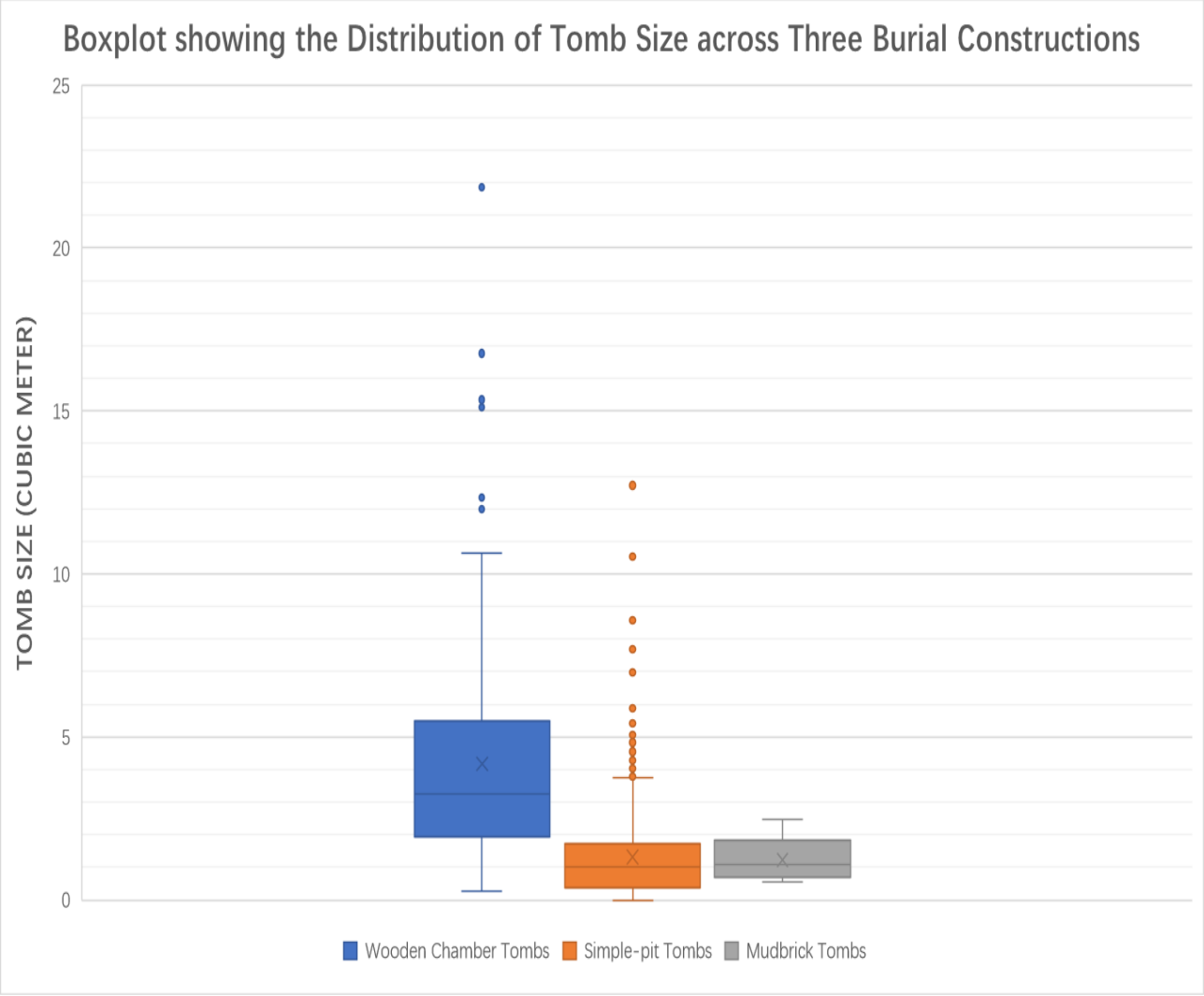


Figure 4.10 Boxplot showing the distribution of tomb sizes in three burial types at Dadianzi. A very high outlier of 43.68 m^3 for wooden chamber tomb has been excluded for greater clarity in the remaining tombs.

The largest wooden chamber tomb has a burial shaft of 43.68 m^3, while only 12 wooden chamber burials are smaller than 1 m^3. All six tombs with a shaft larger than 13 m^3 are wooden chamber graves. Built with wooden planks in complex structures (Figure 4.11), this grave type required more labor to dig a larger shaft, the resources to obtain the wood material, and the craftsmanship to make the coffin box. In contrast, the proportion of simple pit and mud-brick tombs smaller than 1 m^3 account for 95.3% of the total number. Apparently, the least energy and resource were spent on the construction of simple-pit tombs. Mudbrick tombs appear no significantly larger than simple pit graves, but they clearly required more resources and energy (to produce the mudbricks and control the sizes of each brick) to construct, indicating that the mudbrick users were holding more wealth than the deceased buried in simple-pit graves. Therefore, in sum, the occupants who were buried with wooden chambers were more likely to be the wealthiest group in the Lower Xiajiadian community.



Figure 4.11 Example of the Dadianzi wooden chamber structure
(tomb No. M672, after Figure 23.2 of IA CASS 1996).

Furthermore, statistical analysis shows that, compared with mudbrick tombs (Coefficient Variation=60%), greater levels of dispersion around the mean tomb size are seen among wooden chamber tombs (Coefficient Variation=98%) and simple pit

graves (Coefficient Variation=108%).[289] This suggests that there were most inter-group variations among the people who were buried with simple pits, while the degree of variation within wooden chamber tombs is also significant at the Dadianzi cemetery.

Equipped with larger burial pits and more expensive wooden constructions, the wooden chamber group at Dadianzi shows that the local community was hierarchically structured and had a social mechanism that was capable of organizing and constructing large burial spaces and complicated tomb furnishings. On the other hand, the distribution pattern of pit size against grave constructions at the Dadianzi cemetery did not offer us good evidence to suggest the existence of a very strong paramount leadership structure at this period. Buried in a larger tomb shaft, the wooden chamber group were likely representing the top social class with the most material wealth in the Dadianzi community. Their presence and contrast with the other less wealthy tomb occupants are a clear indication of social stratification. However, the proportion of the wooden chamber tombs across Dadianzi (28%) did not suggest a highly forceful social hierarchy. Tombs with simple-pit still constituted the great majority at Dadianzi. Therefore, the Lower Xiajiadian community was more likely to be a group-oriented society, with a hierarchical system but not one on same the scale which archaeologists would expect from a state-level society.[290]

To sum up, combining the qualitative differences in grave construction with statistical analysis, I argue that the size of the burials at Dadianzi represented the general variation in the vertical social position of the local community, while more intensive interior social contrast can be found within the upper-class group.

[289] The mean size and Standard Deviation of mudbrick, simple pit and wooden chamber tombs are 1.23 ± 0.74 m^3, 1.31 ± 1.42m^3 and 4.37 ± 4.3 m^3, respectively.
[290] Shelach, G. 1999: 137-8; Shelach, G., Raphael, K. and Jaffe, Y. Y. 2011: 23-4.

4.3.4 Grave Goods in the Niche

The layout of the cemetery clearly suggests that the use Dadianzi site and construction of different burial types were planned. In the IA CASS 1996 report, 14 graves of various sizes and furnishings were published with full assemblages and drawings.[291] This section takes four burials from this list as representatives. By examining the object deposited in their foot niches, I hope to see how material manifestations were perceived at the Dadianzi cemetery and what messages the grave goods conveyed in their mortuary contexts. This will include two aspects of the study: the generalization of local mortuary practice, and the quantitative and qualitative difference of burial objects in elite and non-elite graves.

In the list of 14 published graves of Dadianzi report, this chapter picks two graves: a female tomb M677 and a male tomb M905 as representatives of the elite group as they are both ranking among the top ten largest tombs across the cemetery. Another two humble graves: M1144 and M673, with their chamber sizes close to the Dadianzi average of 2.17 m^3, are taken as examples of the most modest burials at the site.

Ranking among the top largest graves, tomb M677, with a 12.38 m^3 tomb chamber (3.17 m long, 1.1 m wide, and 3.55 m in depth), is located in the northern part of the cemetery (Figure 4.12).[292] A wooden chamber was originally constructed as the burial coffin, of which archaeologists could only identify parts of remaining rotten wood among the rammed earth fill. The tomb contains one single skeleton belonging to a woman aged over 55. Her grave goods can be neatly categorized into three groups based on different depositional locations: the fill, the foot niche, and the inner chamber. There was a whole pig skeleton in the fill 0.93 m above the wooden chamber, with all four trotters chopped off. A foot niche was found constructed on

[291] IA CASS 1996: 45-62.
[292] IA CASS 1996: 50-1.

the southern side of the pit, inside which eight ceramic vessels were deposited. Six of them are food cooking and serving vessels (a set of *guan* jar with an upturned *li* tripod, two *hu*, and a *zun*), all bearing painted geometric patterns. The other two ceramics were a pouring *gui* and a drinking *jue* vessel, both of which were not painted but carved on the surface with linear decorations. The inner chamber of tomb M677 was enclosed by the wooden timber coffin, which was 1.85 by 0.5 meters at the bottom, just large enough to contain a skeleton of the occupant with her personal ornaments—a set of head ornament made up of 22 turquoise beads and four cowries, one jade necklace and 11 bronze rings (Figure 4.12).[293]



Figure 4.12 Plan of tomb M677 (after Figure 26 of IA CASS 1996).

Exhibiting a similar burial practice, the deposition of grave goods in another elite tomb, M905 largely resembled that of M677—with animal sacrifices including a pig and the head of a dog in the fill, personal ornaments, and a small stone hand-axe in

[293] IA CASS 1996: 51.

the chamber close to the deceased (Figure 4.13). What makes the M905 assemblage especially interesting is the arrangement of grave goods inside the niche. With a prominent configuration (Figure 4.13), the foot niche of M905 was spacious enough to hold four sets of pottery *guan* jars with upturned tripods, with another set of pouring *gui* and *jue* drinking vessels deposited in the eastern side of the niche (Figure 4.13). In between these four ceramic sets were four *guan* jars, acting as spacers separating these sets from one another. This is a typical phenomenon at Dadianzi, where a burial includes more than two sets of *guan-li*, another *guan* jar was usually found in between. Apart from tomb M905, twelve such examples can be found at the Dadianzi cemetery.[294]



Figure 4.13 Plan of tomb M905 (after Figure 27 of IA CASS 1996).

[294] Tomb No. M371, M388, M612, M628, M648, M666, M706, M715, M726, M732, M905, M931 and M1147.



Figure 4.14 Plan of tomb M1144 (after Figure 31 of IA CASS 1996).



Figure 4.15 Plan of tomb M673(after Figure 32 of IA CASS 1996).

If we look at the humbler burials at Dadianzi, tombs M1144 and M673, the same types of ceramic vessels, a *guan* jar with an upturned tripod, also occurred together as a group in both burials (Figure 4.14 and 4.15).

The sizes of M1144 and M673 are much smaller compared with the grand graves at the Dadianzi cemetery and neither of them was buried with any grave goods in the chamber or the fill. But both M1144 and M673 contained the same set of mortuary pottery in their foot niches as M677 and M905——a *guan* jar with an upturned tripod. It seems that the practice of burying such a *guan*-tripod set in the foot niche was a standardized mortuary behavior at Dadianzi (Figure 4.16). Sometimes, in those modest Dadianzi burials, an additional jar was deposited together with the *guan*-tripod group (Figure 4.16), which could be a supplement to the standardized assemblage.



Figure 4.16 Example of the tombs buried with the *guan*-tripod pottery set (after Plate 11-14 of IA CASS 1996).

More quantitive analyses of the burial goods in foot niches yield further interesting archaeological conclusions. There are 470 Dadianzi tombs equipped with a niche in the wall above the feet of the corpse, in which pottery vessels and animal bones were placed. Among them, 365 graves were found with only one set of *guan*-tripod ceramics (Figure 4.17). The number of tombs with two or more sets is merely 36, accounting for 9% of the total graves that yielded such pottery sets. Tomb M612 has the largest number——four sets (Figure 4.18). With an average size of 7.6 cubic meters, these 36 tombs were 3.5 times larger than the mean volume of tombs (2.17 m^3) in the Dadianzi cemetery.

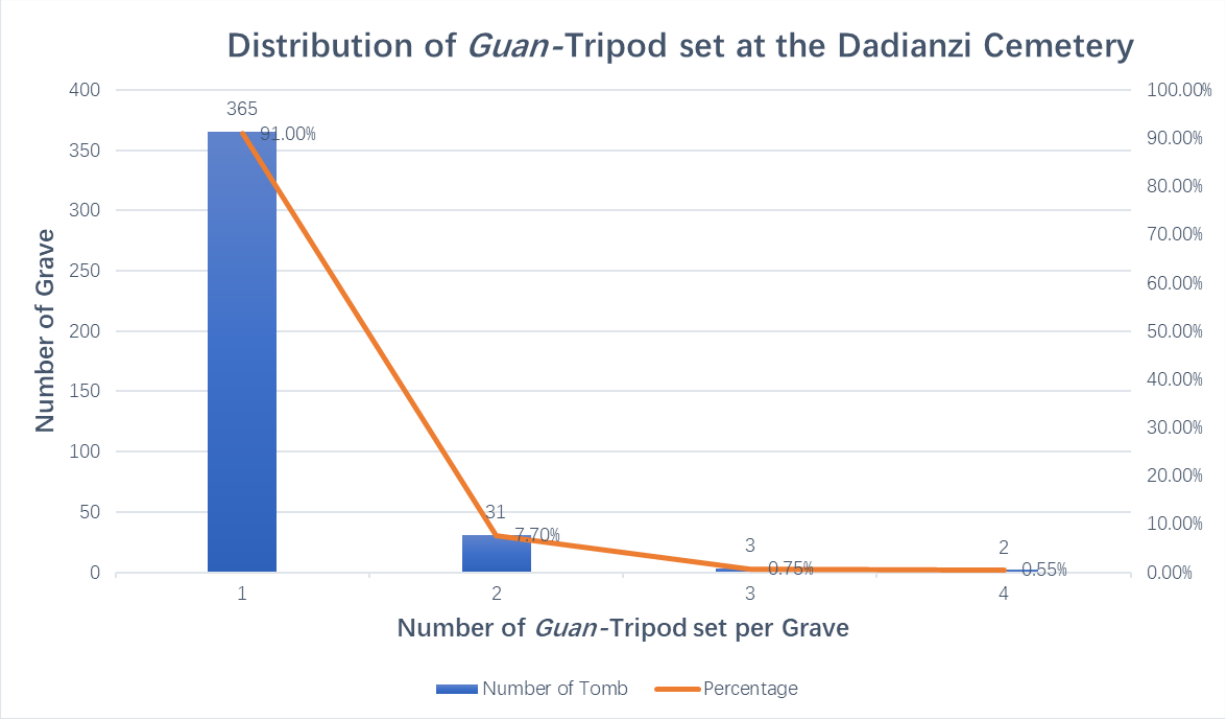


Figure 4.17 Distribution of *guan*-tripod set at the Dadianzi cemetery.



Figure 4.18 Ceramic vessels from tomb M612 at Dadianzi
(after Figure 94 of IA CASS 1996).

A niche represents an additional space for the burial goods other than the tomb chamber. A grave with a niche required more labor overall in the tomb construction than a simple grave of the same size but without a niche. In this sense, the presence of niches was a status display of the deceased. To produce and bury more than one *guan*-tripod food vessel set in the foot niche was an additional investment. Multiple sets of ceramic food containers were found in the foot niches of tombs with larger chambers, while fewer sets were commonly deposited within smaller tombs. This finding supports the suggestion that food consumption was an important part of Lower Xiajiadian lifeways and was desired by different social classes for mortuary rituals. Considering that 401 out of the 470 tombs (85.3%) with a foot niche were buried with *guan*-tripod pottery, it seems that depositing such a ceramic set was a consistent mortuary practice in northeast China during the mid-second millennium BC.

Feasting activities had been occupied a central position in the creation of social relations and shared cultural experiences across prehistoric China. Burying a pottery jar with a tripod is a particularly distinguishing feature of Lower Xiajiadian material culture, as it exhibits a clear division of northeast China from the contemporary burial practice of the Central Plains, where exquisite drinking vessels were deposited with a much more complex and diverse groupings of pottery food vessels, in which four forms, the *gui*, *he*, *jue* and *ding* had a crucial role in the local feasting ritual (Figure 4.19).[295]



Figure 4.19 Erlitou ceramic set used in burial context
(tomb No. 2002VM4, after Color plate 130 of IA CASS 2014).

[295] Xu, H. 2013: 302.

As noted above, burial goods located in the niche include various types of pottery vessels and animal bones. Ceramics constituted the most common type of burial objects at Dadianzi cemetery, ranging in number from 1 to 12 vessels per grave. The number of tombs (591) buried with ceramics accounted for 79.3% of the total 745 graves, but none of the pottery has been found inside the burial chamber.

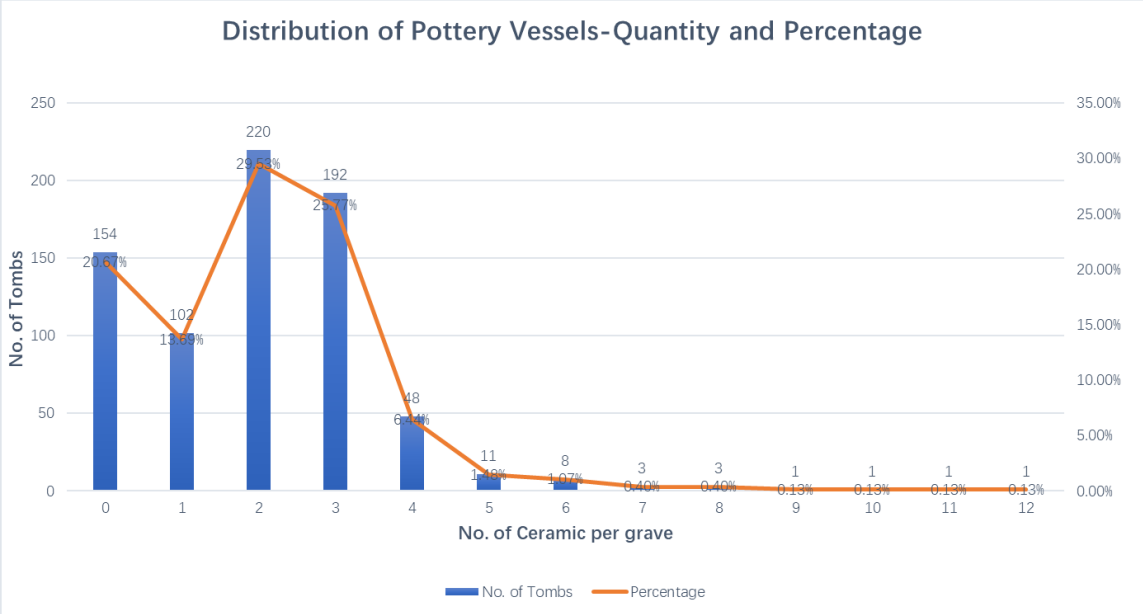


Figure 4.20 Distribution of pottery vessels found in foot niches at the Dadianzi cemetery.

A histogram (Figure 4.20) shows that there were major breaks in the distribution of the number of pottery vessels buried. The great majority of Dadianzi tombs yielded two or three ceramics in the foot niche, accounting for 69.7% of the total burials that had pottery vessels, while there were only 29 tombs (4.9%) buried with five or more pieces.

Plotting the ceramic data against tomb volume (Figure 4.21), we note that graves with one to four pottery vessels tend to cluster in the bottom left corner of the plot. Although the number of tombs buried with five and six ceramics is much fewer than those with four and fewer vessels, there is no striking size difference between them. When looking at the size distribution of tombs with seven and more ceramics per grave, only one tomb, M391 (3.35 m^3), is significantly smaller than the others. It could be argued that either seven or eight remains a good division where tombs with more ceramics were significantly larger. A more important recognition would be that there is no strong association between the number of ceramics with tomb sizes at Dadianzi.

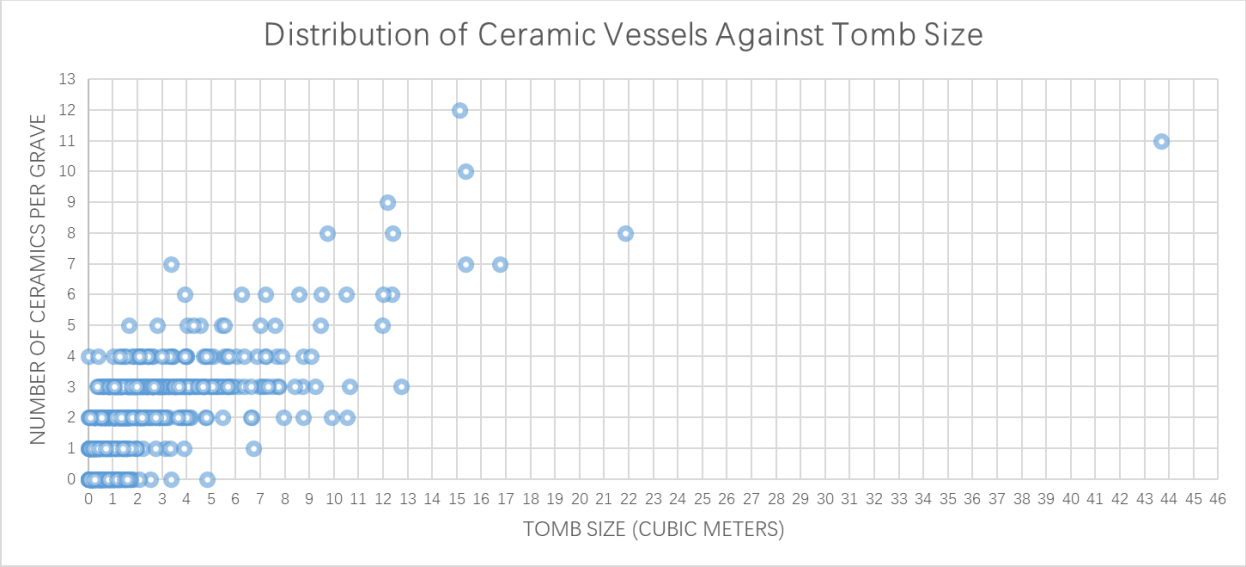


Figure 4.21 Distribution of ceramic numbers against mean tomb size at Dadianzi.

The ubiquity of pottery vessels at Dadianzi points to the fact that this set of ritual activities is not an activity exclusively associated with elites, though the scale of such activity clearly varies across the whole cemetery. Families or individuals with greater resources were able to produce and use more food containers with more exquisite decorations. Both the number and the deposition patterning in graves indicated that a great deal of energy was invested among the Dadianzi community for either status display, to feed more mourners during funerals, or to provide vessels for the deceased to use in the afterlife.

Among the 1683 pieces of pottery excavated from the Dadianzi cemetery, 427 painted pottery vessels were found from 222 graves, which have been decorated with mineral pigments of white, black, and red (Figure 4.22).[296] Previous scholarship has noted these painted ceramics were exclusively excavated from burial contexts, apart from a few sherds recovered from Fengxia.[297] The same pattern has also been confirmed by CICARP surveys and Shelach's regional fieldwork in Chifeng.[298] Given that such multi-colored pigments were applied on the vessels after firing and can easily come off, it is highly possible that these painted pots would have been difficult to use for practical purposes, but were produced specifically for mortuary context.



Figure 4.22 Examples of painted ceramics from the Dadianzi cemetery (after Color plate 1-17 of IA CASS 1996).

Compared with non-decorated ceramics, much can be learned from the distribution of painted ceramics as they required more labor to produce (Figure 4.23). The use of painted ceramics as burial furnishings is characteristic of the Lower Xiajiadian culture but was seemingly not a very common phenomenon in the Dadianzi cemetery, as

296 IA CASS 1996: 143-55.
297 Fieldwork at the Fengxia settlement site revealed 20 painted pottery sherds, among which the excavators identified several pieces belonging to a *li* vessel which bears painted patterns on the exterior and rim of opening. See Liaoning sheng wenwu ganbu peixunban 1976: 208.
298 CICARP 2011: 13-4 and Shelach, G. 1999: 103-4.

there are 525 graves buried without any painted pottery. The number of tombs that yielded painted ceramics (Number=222) is less than one-third of the total graves at Dadianzi. In addition, it can be seen in Figure 4.23 that tombs buried with four or more pieces of painted ceramics only account for 2% of the total number of graves at Dadianzi. This suggests an important finding that the quantity of painted pottery was a crucial dimension that reflected one's social position in the Lower Xiajiadian community.

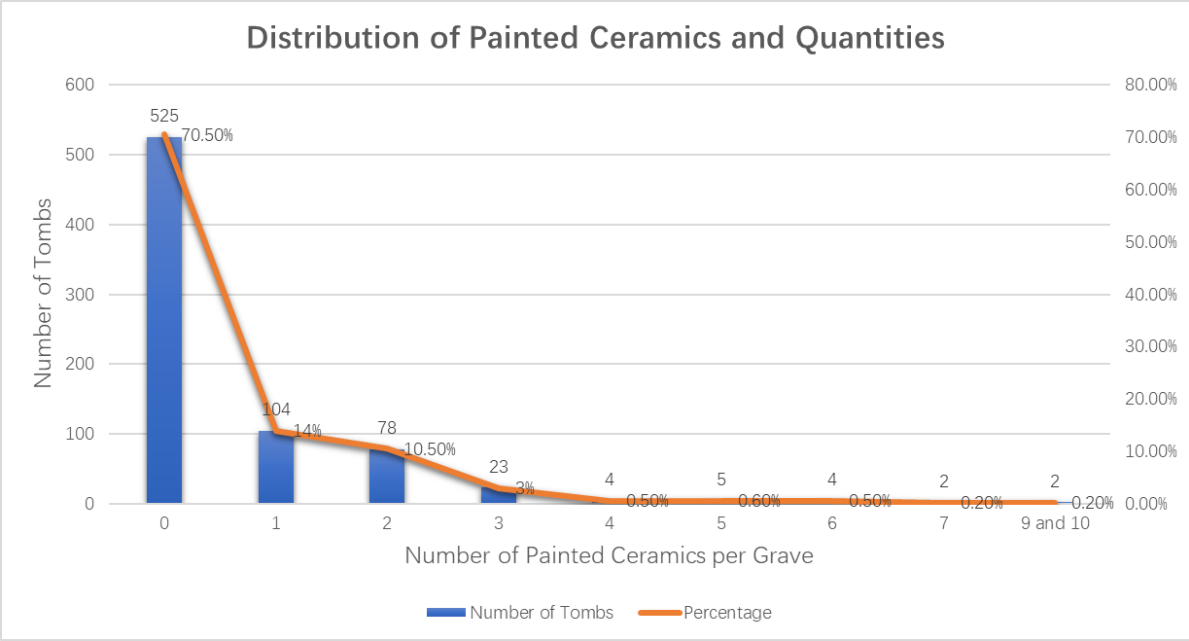


Figure 4.23 Distribution of painted ceramics and quantities at the Dadianzi cemetery.

It is more convincing if we look at Figure 4.24, which shows the distribution of painted ceramics against tomb size. Through this graph, however, we note that four ceramics per grave does not represent a clear division in terms of tomb size. The five graves with five painted pottery show a dispersed distribution, ranging from 3 to 22 cubic meters. It seems that tombs with six or more painted ceramics have a much larger tomb pit than the ones with fewer painted vessels (Figure 4.24). This again suggests that the presence of painted pots alone cannot fully indicate a tomb's position in the hierarchical sequence of the Dadianzi cemetery. As argued above, the quantity of painted ceramics is a more significant factor in determining the social

status of the deceased as they were noticeably more numerous in the largest tombs (Figure 4.24). For example, M726 with a 43.68 m^3 tomb shaft, yielded 11 ceramic vessels inside the foot niche, out of which 9 were painted on the surface (Figure 4.25).

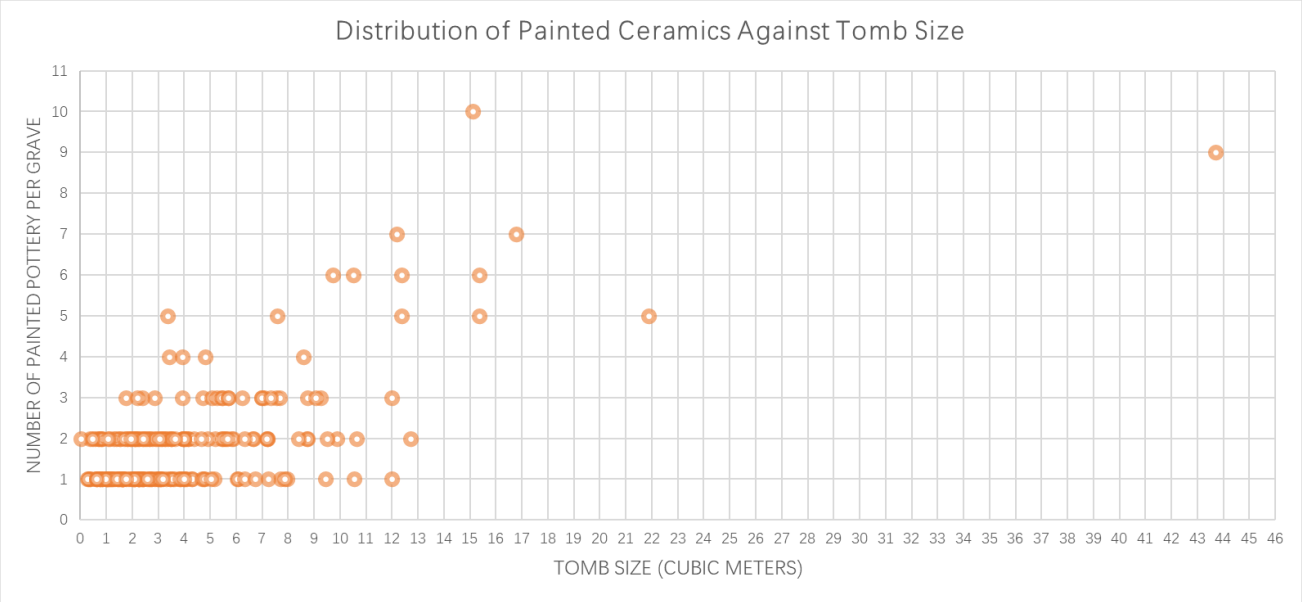


Figure 4.24 Distribution of painted ceramics and mean tomb size at the Dadianzi cemetery.

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 4.25 (left) Ceramic assemblage from tomb M726 (after Figure 95 of IA CASS 1996).

A small amount of red pigment was found inside a stone pot at tomb M453 at Dadianzi (Figure 4.26). Atomic-emission spectroscopy analysis of the chemical composition of the pigment has revealed that it contains mainly hematite (Fe_2O_3).[299] Another two contemporary archaeological sites that yielded ceramic vessels and wall paintings with red pigments are Shimao 石峁 in the Ordos region, and Taosi 陶寺 in southern Shanxi province (Figure 4.27). Referencing the scientific data acquired from these three sites, it seems that the communities of the Chinese northern borders and central plains exploited different major constituents for their red pigments. Wall paintings excavated from the East Gate of Shimao enclosure contain the same major material, hematite, as the Dadianzi pigment in tomb M453, while the red color found on Taosi ceramics was made of cinnabar (Hgs).[300]



Figure 4.26 Red pigment remains from tomb M453
(after Color Plate 18.2 of IA CASS 1996).

[299] IA CASS 1996: 337.
[300] For analysis on Shimao pigments, see: Shao, A. D. et al. 2015. For Taosi pigments, see: Wang, X. Y. et al. 2014; Lu, X. K. et al. 2011 and Li, M. S. et al. 1994.



Figure 4.27 Wall paintings of Shimao and painted potteries found at Taosi.
(1 and 2: after Figure 1 and 14 of Shao, A. D. et al 2015;
3-6: after Color Plate 17, 27.1, 25.1 and 28.3 of IA CASS 2015).



Figure 4.28 Decorative patterns on Dadianzi painted ceramics
(after Figure 54 and 55 of IA CASS 1996).

The designs of the Lower Xiajiadian pottery paintings are of very distinctive types (Figure 4.28) and several patterns are strikingly similar to the cloud patterns and the animal faces, or the so-called *taotie* 饕餮 animal-face mask patterns seen on later Chinese bronze vessels (Figure 4.29). Although the meaning and possible development of the *taotie* motif in ancient Chinese decorative language has been a decade-long research topic, what we know for sure is that within the Chinese Bronze Age sphere, the animal face motif was heavily associated with ritual performances for ancestor-worship during the Shang and Zhou periods (ca. 1500-221 BC).

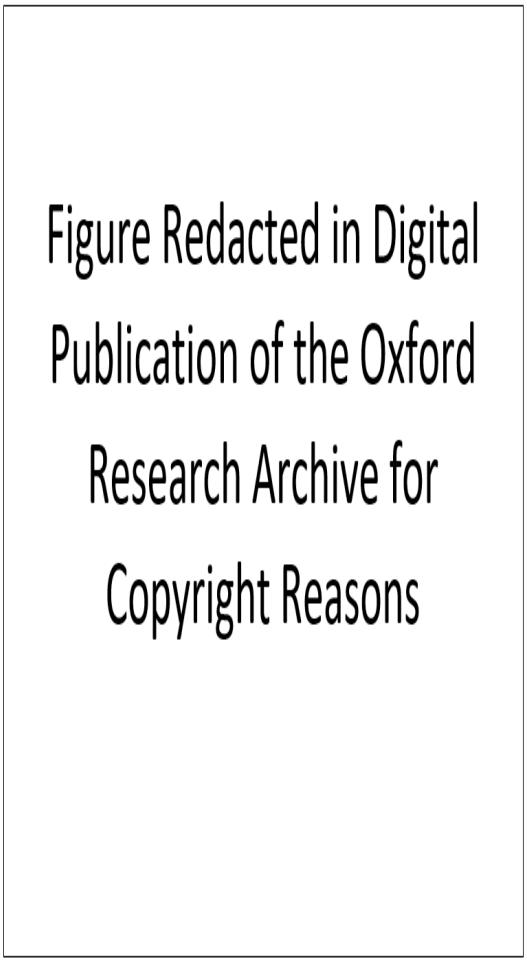


Figure 4.29 (left) *Tao-tie* animal face pattern on early Shang period (ca. 16-15th century BC) bronze *zun* vessel, from Zhengzhou Shang city (after Figure 551.3 of Henansheng Wenwu Yanjiusuo 2001 and Figure 123 of Zhongguo Qingtongqi Quanji Bianji Weiyuanhui 1998, volume 1).

If we start with the earliest generation of *taotie* pattern, the Erligang phase (early Shang, 16-15th century BC) bronze decoration, we can see that the *taotie* began first as a thread-relief design, centered on a pair of eyes (Figure 4.30).[301] This symmetrical pattern gradually gained more and more animal-like details and became a self-contained zoomorphic design in late the Shang (ca. 1200-1045 BC) when three or more mold pieces each containing a *taotie* face dominated the bronze ornamentation repertoire (Figure 4.31).



Figure 4.30 Bronze vessels of early Shang (ca. 16-15th century BC) period, excavated from the Panlongcheng site (photo by author).



Figure 4.31 Bronze *ding* tripod from Anyang, Henan province (after Figure 16 of Zhongguo Qingtongqi Quanji Bianji Weiyuanhui 1998, volume 2)

[301] The way Loehr, M. (1953) identified the thread relief as the earliest form of bronze decoration was largely typological, as it was the surface pattern found on the most primitive bronze vessel shapes. See also Bagley, R. W. 1987: 19-20 for more detailed discussions on the components of *taotie* pattern.

It has been argued by many that the system of *taotie* decoration originated from imaginary animals of the late Neolithic Liangzhu culture 良渚文化 (ca. 3200-2100 BC) jade carvings in the lower Yangtze (Figure 4.32).[302] The whole animal style decorative framework, centered on *taotie,* was used extensively in the Shang period (1500-1046 BC) bronzes, ceramics, jade, and bone carving, and probably many other materials (Figure 4.33a, b, c). All these animals figured importantly in royal tombs that have been excavated in Anyang 安陽, northern Henan province.



Figure 4.32 Jade *cong* tube of the Liangzhu culture (ca. 3200-2100 BC)
(after Figure I-13 of Zhejiangsheng Wenwu Kaogu Yanjiusuo et al. 2015).

[302] Kesner, Ladislav and Li, Xueqin 李學勤 are two major scholars arguing that the *taotie* pattern of Shang and Zhou bronzes may derive from the face-like motifs on the jades of Liangzhu culture (ca. 3200-2100 BC). See: Li, X. Q. 1993: 42-8 and Kesner, L. 1991: 29-53. Another line of argument was taken by K. C. Chang 張光直 in his important paper "The Animal in Shang and Chou Bronze Art" (Chang 1981: 527-41), in which he attempts to explore the meanings of Shang Zhou bronze decoration from the perspective of Heaven-Earth communication. In Chang's view, practice ritual activities using *taotie*-face decorated bronze vessels and make animal offerings to the ancestors was a concrete means of achieving dialogues between the dead and the living, as these animal helpers could transform from real animal shape into mythical creatures and assist the Shang Zhou elites. On the other hand, Robert Bagley thinks the whole question of the meaning of animal designs in Bronze Age China is wrongly formulated (Bagley, R. 1987: 19-24). He reviews the development of *taotie* pattern on bronze making in the introductory chapter of *Shang Ritual Bronzes in the Arthur M. Sackler Collections*, and takes a technically-biased art-historian approach to argue that the Chinese use of mold casting technology was a decisive factor in the evolution of *taotie* decorative style. Deviating from understanding the cultural significance of animal face pattern, Bagley also denies bronze designs were in any way imitations of ornaments conceived earlier in other materials.



Figure 4.33a Early Shang period pottery *gui* vessel with animal face pattern (photo by author).



Figure 4.33b (left) Jade comb of late Shang period (ca. 1300-1200 BC) from tomb No. 5 at Anyang (photo by author).



Figure 4.33c Ivory goblet inlaid with turquoise, Anyang, late Shang period (ca. 1300-1200 BC) (after Figure 10-3 of Yang, X. N. 2004).

The exact reasons for implementing *taotie* face design could hardly be an overnight invention, but we are not very likely ever to know when or in what circumstances it obtained ritual importance. However, what can be observed from the cases above is that the arrangement of *taotie* on Shang and Zhou bronze vessels was highly symmetrical and was constructed with different compartments of ceramic molds. However, unlike the rigorously arranged *taotie* face, the great majority of the decorative patterns on Dadianzi painted ceramics did not feature asymmetrical design but displayed more variety of colors and panel arrangements (Figure 4.22 and 4.28). These painted patterns showed great similarities with the decorative features around the eye of the animal face on a bronze *taotie*—namely, the angular geometric pattern and multiple types of running spirals (Figure 4.30 and 4.31). However, both the angular patterns and spiral patterns occurred in the decorative system on other materials, for example, textiles, lacquer wares, and basketry. Therefore, without acknowledging their wide sources of origins, it is arbitrary to draw a direct connection between the *taotie* pattern on Shang-Zhou bronzes with the painted polychrome decorations on Dadianzi ceramics. All the different decorative panels of both *taotie* and the Lower Xiajiadian pottery patterns could have been invented and reinvented at different times and across regions.

In the Lower Xiajiadian context, it is also worth noting that pottery vessels with elaborate polychrome decoration have never been found in any settlement sites. Their exclusive association with burial rituals draws our attention to the importance of the conceptual meanings of these decorative patterns. Except for the artistic similarities with central Chinese Shang-Zhou bronze vessels, it is hard to know whether these painted patterns on Lower Xiajiadian pottery vessels had a parallel ritual meaning with the *taotie* face design in central China.

From a diachronic perspective, we see more interesting evidence in the archaeological materials of northeast China which suggests a local tradition of

burying painted ceramics in burial contexts. Located 20 kilometers southeast of the Dadianzi cemetery, Niuheliang site complex 牛河梁遺址群 of the Hongshan 紅山 period (4500-3000 BC) greatly enlarged our understanding of the development of painted pottery. At Niuheliang Locality 2, five stone-covered mounds (with an average diameter of 22 meters each) were situated on a flat terraced area on top of a hill's summit (150 by 60 meters) (Figure 4.34).[303] At the center of each mound, archaeologists found a large tomb with a stone coffin and large-high-quality jade artifacts. Subordinate graves on the southern edge of these mounds have also been excavated. However, no jade has been found in these lesser burials.



Figure 4.34 Panorama of Niuheliang Locality 2
(after Color Plate 38.2 of Liaoningsheng Kaogu Yanjiusuo 2012).

Shown in Figure 4.35: 1 is an exquisite *lei* vessel from tomb no. 5, Mound 4 at Locality 2 of Niuheliang site. Tomb no. 5 occupied the central position at Mound 4 and the *lei* was the only pottery that had been buried in the stone coffin by the foot of the occupant (Figure 4.36).[304] Painted with a black pigment of geometric pattern on a red background, this Hongshan *lei* vessel (Figure 4.35: 1) exhibits a close

[303] Liaoningsheng Kaogu Yanjiusuo 2012: 55-7.
[304] Liaoningsheng Kaogu Yanjiusuo 2012: 150-2.

resemblance with the pottery *guan* jar excavated from M371 at Dadianzi (Figure 4.35: 2). The shared intensive use of mineral pigments to decorate pottery in both Hongshan and Lower Xiajiadian burials sheds new light on the local origin of Dadianzi painted vessels. More painted ceramics have been found at Niuheliang Locality 2, which were aligned around the bases of the five stone-covered mounds (Figure 4.37). They are large and identical red clay cylinders with full-body black paintings (mostly 35 by 20 centimeters) (Figure 4.35: 3 and 4).[305] Considering that these painted cylinders were buried with only 1/4 or less above ground and used as part of the mound construction, their function can hardly be purely decorative and they must have a ritual meaning.



Figure 4.35 Lower Xiajiadian painted pottery (2) and its counterparts (1, 3, 4) of Hongshan culture (4500-3000 BC) (1: after Color Plate 135 of Liaoningsheng Kaogu Yanjiusuo 2012; 2: after Color Plate 11.1 of IA CASS 1996; 3: after Color Plate 263.6 of Liaoningsheng Kaogu Yanjiusuo 2012; 4: after Color Plate 176.5 of Liaoningsheng Kaogu Yanjiusuo 2012).

[305] Liaoningsheng Kaogu Yanjiusuo 2012: 153.

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 4.36 Plan of tomb No. 5 at Mound 4, Niuheliang Locality 2 (after Figure 106 of Liaoningsheng Kaogu Yanjiusuo 2012)

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 4.37 Picture showing painted ceramic vessels lined up around the stone mounds at Niuheliang Locality 2 (photo by author).

A complex and large burial structure like Locality 2 constituted an advanced form of surface architecture that undoubtedly involved both high-level planning and detailed organization, in terms of which types of objects and how many of each were to be buried. With the discovery of painted ceramics in tombs and around the stone mounds, we see clearly that there was a strong craft tradition and ritual significance of a full-body red-and-black decoration on pottery in northeast China.

Apart from the painted ceramics, 24 tripods were also excavated at Dadianzi, displaying attributes that are strongly reminiscent of Erlitou pitchers and drinking vessels (Figure 4.19). These tripods are reported from 13 large burials (mean volume 12.78 m^3) and are thought to belong to 13 elite individuals in the local community. Detailed analysis on these 24 vessels and comparison with the tripods excavated from Erlitou site are addressed in Chapter Five.

In the discussion above, we have seen that the number of pottery vessels excavated from Dadianzi cemetery and the way that they were deposited form a hierarchical structure, where the elites were socially powerful enough to acquire more high-quality grave goods and more exquisite tomb constructions. This ceramic-centered burial practice revealed from the Dadianzi cemetery can be regarded as part of the northern Chinese burial system which had long been established among the Yellow River Neolithic communities. Noting the unique practice of burying *guan*-tripod pottery sets and painted ceramics, this section also suggests the importance of viewing northeast China as a culturally different area.

4.3.5 Grave Goods in the Chamber

Apart from the diversity in tomb sizes, constructions, niches, and ceramics, the partition of the Dadianzi cemetery is further detectable through a closer look at other artifact types, for instance, body ornaments and personal items that are buried with the deceased inside the tomb chamber. These artifacts are made from a variety of materials and some of them are costly items, in terms of the energy needed to acquire raw materials, the time consumed for production, and the skills required to achieve such exquisite craftsmanship.

Moving away from the foot niches and ceramics, we will now look at the burial deposition in the inner chamber next to the deceased. The main aim of this section is not to produce a simple description of what were the most common grave items at Dadianzi, but to see if there was any spatial association across the cemetery in terms of the deposition and variation of grave goods. In the light of this, we might be able to conclude which kinds of material were prominently integrated into elites' tombs and thus most valued in the Dadianzi burial system.

We know that the design and deposition of objects in the fill, the niche, and the chamber were formulated or probably regulated during the use of the Dadianzi cemetery. It is quite clear that some items, as has been illustrated earlier in the case of tombs M677 and M905, such as body ornaments and small tools for personal use were deposited in close vicinity to the occupant, whereas sets of pottery vessels and on some occasions, lower limb bones of pig or dog's heads were buried inside the niche. Therefore, this neat division of depositional patterning shows that the objects in each of the three locations (the fill, niche, and tomb chamber) carried different meanings.

Before going through different grave attributes, it is useful to look back again at the tomb sizes. As noted in Chapter 4.3.3, the size of Dadianzi tombs is seen as a useful

proxy to indicate the high-ranking graves within the community, based on which, we are able to identify the high outliers (tombs) that were revealingly larger than the upper whisker of the Dadianzi data set (Figure 4.38). It could be noted from Figure 4.38 that there is a good amount of values/variability located outside the upper whisker, starting from 5.8275 m^3. Statistically speaking, these volumes basically represent tombs that were significantly larger than the other burials at the Dadianzi cemetery. Therefore, 5.8275 m^3 is taken in the following writing as the cutoff line for large graves at Dadianzi and the location of these 53 large graves are marked on the cemetery map (Figure 4.39).

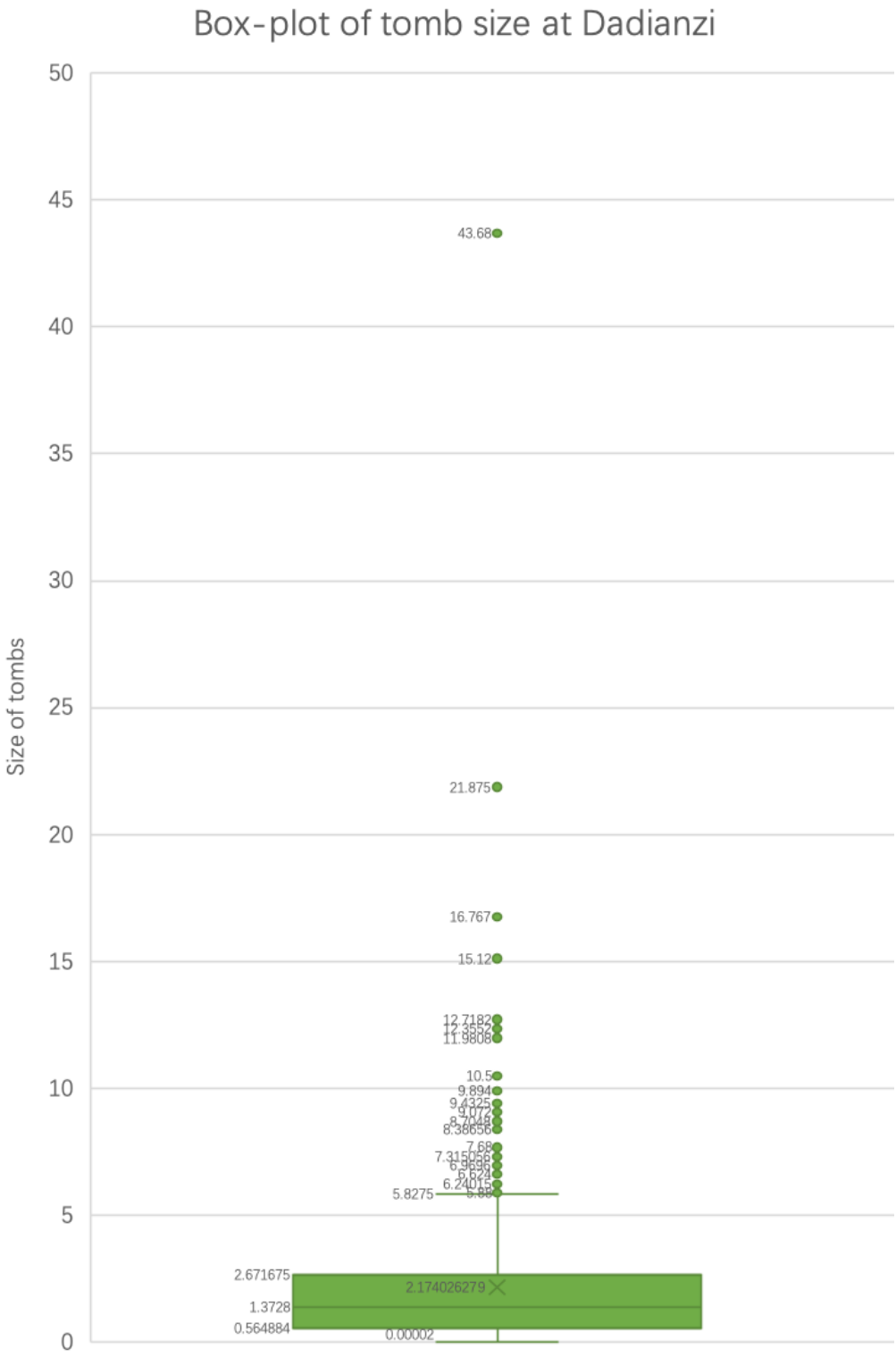


Figure 4.38 Boxplot of tomb sizes at the Dadianzi cemetery.



Figure 4.39 Black symbols showing the location of tombs with a shaft larger than 8.8275 m^3. Redrawn from Figure 22 of IA CASS 1996.

A large number of burials at Dadianzi and their complexity provide a rather detailed but inconclusive picture of the mortuary practice at Dadianzi. In a society of Lower Xiajiadian's scale, there must be many ways of assessing and displaying status and wealth. The possession and exchange of costly objects are generally viewed in archaeological literature to mark social inequality. Especially, mortuary remains to provide a fixed archaeological context to study and search for indicators of institutionalized inequality.[306] Burial goods, particularly those of high cost are displays of one's identity and materialized social inequalities. Aimée Plourde has most recently demonstrated that prestige goods not only originated with the advent of but were essential for the formation of hierarchically structured societies.[307] Actors who were skilled enough to establish and sustain long-distance relationships that granted them access to revered materials or objects attained a higher status and exerted economic and political power over the community.[308] Mary Helms suggests that many of past societies' long-distance activities were of political-ideological rather than merely economic nature.[309] In this account, exotic objects from afar may be valued at least in part for their owners' foreign associations. This, in the other way around, promoted individuals to acquire special power and prestige in the home society. Elites' knowledge of distant places, ability to deal with outsiders, as well as rights to exotic goods and commodities (which were most visible in the archaeological record), all served to reinforce the distance between the leading class and commoners.[310]

In the case of the Dadianzi cemetery, individuals who were afforded to use exotic goods exerted power over people who were not in possession of such objects. This study regards costly burial goods in Dadianzi firstly, as status symbols in that they reflected the general positions of their owners in a hierarchically structured society;

[306] Renfrew, C. 1973; O'Shea, J. 1984; Parker-Pearson, M. 1993 and 2000.
[307] Plourde, A. 2008: 374-88 and 2009: 265-76.
[308] Friedman and Rowlands 1977:221–2.
[309] Helms, M. 1988.
[310] Helms, M. 1988.

secondly, wealthy burial goods should also be perceived as a representation of the deceased's economic resource. Rich and expensive burial goods are material manifestations of economic power, and some individuals who control economic production are managed to convert surpluses into social power or other benefits.[311]

In order to view the distribution and concentration of Dadianzi grave goods more clearly, Table 4.1 lists the 53 graves larger than the upper whisker (5.8275 m^3), with the absence (marked N) and presence (marked Y) of seven attributes in each tomb:

Table 4.1 Fifty-three largest graves at Dadianzi and the presence/absence of selected tomb attributes in each tomb.

Tomb No.	Painted pottery	Erlitou Vessel	Metal	Jade/Stone	Turquoise	Real Cowries/ Copies	Lacquers
4	Y	N	N	N	Y	Y	N
5	Y	N	N	N	N	N	N
44	Y	N	N	N	N	Y	N
78	Y	N	N	Y	N	N	N
371	Y	N	Y	Y	Y	Y	Y
388	Y	N	N	N	N	Y	Y
401	Y	N	N	N	Y	N	N
419	Y	N	N	N	Y	Y	Y
421	Y	N	N	N	Y	N	N
444	Y	N	N	N	Y	N	N
453	Y	N	Y	Y	Y	N	N
459	Y	N	N	Y	N	Y	N
472	N	N	N	N	N	N	N
612	Y	Y	N	Y	Y	Y	Y
645	Y	N	N	N	Y	N	Y
646	Y	N	N	N	N	N	N
652	N	N	N	Y	N	Y	N
659	Y	N	N	Y	Y	N	N
666	Y	Y	N	N	Y	Y	Y
672	Y	Y	Y	N	Y	Y	Y
677	Y	Y	Y	Y	Y	Y	N
682	Y	N	N	N	N	N	Y
713	Y	Y	N	N	N	Y	N
715	Y	N	Y	N	Y	Y	N
722	Y	N	N	N	N	Y	N
726	Y	Y	N	Y	Y	Y	Y
730	Y	N	N	N	N	N	N
732	Y	N	N	N	N	Y	N
751	Y	N	N	N	N	Y	N

[311] Hayden, B. 1995: 20-3.

791	Y	N	N	N	N	N	N
818	Y	Y	N	N	Y	N	Y
827	Y	N	N	N	Y	N	N
838	Y	N	N	N	N	N	N
840	Y	N	N	N	Y	N	N
853	Y	Y	N	Y	Y	N	Y
858	Y	N	N	N	N	N	N
859	Y	N	N	N	N	N	N
867	Y	Y	N	N	N	Y	Y
881	Y	N	N	N	N	N	N
882	N	N	N	N	Y	N	N
885	Y	N	N	N	N	N	N
905	Y	Y	N	Y	Y	Y	Y
931	Y	Y	N	N	N	Y	Y
1006	Y	N	N	N	N	N	N
1011	Y	N	N	Y	N	N	N
1031	Y	N	N	Y	N	N	Y
1102	Y	N	N	Y	N	N	N
1103	Y	N	N	N	N	N	Y
1109	Y	N	N	N	N	N	Y
1121	Y	N	N	N	N	N	Y
1147	Y	N	N	N	Y	N	Y
1203	Y	N	N	N	Y	N	N
1208	Y	N	N	N	N	N	N
Number of Tombs (Y)	**50**	**11**	**5**	**14**	**23**	**20**	**19**
Total Number of Tombs with Such Attributes at Dadianzi	**222**	**13**	**25**	**85**	**85**	**51**	**38**

With this data, we can compare them with the percentage of presence of grave attributes in the remaining 692 tombs (which had a pit smaller than 5.8275 m^3). Shown in Table 4.2 below is the contrasting rates of presence in tombs larger and smaller than the upper whisker:

Table 4.2 Percentage of the presence of the seven grave attributes in tombs at the Dadianzi cemetery.

	Painted Pottery	Erlitou Vessel	Metal	Jade/Bead	Turquoise	Cowrie	Lacquer
Percentage of presence in 53 graves larger than the whisker (%)	94.3	20.8	9.4	26.4	43.4	37.7	35.8
Percentage of presence in graves smaller than the whisker (%)	24.9	0.3	2.9	10.3	9.0	4.5	2.7

Based on Table 4.1 and 4.2, we see that the presence of Erlitou-style ceramics and lacquer remains were remarkably higher in the 53 graves larger than 5.8275 m^3: the chance of having an Erlitou vessel is even 69 times higher. Both types of objects were much more likely to be associated with larger graves. By comparison, turquoises and cowries (including copies) were relatively more common than Erlitou ceramics or lacquer artifacts in smaller graves, though they were also five and eight times more likely to be found in tombs larger than 5.8275 m^3. For the painted pottery, one out of five tombs in the smaller group were buried with at least one such vessel. However, the proportion in the larger tombs of having painted ceramics can reach as high as 94.3%. It has also been noticed in section 4.3.4 that 92.3% of the tombs having more than five pieces of painted pots were larger than 5.8275 m^3. These again suggest that the quantity of painted ceramics is a more significant factor than the mere presence or absence in determining one's social status across the Dadianzi burial ground. Two kinds of objects, metal and jade/ stone beads are surprisingly found to be the least associated with large graves in the Dadianzi cemetery.

In the following writing, I will analyze each of these grave attributes and discuss their spatial distribution at the Dadianzi burial ground.

Figure 4.40 shows the distribution of real cowries and cowrie copies (clamshells). Thirty out of thirty-two burials that have real cowries were in the northern sector of the Dadianzi cemetery, with the other two graves belonging to the central tomb section. There was only one single cowrie copy found in the whole of the northern section (tomb M430), while the south and middle zone have the other 658 imitation pieces. Tomb M1021 is the only burial with a single real cowrie outside the northern part of the cemetery, and it also yielded another 149 clamshells that were modified by grinding to look like real cowries.[312]

A total of 1240 cowries (both real cowries and cowrie copies) have been excavated from Dadianzi.[313] They were of various sizes and unearthed from 51 tombs, placed either inside the niches between different vessels sets or along the deceased' bodies as personal ornaments. Among them, more than 1090 cowries were found inside the tomb chambers. They were either deposited around the deceased's head, besides the waist, or arranged in horizontal format along the legs. Tombs M672 and M726 yielded the greatest number of real cowries at Dadianzi: each buried with 226 and 191 pieces of real cowries around the thighs and crus (Figure 4.41). According to the Dadianzi excavators, cowries in this context were most likely used as a body decoration.[314] It is even more interesting to note that in tombs M4 (south), M1015 (central), and M1021 (central), an identical way for decoration, using clamshells, have been found. More than 290 ground clamshells were placed around the crus of the male occupant at tomb M4, and another 149 and 93 pieces are reported from M1021 and M1015.[315] That is to say, real cowries and cowrie copies made of clamshells were used in the same fashion across the Dadianzi burial ground. Their contrasting spatial distributions seemed to suggest that they were of different origins, that the real cowries were very likely imported from marine environments,

[312] IA CASS 1996: 187.
[313] IA CASS 1996: 183.
[314] IA CASS 1996: 187.
[315] IA CASS 1996: 185.

while clamshells were more locally based products (presumably freshwater shells) and much easier to get access to for the Lower Xiajiadian residents.



Figure 4.40 Distribution of tombs with cowries
(marked in blue) and cowrie copies (marked in orange).
Redrawn from Figure 22 of IA CASS 1996.



Figure 4.41 An example of cowries used as decoration for clothes at tomb M672 (after Color Plate 20.2 of IA CASS 1996).

Identifying instances of emulation in the mortuary record allows us to determine which artifacts generated real prestige. In the light of this, clamshells that had been reworked to look like real cowries became exotic artifacts that indicated a maritime origin. Real cowries' non-local background was clearly treasured in the Lower Xiajiadian society and made them a valuable material procured at high cost through long-distance trade networks and cross-region social connections. People who buried with clamshells were attempting to display in their graves the likely symbolism of the real cowries, a scarce and expensive foreign resource.

The history of cowrie use in ancient China goes back to the third millennium BC. Based on Peng and Zhu's review of cowrie use in early China, the earliest phase of cowrie use within present-day China's territory occurred in the far western inland region.[316] Cowrie shells were interred with burials at the Liuwan 柳灣 cemetery in Qinghai province (Majiayao 馬家窯 culture, ca. 3300-2600 BC).[317] Contemporary cowrie remains have also been reported from Lixian 理縣 county of northern Sichuan, where they were excavated from an archaeological layer that yielded Majiayao culture materials.[318]

[316] Peng, K and Zhu, Y. S. 1995: 6-9.
[317] Qinghaisheng Wenwu Guanlichu Kaogudui and IA CASS 1984: 167-8.
[318] Sichuan University 1965: 614-8.

Along the Yellow River valley to the east, Jiangzhai 姜寨 site in southern Shaanxi appears to be the only early third-millennium site in the Central Plains that had cowries. Occupants of tombs M268 and M275 at Jiangzhai were buried with cowrie shells in their mouths.[319] Still, the practice of using cowries at this stage is only reported along the northern borders of central China. Following this, the next stage of cowrie use saw a gradual southern and eastern expansion into Henan province, the heart of the Central Plains. Cowrie remains have been reported from the 18th century BC site of Erlitou 二裡頭 in Yanshi 偃師, and Dashigu 大師姑 site in Xingyang 滎陽.[320] However, on the whole, the total cowrie distribution pattern did not change very much in the early half of the second millennium BC, as revealed by more cowrie-use evidence at Huoshaogou 火燒溝 site in northwest China and northeast China, here from the Dadianzi cemetery.

We have seen that the geographical expansion of the Neolithic period cowrie use was exclusively along the crescent-shaped area, suggesting that the practice of cowrie use in the mortuary context was largely a northern borderland tradition. This preluded the peak of burying cowrie shells in the Bronze Age when a geographic shift to the Central Plains can be observed. Cowries, especially cowrie ornaments were found in large quantities from central China, dated to the dynastic Shang (1500-1045 BC) and the Western Zhou (1045-771 BC) polity. Li, Y-T. (2003) suggests that cowries were mentioned in the Shang and Zhou bronze inscriptions as prestige items given by the king and members of the elite family to their subordinates.[321]

Like cowries, turquoise found in the Dadianzi cemetery was surely an imported material. A total of 332 turquoise objects have been reported from 85 burials (Figure 4.42).[322] Among them, the southern and central cemetery sectors each includes five and nine tombs, accounting for 4.5% and 6.4% of the total tomb number,

[319] Banpo Museum 1988: 149 and 410.
[320] IA CASS 1999: 69 and 137; Zhengzhoushi Wenwu Kaogu Yanjiusuo 2004: 213.
[321] Li, Yung-T. 2003: 4.
[322] IA CASS 1996: 167-8 and 193.

respectively. The northern tomb section has the remaining 71 graves, which means that the percentage of graves having turquoise is 14.3%, dramatically higher than the proportion of the south and central tomb sectors. A Chi-square test of this distribution produces a p-value of <0.0001, suggesting a definite association between turquoise and the north cemetery area. In addition, the associated Cramér's V is 0.846, indicating a moderate to high strength of correlation between the presence of turquoise with the north burial sector at Dadianzi.[323] Further, if examine the average turquoise/per grave across the three cemetery areas, we see another interesting distribution that, on average, in the south sector each of the five graves containing turquoise is buried with 2.2 turquoise artifacts, while the number for the nine graves with turquoise in the central sector is 6.4. However, the average number of turquoise items in the 71 tombs of the northern tomb section is only 0.53, dramatically lower than those in the other two grave sectors. This suggests that the tomb occupants in the central sector were most willing to bury more turquoise artifacts in their graves.

All the Dadianzi turquoise objects have been drilled. According to the 1996 IA CASS report, they can be divided into two stylistically different types: the flat quadrilateral ones (Number=211) with a hole on the long side, and the cylindrical ones (Number=121) (Figure 4.43).[324] Based on Qin (2016), major known turquoise sources of ancient China are located in northwest Hubei, southern Shaanxi, south Henan, central Yunnan, and the northwest (Qinghai and Hami) (Figure 4.44).[325] Although Hubei has the highest density of turquoise mines among these locations, it was not used before 1500 BC when the Shang (1500-1045 BC) started to take control of the Yangzte region.[326] That is to say, northeast China was geologically very far away from all the available turquoise sources. What could be argued is that burying with turquoise ornaments is a mortuary expression symbolizing personal aesthetic

[323] Cramér, H. 1946.
[324] IA CASS 1996: 167.
[325] Qin, X. L. 2016: 229.
[326] Zhang, D. Y. 2016: 158.

tastes and cross-regional connection at Dadianzi. We have seen the distribution of turquoise across the Dadianzi cemetery did not show a significant spatial concentration, other than a strong association with the north sector. Considering that turquoise occurs in 9% of the graves smaller than the upper whisker, 5.8275 m^3, it seems that they were not consistently related to large graves or high-status individuals in the Lower Xiajiadian community.



Figure 4.42 Distribution of Dadianzi tombs with turquoise (marked in turquoise color). Redrawn from Figure 22 of IA CASS 1996.



Figure 4.43 An example of cylindrical-shaped turquoise
excavated from the Dadianzi cemetery (after Figure 81.16 of IA CASS 1996).



Figure 4.44 Map showing major turquoise mines in China
(after Figure 1 of Qin, X. L. 2016).

From a stylistic perspective, there is a clear association between the Lower Xiajiadian turquoises with the ones excavated from the Chinese Central Plains, as both types of drilling methods are seen in the Dadianzi turquoise ornaments have been found at Erlitou (Figure 4.45). Although Neolithic sites in the Shandong peninsula have reported turquoise use before the second millennium BC,[327] their drilling spot was

[327] Pang, X. X. 2016: 152-61.

on the short side of the objects, indicating a different way of wearing turquoise ornaments from northeast China (Figure 4.46). It seems that in the eastern coastal area turquoises were largely worked to make pendant-type decorations rather than horizontally arranged ornaments.



Figure 4.45 Turquoise found at Erlitou turquoise foundry
(after Color Plate 290 of IA CASS 2014).



Figure 4.46 Turquoise remains from the Shandong area
(after Figure 2 of Pang, X. X. 2016).

In 2004, a stone workshop containing over 2000 turquoise fragments has also been reported south of the palatial enclosure at Erlitou (Figure 4.47).[328] This shows that the Central Plains was an active producer and user of turquoise artifacts, with the

[328] Erlitou Gongzuodui, IA CASS 2004: 12.

Erlitou site being situated close to several turquoise mines in southern Henan and Shanxi provinces. For northeast China, the turquoises buried at Dadianzi clearly shared a similar stylistic tradition with the ones found in the Erlitou tombs. This allows us to suggest that they might be the results of some cross-regional exchange network between the Lower Xiajiadian community and the Central Plains.



Figure 4.47 Locations of Erlitou turquoise and bronze workshops, and the palatial area (after Figure 2 of Xu, H. 2018).

As has been touched upon in section 4.3.4 that 24 Erlitou-style ceramic tripods have been reported at Dadianzi, displaying attributes that are strongly reminiscent of the south. Lacquer wares, like central Chinese pottery vessels, originated in the south and were likely another vehicle for the expression of ranking and cross-regional contact. Figure 4.48 and Figure 4.49 each show the distribution of Erlitou-style ceramics and lacquers at the Dadianzi cemetery. We can see clearly that 12 out of 13 tombs with Erlitou-style vessels are in the northern area. Thus, the chance of having Chinese ceramics in the northern sector is 2.4%, notably higher than in the central burial sector (0.7%). A few tombs with lacquer wares are concentrated in the northwest corner in the northern part of the burial ground, and several others are scattered in the middle and southern sections. To understand the relationship between lacquer with the three tomb sectors, the appearance (frequency) of tombs with lacquers across the north, central and south sectors is tested by a Chi-square analysis. The statistical result shows that the p-value for lacquer artifacts is less than 0.0001, suggesting the distribution of lacquer was uneven across the different tomb sectors. Based on all these calculations, it can be argued that as with Erlitou-style ceramics, lacquer objects are more concentrated in the north tomb sector at Dadianzi. However, it can also be observed that 9 out of the 13 graves (69%) buried with Erlitou pottery were also equipped with lacquer objects, while only 9 out of 38 tombs (24%) with lacquers have yielded Erlitou ceramics. That is to say, the correlation between Erlitou pots and lacquers is one-sided. This one-sided connection is also spatially significant, given that all nine tombs with both types of grave objects are in the north tomb sector, whereas a lack of spatial association is immediately obvious outside the north sector. Based on these observations, we can conclude that both Erlitou-style pottery and lacquer artifacts are concentrated in the north tomb sector. However, the one-sided association between them seems to suggest that these central Chinese ceramics and lacquer objects were not introduced into the Lower Xiajiadian area from the same cultural source or via the same contact route.



Figure 4.48 Brown symbols highlighting the distribution of tombs with Erlitou-style tripod vessels. Redrawn from Figure 22 of IA CASS 1996.

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 4.49 Orange symbols showing the distribution of tombs with lacquer wares. Redrawn from Figure 22 of IA CASS 1996.

A slightly indistinct picture is shown in the distribution of painted pottery vessels. When color-coded on the cemetery plan (Figure 4.50), it is difficult to suggest any spatial connection between the presence of polychrome ceramics with other grave attributes. However, based on earlier analysis results (Figure 4.24), we know that tombs with five or more pieces of painted ceramics have a much larger tomb shaft than those with fewer painted vessels. So, in Figure 4.50 the location of the 13 graves with five or more painted ceramics are circled, 11 in the north and 2 in the middle tomb sector. Table 4.3 is a list of these 13 tombs and other grave attributes in them. Percentage data in the last row shows that strong associations exist between tombs with five or more painted ceramics and the possession of real cowries, turquoise, and lacquer objects. A slightly mild correlation is found with Erlitou pottery, while jade and metal are the grave goods with the least association with tombs yielding five and more painted ceramics.

Table 4.3 Tombs with five or more painted ceramics and other grave goods buried in them.

Tomb No.	Painted ceramic	Erlitou pottery	Metal	Turquoise	Jade	Real cowrie	Lacquer
371	7		1	4	4	4	2
388	5					1	1
419	7			1		1	1
459	5					10	
612	6	2		2	1	5	1
672	5	2	2	4		226	2
677	6	2	11	22		4	
706	5	2			1		
715	6		2	1		4	
726	9	2		5	1	255	3
853	6	2		4	1		1
905	10	2		2	1	17	1
931	5	2				9	1
Correlation		62%	31%	69%	46%	85%	69%

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 4.50 Red symbols showing the distribution of tombs with painted ceramics, and the ones circled are graves with five and more painted vessels. Redrawn from Figure 22 of IA CASS 1996.

It is further suggestive when we look at the distribution pattern of metal artifacts at Dadianzi (Figure 4.51). As shown in Figure 4.51, we see that 18 out of 25 tombs with metal objects were in the northern part of the cemetery. Considering the different tomb quantities across the three burial areas, thus the chance of a grave containing metal objects in the middle and south sectors is 2.8%, and it is slightly higher in the north (3.6%).

Table 4.4 Tombs with metal artifacts and other grave goods buried in them.

Tomb No.	Metal	Painted ceramics	Erlitou vessel	Bead	Turquoise	Real cowrie	Cowrie copy	Lacquer
11	1							
15	1							
43	1	2			3		7	
371	1	7		1	4	4	2	2
453	4	2		70	24			
454	5	2		35	17			
463	1	1		6				
507	2			108	4			
516	1	2		103	5			
523	2			1				
672	2	5	2		4	226	1	2
675	2				1			
677	11	6	2	15	22	4		
683	1	1				2		
715	2	6			1	4		
725	2							
756	3	1		853	6			
782	1				2			
788	1							
813	1	1						
822	2	1			2		2	
830	3	2		8	6	2		
1032	1							
1254	1							
1265	2	2						
Correlation		60%	8%	40%	56%	24%	16%	8%

Table 4.4 is a list of the 25 tombs with metal artifacts and other grave attributes in them. Correlation data in the last row shows that there is a moderate association between metal and Lower Xiajiadian painted ceramics. A similar relationship can be found between metal and turquoise as well. However, in contrast, we see in Table 4.4 that the least association existed between a metal with Erlitou ceramics and lacquer objects, suggesting that tomb occupants interested in metal products were not the same social group who controlled and benefited from a cross-regional connection with the south. This makes sense because metal and metalworking technology arrived at China's border area from the Eurasian steppe to the north in the late third millennium BC,[329] and the metal artifacts found at Dadianzi dated no earlier than 2000 BC. The low association between metal and Erlitou ceramics/lacquer objects strongly suggests that metal was part of a different set of cross-regional contacts from China's Central Plains. However, as mentioned above, metal had a relatively high correlation with turquoise, which was also a non-local artifact in Northeast China. Immensely pertinent and helpful is Qin's work on the ancient turquoise mines in China, which has pointed out that apart from Northwest China (Qinghai and eastern Xinjiang), the other probable turquoise sources are all located south of the Yangzi River.[330] This brings us to an important recognition that the metal artifacts excavated from the Dadianzi cemetery might come together with turquoise from Northwest China.

Another useful dimension of accessing metal's role among the foreign-related artifacts is to compare the average tomb size of each non-local grave goods: Erlitou ceramics (13.8 m^3), lacquer (7.5 m^3), real cowries (7.4 m^3), turquoise (4.7 m^3) and metal (4.4 m^3). Although the mean tomb size may not reflect the exact significance of these grave goods at Dadianzi, these contrasting numbers indeed suggest that metal and turquoise were the two artifacts least associated with high burial

[329] Linduff, K. M. and Mei, J. J. 2009; Linduff, K. M. et al. 2017.
[330] Qin, X. L. 2016: 229.

expenditure. In contrast to many other societies, including some of ancient China, metal products did not seem to constitute an essential part of the prominence of their owners in the Lower Xiajiadian society. At the Erlitou site, for instance, the very early appearance of metal in mortuary contexts from 1750 BC documented the emergence of social differentiation.[331]

How to best explain these variable spatial distributions of grave artifacts at Dadianzi is an archaeological question rarely been addressed. The excavators merely suggest that the spatial division of the three burial areas (the northern, middle, and southern sections) was an indicator of different social groups of the Dadianzi community, without mentioning that there were many differences exhibited from mortuary practices and burial goods other than the *li* tripods.[332]

[331] IA CASS 1999 and 2014; Liu, L. and Chen, X. C. 2012: 271-2.
[332] IA CASS 1996: 209-14.



Figure 4.51 Green symbols showing the distribution of tombs with metal artifacts. Redrawn from Figure 22 of IA CASS 1996.

Following on the discussion of burial analysis offered in the previous and current sections, this chapter argues that there were multiple lines of behaviors and material representations contributing within the Dadianzi burial space and reflecting various aspects of the lower Xiajiadian society. The account of the grave sizes demonstrates a value system that was similar to the possession of foreign objects (non-local ceramics, cowries, turquoises, and lacquerwares), while other forms of material manifestations were more quantitatively significant and locally defined (the possession of painted ceramics). In comparison, unlike other imported materials, metal artifacts seemed to have a less important role in the Lower Xiajiadian material cultural arena in terms of indicating one's social status.

However, we also need to acknowledge that during different chronological periods of the Dadianzi cemetery, the clustering of grave goods must have changed over time. The Dadianzi 1996 report assigned relative dates of "Phase I" and "Phase II" to only 347 burials based on the stylistic morphology of a Type A tripod *li*. Then the excavators assumed the site had been in use for some 150 years.[333] Other assemblages of pottery artifacts apart from tripods did not merit proper discussion. Therefore, unfortunately, it is impossible to date all the 745 burials into the two phases, as a stratigraphic seriation of the tripod-absent graves is not available. Given that no convincing relative chronology is available at the Dadianzi cemetery, what has been discussed above is based on the results of a cumulative process, which may not reflect the temporal distribution of grave objects during different stages of the Dadianzi burial ground.

[333] IA CASS 1996: 208.

4.3.6 Dadianzi Ritual: Animals in the Fill

It has been a crucial question in pre-Qin (221 BC) Chinese archaeological study that how and why food and alcohol vessels constituted the most prevalent type of graves goods. The roles of mortuary offering and ritual feasting, both in this life and the afterlife, were important and consistent concerns for Neolithic and Bronze Age communities living in the area of today's China.

Closely associated with this issue is the discovery and investigation of faunal and plant remains. The subsistence economy, a frequently explored topic in present-day archaeological literature, tells us what the diet pattern of past populations looks like. However, it is unlikely that these day-to-day subsistence activities would have been consistent with the pattern which is revealed from mortuary faunal and faunal assemblages. Based on the excavated data from the Dashanqian 大山前 site, the proportion of pig remains in the local faunal assemblage is 63%, while herded animals (cattle, sheep, and goat) make up only 37%.[334] However, at Dadianzi cemetery, only pigs (64%) and dogs (36%) were recognizable and involved in the burial remains.[335] More importantly, both pigs and dogs were either buried as whole burnt offerings or only the heads were buried in the fill above the chamber. All the animal heads were placed in the same orientation as the tomb occupants.[336] This is clearly ritualized. The fill, as separate burial space, was intentionally used by the living performing mortuary ritual activities at Dadianzi.

A total of 166 Dadianzi burials were equipped with sacrificial pigs or dogs in the fill. And 148 of them have foot niches. The number of tombs buried with a single pig is 81, accounting for nearly 50% of the 166 graves, while the other 85 burials have

[334] Wang, L. X. 2004: 353-4.
[335] IA CASS 1996: 194.
[336] IA CASS 1996: 194.

various combinations of pigs and dogs. One dog remain was found in 23 graves; two dogs were found in seven tombs.

It is interesting to note that dog remains were exclusively found in male graves, suggesting that animal sacrifices at the Dadianzi cemetery may be closely gender-related. The calculation also shows that animal remains are more common in male tombs: 120 out of the total 166 tombs with fill sacrificial animals are males. Eleven burials that have four and more than four animal remains in the fill are variously sized from 4 to 16.8 m^3, of which only the smallest one belonged to a female occupant. The strong association between animal remains and male gender underscores the possibility that food, especially meat, was an important aspect in the construction and maintenance of male dominance and high status in the Lower Xiajiadian community. Adams (2010) discussed the interplay between meat-eating and gender disparity from an anthropological perspective. One of his main arguments is that gender politics is structured into the way humans view and consume animals, and that animal resources have a recognizable association with the male role.[337]

Tombs M612 and M371 at Dadianzi are two good examples that display such gender distinction through both the quantity and quality of grave goods. Four whole skeletons of pig and three whole dogs were found in the fill of M371, which belonged to a 45-year man. Also, in his foot niche archaeologists found three sets of *guan*-tripod pottery, one metal mace-head, and more than 20 pieces of stone and bone artifacts (Figure 4.52). All seven ceramics deposited in the foot niche of M371 were decorated with delicate surface polychrome, all of which showed us the above-average wealth and social resources the male individual had before his death.

[337] Adams, C. 2010: 50-2.



Figure 4.52 Plan of tomb M371 at the Dadianzi cemetery
(after Figure 30 of IA CASS 1996).

Aside from social differences, burying animals in the fill also encompasses the visual presentation of social/political inequality. Like constructing a large wooden coffin, the process of burying animals at the funeral could draw huge attention across the community. When a ritual that is intended to express class and hierarchy was given great publicity, it becomes unique and powerful. The identity and social status of the deceased with more animal sacrifices than the others, such as tombs M371 and M612, were clearly symbolized and celebrated through the burial practice. In association with their rich animal resources, both M371 (size=16.77m^3) and M612 (size=15.36m^3) were equipped with wooden chambers, and had two burial pits much larger than the rest majority of tombs at Dadianzi, making them rank 3rd and 4th across the whole cemetery.

Therefore, we could say that burying animals in the tomb fill was a visual demonstration of one's wealth accumulation and social hierarchy. Through the

burial of different numbers of animals, this section argues that the personal wealth accumulation and gender inequality were clearly manipulated at Dadianzi.

4.3.7 Sex Differences

Gender, as expressed in the Dadianzi mortuary context, is briefly recorded in the IA CASS 1996 report, but it has not been carefully analyzed in detail. As mentioned in section 4.2, the skeletons identifiable in sex at Dadianzi are 233 males and 228 females. The focus of this section is how mortuary displays affected gender relationships at the Dadianzi cemetery.

Firstly, clear and consistent sex differences can be identified both from the preserved skeletal remains and associated burial goods. Among the individuals with clear sex information, 94% of the adult male occupants were buried facing southwest and 91% adult female occupants facing northeast.[338] Furthermore, except for tomb M398 (a male burial), which yielded both a pottery spindle whorl and a stone axe, 100 out of the 228 known female burials were each found with a spindle whorl (76 made of pottery and 25 in stone), and 100 out of the 233 known male tombs each yielded a stone axe.[339] This nearly exclusive association of objects with specific sex seems to indicate a clear division of labor among the Lower Xiajiadian community. Implementing certain burial practices and assigning grave goods to male and female individuals were in no way exclusive to the Lower Xiajiadian community. But their presence in the Dadianzi cemetery shows that the gender relations, though often largely neglected in the Lower Xiajiadian literature, were in fact quite common in the mortuary context of northeast China during the second millennium BC.

[338] IA CASS 1996: 225.
[339] IA CASS 1996: 64, 141, 156 and 165.

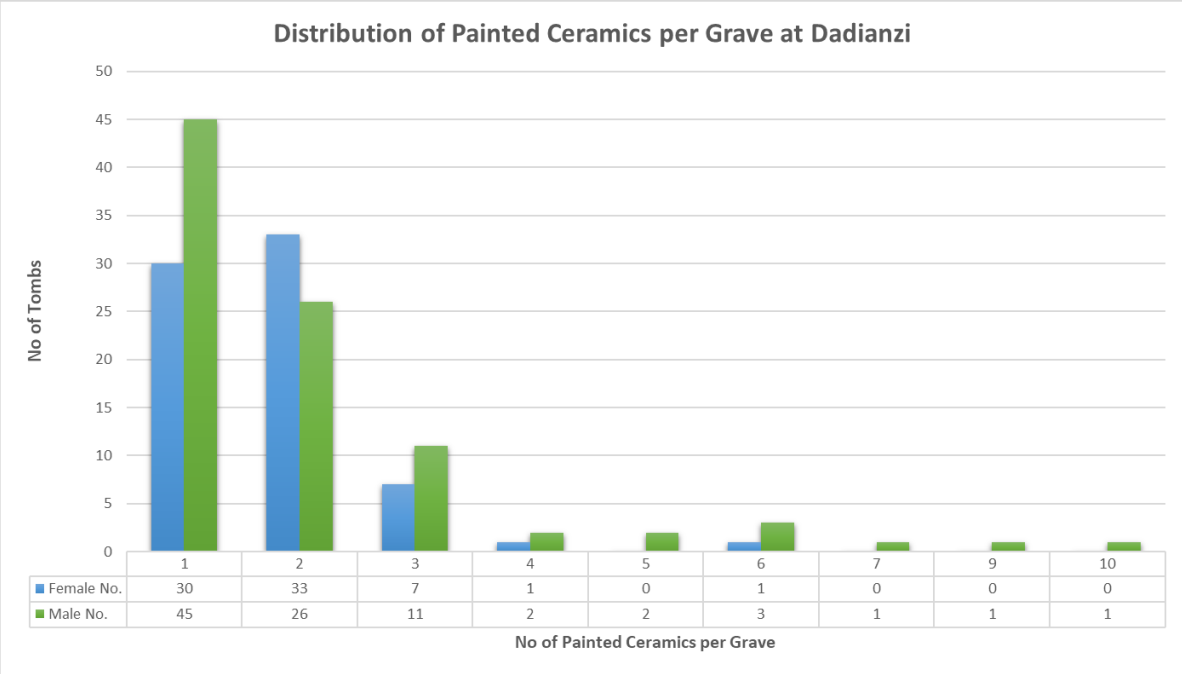


Figure 4.53 Distribution of painted ceramics by sex at the Dadianzi cemetery.

Painted ceramics are discovered from 31.6% of female graves (Number=72) and 39% of male tombs (Number=92) (Figure 4.53). Nine tombs yielded at least five painted pottery vessels, including eight male graves and only one female grave. Based on this distribution, the numbers of males and females who were buried with two and fewer than two painted ceramics are not significantly different. However, male individuals outnumber females in graves with more than four painted pots. In addition, if compare the average number of painted ceramics between males and females, we note that the mean painted vessels in male tombs are 2.08 while it is 1.76 in female graves. In order to see whether the frequency (appearance) of painted ceramics at Dadianzi has anything to do with the sex of tomb occupants, two sets of data have been assessed using a Chi-square test: a) the numbers of male and female graves with and without painted pottery; and b) the numbers of male and female graves with three or more painted vessels and those with fewer than three painted vessels. Both analyses show a p-value above the significance level of 0.05;

thus, we cannot say that painted ceramics were gender-related objects across the Dadianzi cemetery.

Tripod pottery vessels of the Central Plain types—*gui*, a pitcher with three supporting legs and *jue*, a beaker with handle, and an open spout are found in the Dadianzi cemetery in pairs. As has been noted before, these Erlitou style ceramics were found in 13 large graves (average size=13.8 m^3) with rich burial goods. Table 4.3 shows the number of vessels in each of the 13 tombs with gender information.

Table 4.5 List of tombs with Erlitou-style ceramics and their sex information.

TOMB NO.	SIZE (M^3)	NUMBER OF ERLITOU CERAMICS	SEX
612	15.4	2	M
666	6.2	2	M
672	15.3	2	Unknown
677	12.4	2	F
706	3.4	2	M
713	12	2	M
726	43.7	2	M
818	8.6	2	F
853	9.7	2	M
867	12	1	F
905	15.1	2	M
931	21.9	2	Unknown
1215	3.9	1	M
TOTAL		**24**	**3F, 8M, 2 Unknown**

The distribution of Erlitou pots in male and female graves indicates that male individuals occupied 62% of the tombs with Central Plain-style ceramics. Unlike the local food assemblage, these ceramics were intended for warming the wine/beverages and serving elite drinking ceremonies. The number of male tombs (Number=8) containing Erlitou ceramics is twice more than the number of female

graves (Number=3), indicating that on the whole, males were controlling more cross-regional connections with central China than females in the Lower Xiajiadian community.

Twenty-six burials at the Dadianzi cemetery are found with metal artifacts (Number=60), in which bronze earrings (Number=26) and finger rings (Number=25) constituted 85% of the total metal assemblage. Bronze earrings are reported from 16 graves: five were females, seven were males, and four were sex unknowns (Table 4.4). Twenty-five bronze finger rings have been identified from five tombs and they are all confirmed to be belonging to female occupants (Table 4.5). This suggests an exclusive relationship of bronze rings with female individuals, probably as personal adornment. However, bronze earrings showed less of a clear gender association.

Table 4.6 List of tombs with bronze earrings and their sex information.

TOMB NO.	NUMBER OF BRONZE EARRINGS	SEX
11	1	F
15	1	Unknown
453	4	F
463	1	F
507	2	M
523	2	M
672	2	Unknown
675	2	F
725	2	Unknown
782	1	M
788	1	Unknown
813	1	M
822	2	M
1032	1	M
1254	1	M
1265	2	F
TOTAL	**26**	**5F, 7M, 4 Unknown**

Table 4.7 List of tombs with bronze rings and their sex information.

TOMB NO.	NUMBER OF BRONZE RINGS	SEX
453	3	F
454	5	F
677	11	F
756	3	F
830	3	F
TOTAL	**25**	**5F**

Three hundred and thirty-two turquoise artifacts have been discovered from 85 graves at the Dadianzi cemetery (Figure 4.54 and Appendix VIII). The distribution of turquoise items in male and female graves seems to suggest a very interesting pattern: although there were more male graves buried with turquoise objects, they came in quite small quantities, mostly fewer than four artifacts per grave (Figure 4.54).

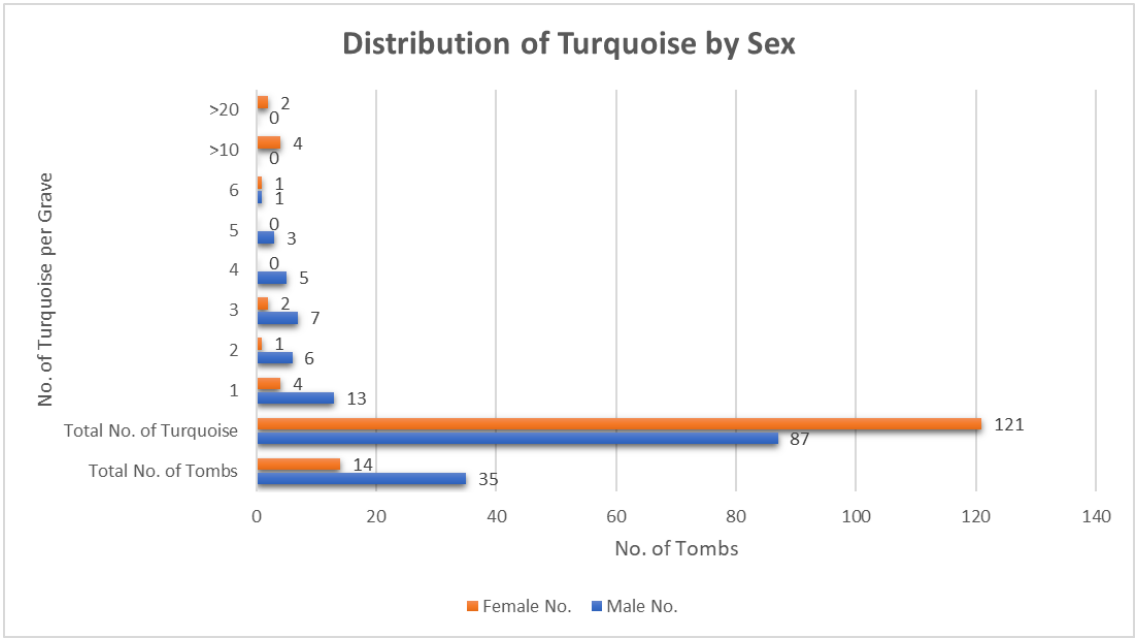


Figure 4.54 Number of turquoises per grave with sex information at Dadianzi.

In fact, the number of turquoise artifacts per grave in male tombs (2.48 per male tomb) is much lower than that in the female graves (8.6 per female tomb). All six tombs with more than 10 turquoise objects belonged to females (Figure 4.54). It

seems that wealthy female occupants were particularly interested in having turquoise body decorations, given that all turquoise artifacts were found inside the tomb chamber and some were used as earrings and pendants.

Fifty-three jade personal adornments, including different shaped jade pendants and arm ornaments, were found from 38 tombs at the Dadianzi cemetery (Figure 4.55). If we examine the number of jades excavated from female and male tombs, it seems that jade adornments were in general more popular with female tomb occupants. Although there was one male buried with four jades, the same quantity as the most jades found in the female tomb, but the other 11 male occupants each had no more than two jades per grave.

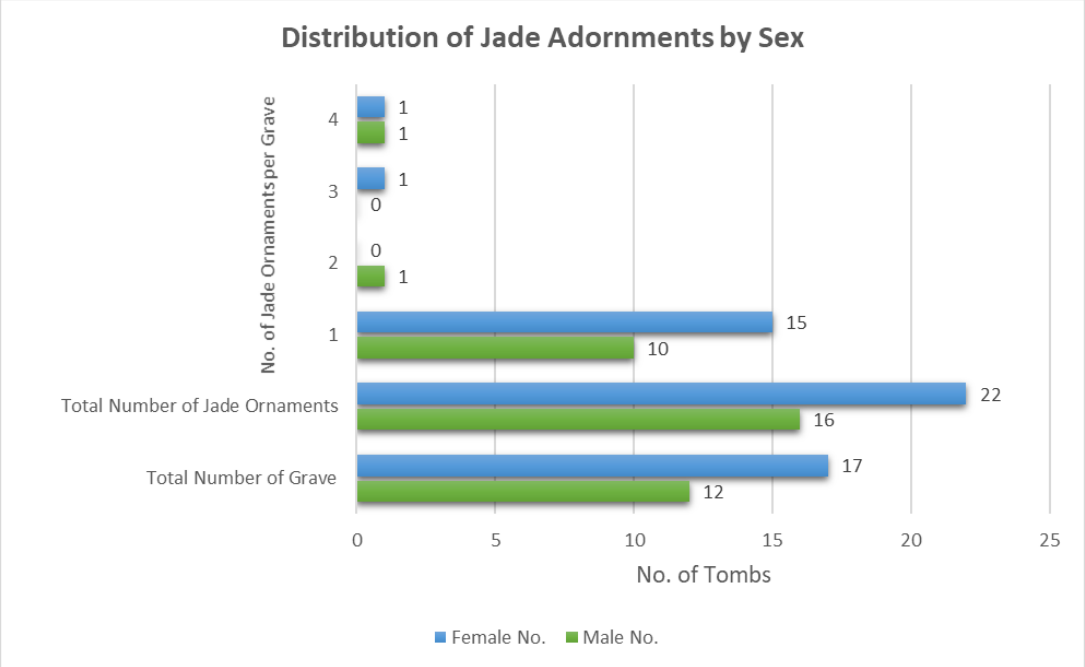


Figure 4.55 Distribution of jade artifacts per grave with sex information.

In addition to jade personal adornments, more than 1500 small stone beads have been reported from the Dadianzi cemetery. They were excavated from 57 tombs (Figure 4.56). It can be clearly noted from Figure 4.56 that female tombs outnumbered male graves in total grave number, tombs with 1 to 10, 10 to 20, and

20 to 100 beads per grave. This evidence suggests beads were much more associated with female individuals in small quantities.

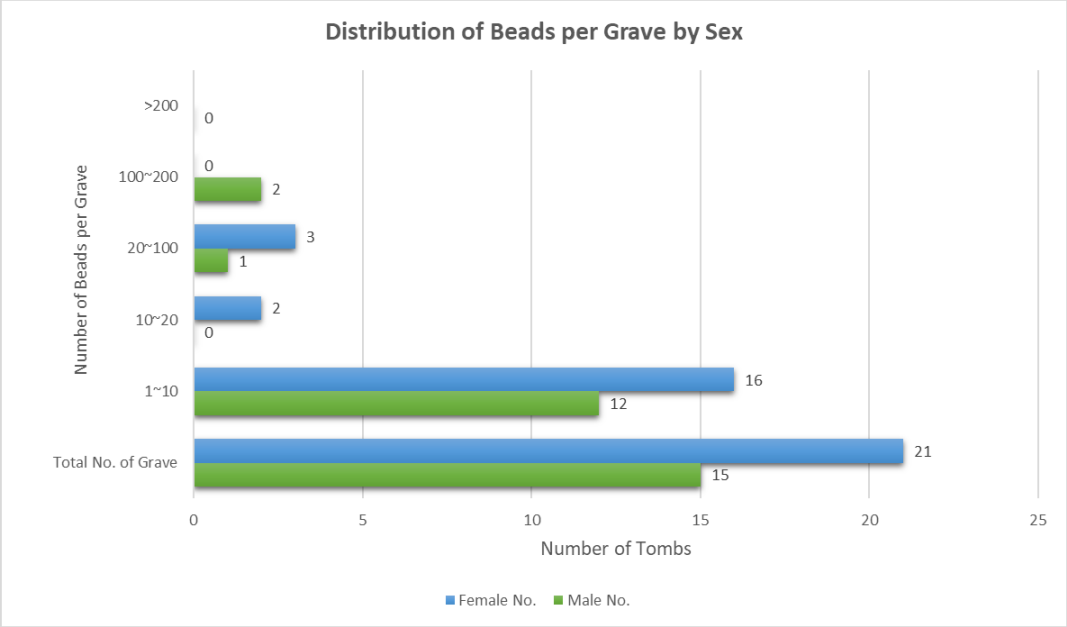


Figure 4.56 Distribution of beads per grave with sex information.

However, the total number of beads excavated from male tombs is 267, whereas there is only 237 from female tombs, indicating that a few male individuals had an especially large number of beads buried with them. Two male graves, M507 and M516, were each buried with more than 100 beads. Considering that M507 and M516 each has a tomb size of 5.63 m^3 and 2.15 m^3, one slightly above the upper whisker of tomb size (5.8275 m^3) at Dadianzi and the other is only half the size of 5.8275 m^3, we cannot say for sure that a large number of beads in male tombs are status-related. Similarly, the three female tombs (M317, M453, and M810) each with 20 to 100 beads had a chamber ranging from 1.8 to 10.64 m^3, a distribution too wide to suggest that burying beads was indicative of high social position for females.

Two types of cowrie shells have been found at the Dadianzi cemetery: the natural real cowries (Number=651) and imitation cowrie shells (Number=581).[340] The

[340] Some imitation cowrie shells were made of lead and some were made with clam shells to look at real cowries.

natural ones are thought to have been obtained from areas near the sea through cross-regional contact. The presence of large numbers of cowrie copies suggests that the natural ones were rare, difficult to access, and thus, highly valued. As has been noted previously, the spatial distribution of real cowrie shells is associated with the northern section of the Dadianzi cemetery, as opposed to the spatial distribution of cowrie copies, which were found mostly in the southern cemetery sector. A strong disparity is also observed from the distribution of real cowries and imitation cowries in two genders: male graves had 99% of the cowrie copies (Figure 4.57 left).

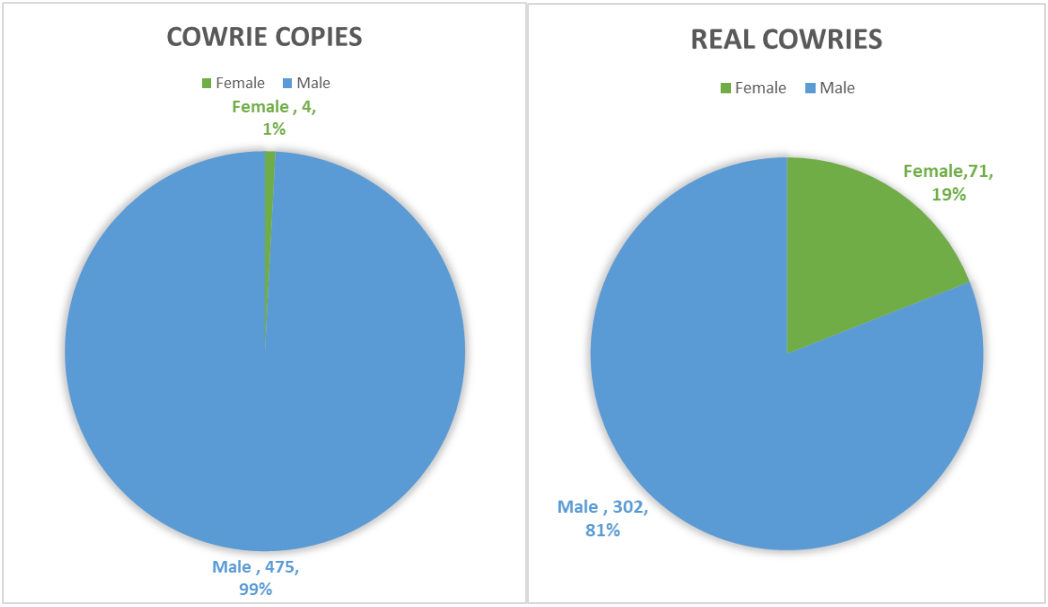


Figure 4.57 Distribution of real cowries and cowrie copies by sex.

At the same time in the profile of real cowries (Figure 4.57 right), we note that the number of real cowries found from male tombs (Number=302) is notably higher than that from female graves (Number=71). Both strands of evidence indicate that having cowries (both the real ones and imitations) was a highly male-gendered issue in the Dadianzi cemetery. It may also be argued that the male occupants had stronger economic connections with far-away regions and they also would like to invest in making cowrie copies and burying them in their tombs.

4.4 Chapter Summary

Dadianzi as the only thoroughly excavated and reported burial site of the Lower Xiajiadian culture, provides important information about social differentiation through mortuary treatment. This chapter begins with an introduction to the chronology and layout of the Dadianzi cemetery. Through the examinations of tomb constructions, burial size, grave goods in the foot niche and burial chamber, it is suggested that: a) vertical social stratification has already emerged within the Lower Xiajiadian community; b) the larger a tomb shaft is, the more likely the tomb occupant had foreign-originated objects; c) by mapping and comparing different attributes across the Dadianzi cemetery, this chapter notes that the account of the grave sizes and tomb furnishings demonstrates a value system that was consistent to the possession of foreign objects (non-local ceramics, cowries, turquoises, and lacquerwares), while other forms of material manifestations were more quantitatively significant and locally defined (painted ceramics). In comparison, metal artifacts and stones/jades seemed to have a lesser important role in the Lower Xiajiadian material cultural arena.

The last part of this chapter concerns the issue of sex differences and how gender affected mortuary displays at the Dadianzi cemetery.

If viewed together with the settlement evidence discussed in Chapter Three, it seems that there was a slight contradictory pattern of social disparity presented in the mortuary data at Dadianzi and the settlement remains. Differences in the hierarchy were much less pronounced from the size, construction method, and the structure of houses within the Lower Xiajiadian settlements not until post ca. 1500 BC, while by that time, there already started in the Dadianzi cemetery a strong intentionality to manifest inter-group social distinction through mortuary expression.

Chapter Five: Lower Xiajiadian in Context

Unlike the previous two chapters, Chapter Five presents a broader picture, situating the cultural characteristics of the Lower Xiajiadian community within the Chinese Late Neolithic and early Bronze Age context. Starting from the latter half of the third millennium BC, we see regional and local cultures within a sphere of interaction manifest growing similarities. Featuring increased internal complexity and external contacts, archaeological cultures of the Yellow River valley and the Ordos region show various levels of interaction with communities in northeast China. These cross-regional contacts are analyzed below from three different perspectives: ceramics assemblage and their decorations, metal artifacts, and stone-constructed settlements.

5.1 The Widespread Use of Hollow-foot Tripods in Northern China

As has been described in Chapter One, social development of the third millennium BC, especially the Longshan period (ca. 2600-1900 BC) 龍山時代 is extremely crucial for understanding the rise of borderland communities like the Lower Xiajiadian. During this Late Neolithic period, archaeologists saw a large-scale homogenization of coastal Shandong Longshan 山東龍山 practices across major cultural centers after the decline of the Yangshao tradition (4200-2900 BC). One particular feature of the Shandong Longshan culture—the production and use of different tripod vessels—was taken over and imitated by the Central Plains communities during an intermediate phase, the Miaodigou II culture 廟底溝二期文化 (ca. 2900-2600

BC).[335] Then it was increasingly embraced along the northern borderlands by the end of the third millennium BC.[336]

Mainly viewed from the ceramic perspective, the current chapter argues that during the third millennium BC, the sharing of tripod vessel form was characteristic of China's Late Neolithic period and represented a cultural marker across the coastal area, central China, and the northern borderlands.[337] It will be demonstrated how northeast China was incorporated into this "tripod-using sphere" after 2000 BC.

With many contemporary walled centers appearing in the middle reach of the Yellow River (Figure 5.1) in the latter half of the third millennium BC, Central Plains Longshan cultures experienced a period of increasing population aggregation and this motivated a diversification in pottery assemblage.[338] It is argued by Underhill (2018) that, the Central Plains communities took not just the elaborate vessel types from the Shandong Longshan tradition, but also the concepts of feasting, presentation, and consumption of fermented liquids and food during public events.[339] That is to say, following an eastern coastal tradition, the values attached to food and drink promoted the variation in the production of associated pottery containers in the middle Yellow River valleys. In Underhill's view, the use of finely made, elaborate ceramic vessels, such as the egg-shell ceramics (Figure 1.9), was

[335] IA CASS 1959. Producing mainly black and grey pottery with cord-marked or checker-marked surface decorations, the Miaodigou Phase II (ca. 2900–2600 BC) features a significant deviation from the cultural preference of smooth surfaced red ware during the Yangshao period (4200-2900 BC).

[336] Apart from the Lower Xiajiadian area, tripods dated to late third millennium BC has been found in the Ordos region, such as Shimao 石峁 (2200-1800 BC), Xinhua 新華 and Zhaimaoliang 寨峁梁 (2300-1900 BC) sites. See Shaanxisheng Kaogu Yanjiuyuan 2005, 2013 and 2018.

[337] Although we do not have evidence to show that tripods were of clear political importance before the rise of Erlitou in 1700 BC, they clearly continued to be the diagnostic ceramic vessel for daily cooking after the decline of Longshan cultures. Large numbers of tripod vessels (discussed in 1.3.1) found dated to the Neolithic and Bronze Age suggest strong ties between the Shang Zhou regimes (1500-221 BC) with the Longshan culinary tradition. Li Min (2018) offers a thorough overview of the development of tripod vessels gaining political significance in the Bronze Age (see Li, M. 2018: 175-229).

[338] Underhill, A. P. 2018: 10-1.

[339] Underhill, A. P. 2018: 16-7.

crucial to the creation and maintenance of social relations during the Longshan period.[340]



Figure 5.1 Map showing the Shandong peninsula, Longshan type cultures (ca. 2600-1900 BC) in the middle reach of the Yellow River (dotted circles), and the location of sites associated with Longshan remains mentioned in this thesis (Calibrated dates for Keshengzhuang II, see Appendix I; Taosi, see Appendix II; Wangwan III, see Appendix III; Hougang II, see Appendix IV).

The huge importance of ritual feasting is most evident in Longshan mortuary contexts, where rich assemblages of drinking and serving vessels constituted most elite grave goods. Tomb M203 at Xizhufeng 西朱封 site, Linqu 臨朐 county in central Shandong (Figure 5.2), is the so-far-known largest intact Shandong Longshan burial.[341] It is 6.5 m long, 4.5 m wide and 2 m deep. M203 has a built secondary ledge, upon which the outer coffin and grave goods were placed. Wearing jades and turquoise ornaments, the deceased was buried with more than 50 ceramic vessels, deposited between the inner and outer coffins. Among the ceramic assemblage of M203 (Figure 5.3), we see four major vessel types: five *gui* 鬹 tripod pitchers with open spout, five *ding* 鼎 tripod cooking pots, six *lei* 罍 jars with ring hooks and eight flat-base single-handle *bei* 杯 mugs.[342] Constructed in very similar designs, each type of vessel was represented by more than one piece, suggesting that they

[340] Underhill, A. P. 2018: 17.
[341] IA CASS 2018: 192-3.
[342] IA CASS 2018: 193-219.

were displayed and used in sets. It has been argued by Welch and Scarry that ceremonial feasting can be recognized by the presence of ceramic assemblages that consist of elaborate and aesthetically superior serving bowls, cups, and plates that differ significantly from everyday household assemblages.[343]



Figure 5.2 Xizhufeng tomb M203 (after Figure 4.9 of IA CASS 2018).

[343] Welch, P. and Scarry, M. 1995: 397-419.



Figure 5.3 Pottery assemblage of Xizhufeng M203
(after Figure 4.10A-M of IA CASS 2018).

As the most sophisticated vessel shape, the presence of *gui* pitchers in tomb M203 (top left of Figure 5.3) draws our attention to their hollow pouch feet. Individually made on a fast wheel, these supporting feet were then joined together with the upper section of the vessel.[344] Thought to be used for heating and serving liquids, the *gui* pitcher bears an elegant appearance and has also been excavated from several Central Plains Longshan culture sites in Henan province, such as Wadian 瓦店, Haojiatai 郝家臺, Mengzuang 孟莊, Wangchenggang 王城崗 and Xinzhai 新砦 (Figure 5.1). As an important characterization of Shandong Longshan legacy, the *gui* seemed to enjoy widespread popularity in the Central Plains Longshan configuration. One possibility is that the potters in Henan attempted to emulate the *gui* vessels known from the Shandong coastal areas.

[344] Underhill, A. P. 2002: 35-6.

There was conscious emulation of eastern ceramic characteristics as early as the beginning of the third millennium BC. Shown in Figure 5.4 is the distribution of Shandong *gui* tripod pitchers (4000-2600 BC) and the western emulations of hollow-foot tripods during the Miaodigou Phase II (2900-2600 BC) in the Yellow River areas. One significant feature of the tripods excavated from the middle Yellow River area is that, unlike the original Shandong pitchers, they were all cooking/serving vessels (Figure 5.4). It seems that there was a new emphasis on cooking and rituals associated with food consumption when the tripodal shape was adopted in the west. Modeled on the earlier *gui* tripod pitchers, these western examples known as *jia* 斝 tripods bear evident hybridity of shape—the incorporation of an earlier local *guan* jar as the upper part and the tripodal foot often seen on the *gui* vessels.



Figure 5.4 Distribution of the Shandong *gui* pitchers and Miaodigou II *jia* tripods (after Figure 1 of Ozawa, M and Zhao, H. 2012)

Instead of copying the exact shape of *gui*, communities in the Central Plains were clearly more interested in the practical and aesthetic features of the three hollow feet. Therefore, since the early Longshan (2600-1900 BC) period, we see tripod *jia* 鬶 achieve a wide distribution across northern China (Figure 5.5). Showing many local features of their prototypes, these recombined *jia* tripods are variously shaped, some of which were equipped with single/double handles or a small spout (Figure 5.5: 3, 7, 9, 21, 22, 31). As the hollow pouch-foot tripods moved from Shandong to the Central Plains, they not only gained new shapes but also were incorporated into a different functional department—from liquid pouring pitchers to food cooking/serving tripods.



Figure 5.5 Distribution of the Longshan period (2600-1900 BC) *jia* tripods (after Figure 3 of Ozawa, M and Zhao, H. 2012).

A Yellow River area example of *jia* holding an important position in elite burial contexts can be seen from tomb No. M2001 at Taosi 陶寺 site. Near the Taosi walled enclosure, two large cemeteries containing more than 1,300 burials have been excavated (Figure 1.11).[345] Ranking among the most lavish group, M2001 contained a painted wooden coffin, 31 pottery vessels, and 29 wooden lacquer vessels (Figure 5.6).[346]



Figure 5.6 Plan of Taosi tomb M2001 (after Figure 4.38 and Color Plate 11 of IA CASS 2015)

[345] IA CASS 2015: 391-4.
[346] IA CASS 2015: 458-61.

Placed outside the coffin, 58 vessels were deposited along the southern and western walls of the earthen pit (Figure 5.7). Two *jia* tripods, however, were buried separately from the main vessel assemblage. Numbered as objects 58 and 59, a pair of pouch-legged *jia* tripods were placed together with several chopping blocks (no. 57, 63, 64), stone knives (no. 60, 61), and a mini ceramic stove (no. 56) on the eastern side, suggesting they were used as major food preparation and cooking vessels. Another *jia* of smaller size (no.6), was found on top of polychrome painted wooden side table (no. 7) just next to the deceased's head. Unlike the *jia* no. 58 and 59, the small tripod (no.6) was clearly associated with food serving. Supplementing the small *jia* (no.6) is a set of six wooden high-stemmed *bei* goblets (no. 75-81) deposited nearby, which were presumably for serving beverages during feasts. Therefore, in contrast to Shandong's huge investment in drinking and pouring implements, tomb M2001 shows a clear culinary elaboration among the Taosi elites who had an exclusive focus on feasting.[347] There was also an evident division of pottery vessels for food cooking and serving, and in both systems, the *jia* hold special roles which entitled the tripods to a higher position than other vessel types.

[347] Li, M. 2018: 122.



Figure 5.7 Burial objects of Taosi tomb M2001 (after Figure 4.38B of IA CASS 2015).

Almost simultaneously with the appearance of *jia* 斝, a new type of hollow-foot cooking tripod, the *yan* 甗, came into the Central Plains Longshan archaeological record (Figure 5.8). The *yan* 甗 tripods, concentrated in Hougang II 后崗二期 cultural area (Figure 5.1) in present-day northern Henan and southern-central Hebei, became an eastern counterpart of *jia*.[348] Consisting of a deep upper bowl (sometimes with a pierced bottom), which was placed upon or attached to a lower, legged vessel, *yan* has a completely different function from the *gui* or *jia*. The *yan* is a cooking vessel mainly used for steaming. The shape was widely shared among Neolithic cultures in Henan and Hebei provinces during the Longshan period. The popularity of *jia* 斝 and *yan* 甗 has been well documented in the archaeological record, and this study regards both types as the initial stage of cooking tripods developed west of the Shandong peninsula based upon the *gui* 鬶 pitcher prototype.

In the late third millennium BC soon after the popularity of *jia* 斝 and *yan* 甗, we see a second wave of "Tripod Revolution" across the Central Plains, represented by the invention and rapid expansion of *li* 鬲 tripods (Figure 5.9). Largely modeled on the previous *jia*, the *li* was characterized by a minimized upper section and three enlarged baggy legs. With the tri-lobed legs, the shape of the *li* cooking pot could greatly increase the heating efficiency by maximizing the vessel's heating surface area.

[348] Chen, B. B. 1996: 90-2.



Figure 5.8 Distribution of the Longshan period (2600-1900 BC) *yan* tripods (after Figure 5 of Ozawa, M and Zhao, H. 2012).



Figure 5.9 Distribution of the Longshan period (2600-1900 BC) *li* tripods (after Figure 4 of Ozawa, M and Zhao, H. 2012).

As argued by Chen (1996) and Zhang (1997), the invention of *li* tripods took place from the northern periphery of the Central Plains, basically in the highland of Shaanxi, the Kengshengzhuang II 客省莊二期 type Longshan culture (Figure 5.1).[349] Despite exhibiting close similarities with the *jia,* the shape of *li* tripods shows a rather divergent developing philosophy from the *jia:* the shape of *li* was totally new and never seen before. Unlike the *jia*, which bears an evident hybridity configuration of a jar and tripodal foot, the *li* was not produced based on the simple incorporation of any previously existing vessel types. Soon after *li* was invented, it was quickly taken by the Longshan culture variants along the Yellow River valley (Figure 5.9). Evident stylistic differences remained between the early types in Shanxi and Shaanxi and the later eastern shapes, which featured a straight and less baggy hollow-foot (Figure 5.9: 13 and 14). In later scholarship, in contrast to *yan* 甗, *li* 鬲 vessel is regarded as a representative of Northern Type Longshan culture 北方系龍山文化, or as described by Han Jianye 韓建業 and Li Min 李旻, as a typical feature of the Highland Longshan communities.[350]

Overall, we have seen three new tripod cooking types, *jia* 斝, *yan* 甗 and *li* 鬲 developed in areas west of the Shandong peninsula, where the earlier *gui* 鬶 pitcher was first produced. The concept of hollow tripods traveled up the Yellow River valley to the west and was taken and transplanted in the local assemblages among various Neolithic communities since around 2500 BC. As has been shown above, *jia* 斝, *yan* 甗 and *li* 鬲 were each invented in different places at different times, and within one vessel category, we could observe regional morphological features. There was not a linear trajectory in the evolution of these three types, and their coexistence in the Longshan period (2600-1900 BC) archaeological record shows a strong preference for tripodal vessels.

[349] Chen, B. B. 1996: 93-6; Zhang, Z. P. 1997: 58.
[350] Han, J. Y. 2015: 187; Li, M. 2018: 116.

This thesis also argues that, during the transplantation process, what had been modeled in the north and west was primarily the bagged shape of earlier Shandong tripods, rather than the original use of *gui* 鬶 vessels. What underpins this suggestion is: a) the function of tripod vessels changed from pouring vessels to food cooking/serving implements; b) there were clear differences in the production techniques between the *gui* pitchers of Shandong and the *jia*, *yan,* and *li* tripods. In the Shandong peninsula, a high percentage of vessels (prestige and utilitarian vessels) were made using a fast wheel.[351] Traces of wheel throwing observed on the interior of many Shandong Longshan *gui* pitcher tripods has prompted archaeologists to infer that these prestige vessels may have been constructed in different parts: the coiling of the upper body and the wheel-turning of the baggy tripodal legs.[352] The two parts were then being assembled to produce a *gui*. In stark contrast, potters in the Yellow River valley and northern highlands used predominantly the technique of molding and hand-building ceramic cones to construct *jia*, *yan,* and *li* tripods (Figure 5.10).[353] By joining together three individually hand-built cones, the manufacture of *jia*, *yan,* and *li* left traces of the cone mold on the inner side of the vessel.[354] As argued by Li Wenjie (1996), this cone-molding technology has its root in the previous Yangshao (4200-2900 BC) ceramic tradition, which yielded much evidence of hand-making thick-walled amphorae with pointed bases (Figure 5.11).[355]

Taking a pottery perspective, this thesis shows that during the Longshan Period (2600-1900 BC), Neolithic groups across northern China imitated the Shandong coastal traditions and renovated their cooking and serving ceramics into tripods. Although this was only one facet of the many social changes that took place in the late third millennium BC, contemporary modifications of everyday cooking and

[351] Underhill, A. P. 2002: 35-6.
[352] Li, W. J. 1996: 21; IA CASS 2015: 1289-99; Li, W. J. 2016: 8.
[353] Li, W. J. 1996: 13-7.
[354] As there was no clear archaeological survival of the inner mold, Li Wenjie claims that the mold was very likely to be ceramic vessels of identical shape, but one size down.
[355] Li, W. J. 1996: 13.

serving pots across a vast geographical area undoubtedly indicate frequent regional connections.



Figure 5.10 Molding of tripods (after Figure 20 of IA CASS 2015).



Figure 5.11 Characteristic Yangshao culture thick-walled amphorae with pointed bases (excavated from Dadiwan site, Gansu, photo by author in the Gansu Provincial Museum).

The concept of a "Longshannoid horizon" proposed in 1986 by K. C. Chang is an early characterization of the shared cultural traits among different groups from the eastern coast to the Central Plains in the late third millennium BC.[356] Chang argued that communities within a certain sphere of interaction manifested cultural similarities and he points to a few shared material features that he believed to be Longshan characterizations.[357] As Chang suggested, there was a spatial integrating device crosscutting many regional sequences.[358] However, there are numerous new archaeological discoveries concerning Longshan remains reported each year in China and the complexity of the interaction sphere has not yet been fully revealed.

Never a strict core-periphery model, the incorporation of hollow foot tripods shows a clear eastern influence, with many regional transplantations. The tripod *gui* 鬶 vessels, as a prototype, had obtained a crucial ritual position in Shandong (Figure 5.4). Then in the subsequent Longshan expansion across the Central Plains and the crescent-shaped area, we see the promotion and consolidation of the use of black/gray pottery and different hollow-foot tripodal ceramics (Figure 5.5, 5.8, and 5.9). Eventually, this whole emphasis and investment gave the tripod *li* 鬲 the utmost distinguished position within the Bronze Age Shang (1500-1046 BC) and Zhou (1045-771 BC) elite rituals.

Through an overview of tripods getting onto the main stage of Late Neolithic development, I think it is helpful to use the Longshan expansion framework to look at the material cultures of each different region. Against this background, in the next section, we zoom out from the Yellow River areas to include a broader geographic area, northeast China. What will be examined is the northeast-ward push of Longshan tripods into the Chifeng region and western Liaoning, where tripods took

[356] Chang, K. C. 1986: 238-9.
[357] Chang, K. C. 1986: 239-41.
[358] Chang, K. C. 1986: 238.

the place of flat-bottom vessels and became the most important cooking and ceremonial pottery shape in the Lower Xiajiadian culture.

5.2 A Pottery Perspective: New Elements in the Lower Xiajiadian Assemblage

Pottery is the most common type of artifact excavated from Lower Xiajiadian sites, both in tombs and residential houses. Based on decades of fieldwork and research, a group of vessels has been singled out as differentiating the Lower Xiajiadian assemblage from the ones excavated from other contemporary cultures (Figure 5.12). Sandy grey-brown pottery baked at low-temperature accounts for 60 percent of the vessels.[359] There are also rarer pieces of black and dark grey pottery in the Lower Xiajiadian assemblage, which were fired at high temperatures. A unique *hu* vessel shaped with a sharply angled and swelling silhouette (Figure 1.3A: 11 and 12) is never seen in other Late Neolithic or Bronze Age cultures in China. Tall slender *li* tripods with short cylindrical legs (Figure 5.12: 7 and 8) are also distinguishable in the Lower Xiajiadian material remains and underscore the variety and great sophistication of its ceramic industry. The other commonly seen pottery types include small *ding* 鼎 tripods (Figure 5.12: 10 and 11), *guan* 罐 jars (Figure 5.12: 19), *zun* 尊 basins (Figure 5.12: 9 and 15) and *yan* 甗 tripod steamers (Figure 5.12: 1-6). The *yan* 甗 and *li* 鬲 tripods were found in almost every settlement context that has been excavated, representing popular cooking vessels designated for everyday use (Figure 5.12). Unfortunately, no residue analysis has been undertaken on any of the Lower Xiajiadian ceramic vessels found in the settlements or the Dadianzi cemetery.

[359] Guo, D. S. 1995: 152.



Figure 5.12 Lower Xiajiadian pottery assemblage. (1-8, 10-11, 15 and 18: excavated from Fengxia site, after Figure 11 and 14 of Liaoningsheng Wenwu Ganbu Peixunban 1976; 9, 14 and 19: excavated from Dashanqian site, after Figure 4 of IA CASS 1998;16: excavated from Dashanqian site, after Figure 5 of IA CASS 2004; 12-13 and 17: excavated from Dongshanzui site, after Figure 7 of Liaoningsheng Bowuguan 1983a).

From two perspectives, we can see the pottery inventory of the Lower Xiajiadian culture is very different from the ceramics of previous periods. Firstly, it features a much greater pottery diversity. The flat-base bucket-like jars 筒形罐 which dominated the local repertoire during the Hongshan 紅山 (4500-3000 BC) and Xiaheyan 小河沿 (3000-2000 BC) periods (Figure 5.13A: 1, 3, 8, 9, 13 and 14; Figure 5.13B: 6, 8 and 11) were replaced by the Lower Xiajiadian assemblage which featured more tripod shapes (Figure 5.12). The commonly seen red coating and black pigment decoration of Hongshan pottery (Figure 5.14) is not found in the Lower Xiajiadian assemblage. Instead, black and gray burnished vessels were found in the regional surveys and excavations of Lower Xiajiadian sites.[360] By owning a wide range of pottery forms, the Lower Xiajiadian communities had a different set of food

[360] Guo, D. S. 1995: 152; CICARP 2011: 13-4.

processing, cooking, and serving formats from the previous Hongshan and Xiaoheyan communities. This thesis argues that during this period, with good evidence for millet agriculture (See Chapter 3.5.2), Lower Xiajiadian people enjoyed a sufficient supply of crops and changed their cooking, serving, and eating utensils. We see new types of cooking vessels were gradually gaining importance in people's daily life and their death rituals. It can also be argued that this introduction of new ways of making and using everyday objects point to new technological styles since the beginning of the second millennium BC.



Figure 5.13 A: Hongshan period (ca.4500-3000 BC) pottery assemblage
B: Xiaoheyan period (ca. 3000-2000 BC) pottery assemblage
(after figure 4.56 and 4.64 of IA CASS 2010).



Figure 5.14 Hongshan pottery with red coating
(photo by author in the Liaoning Provincial Museum).

The other aspect of the importance of the Lower Xiajiadian pottery assemblage is the abundance of tripods recovered from both burial and settlement contexts. This might suggest a shared cooking tradition with Longshan culture groups in the Yellow River areas. Known for its straight silhouette and relatively short cylindrical legs, Lower Xiajiadian culture had a special style of *li* tripods 直腹鬲 that were idiosyncratic in northeast China (Figure 5.12: 7 and 8). Fired at a high temperature, most of these *li* tripods were made of black clay with the full-body polished, all the way down to the lower part of the tripodal legs.[361] If we go back to the distribution of *li* of the Longshan period (Figure 5.9), it is typologically evident that the Lower Xiajiadian culture *li* vessel bears more similarities with the ones found in northern Henan and western Shandong. Featuring a straight upper-body profile and less pouched supporting feet like the Lower Xiajiadian type, *li* tripods no. 13 and 14 in Figure 5.9, are two representatives of such kind. More of such *li* counterparts can be found across Hebei province and they will be addressed in section 5.3.3.

[361] IA CASS 1996: 70.

Almost certainly a southern introduction, the *yan* 甗 tripods are also frequently reported from Lower Xiajiadian settlements (Figure 5.12: 1-6). They were made of sandy grey-brown pottery, with three fat baggy legs, raising the vessel for better heating. The upper part of Lower Xiajiadian *yan* vessels is usually in a jar shape. In most cases, the whole body is decorated with light cord-marked patterns, and there are raised clay strips at the junction area between the upper and lower body. Food for steaming can be placed on a grate-like plate in between the upper part and the three-legged stand underneath.

Like the Longshan communities, *ding* 鼎 tripods were also found in the Lower Xiajiadian ceramic inventory (Figure 5.12: 10 and 11), though not as many as *li*. They are mostly in the shape of a deep bowl, with a big flat base and three legs in the shape of short flat adzes. They are usually not large. Cord marks and incised lines decorate the whole body, and the cord marks continue down to the legs. The mouth and the shoulder are very well polished and black.

Apart from *li, yan*, and *ding*, low-sided *pan* 盤 dishes with a big flat base and tripodal ring-foot (Figure 5.12: 12 and 13) also belonged to the Shandong Longshan-originated assemblage. However, in contrast to other sandy vessels of the Lower Xiajiadian culture, these plates were made by a fast wheel with very fine paste, which has almost certainly been processed and washed.[362] Not only frequently seen in the Longshan remains in Shandong, similar style plate *pan* have also been found in the later Erlitou pottery assemblage (1750-1500 BC) and constitutes one of the major types of serving vessels in the Central Plains (Figure 5.15). As for their archaeological context, these black and grey fine pottery have only been found from Type A mudbrick constructed Lower Xiajiadian settlements (See Chapter Three), for example at Fengxia 豐下(Figure 3.1: 2) and Dongshanzui 東山咀 (Figure 3.1: 11). They were excavated from the lower layers of cultural remains, covered by several

[362] Vandiver, P. et al. 2005: 67.

upper layers in which typical sandy ceramics and housing foundations of Lower Xiajiadian culture were identified.[363] Therefore, pottery that was finely made with black or grey paste can be considered as belonging to the early period of the Lower Xiajiadian culture. They were produced before large amounts of sandy grey-brownish ceramics gained a dominant role in the later phases of the Lower Xiajiadian culture.



Figure 5.15 *Pan* plates from Longshan culture sites and Erlitou (1 and 2: excavated from Xizhufeng tomb M1, after Figure 5 of Shandongsheng Wenwu Kaogu Yanjiusuo 1989; 3: excavated from Xizhufeng tomb M22, after IA CASS 1990b; 4: excavated from Hougang site, after Figure 28 of IA CASS 1972; 5-7: excavated from Erlitou site, after Figure 3-2-1-10 of IA CASS 2014 and Figure 78 of IA CASS 1999).

Pottery recovered from settlements reflect the daily consumption of food in Lower Xiajiadian sites, through which we get a glimpse of the practice of food production and consumption. Having seen that many Longshan period tripod ceramics occurred in the Lower Xiajiadian archaeological record, this thesis argues that from the stylistic perspective, the ceramic assemblage of northeast China was incorporated

[363] Liaoningsheng Wenwu Ganbu Peixunban 1976: 210.

into the "tripod-using community" from the beginning of the second millennium BC. And this also suggests that the rise and remarkable expansion of activities during the Lower Xiajiadian period were also resulted from a strong Longshan-related cultural input and fed by some of the populations from the south.

5.3 Contributors to Lower Xiajiadian: The Push from the South

We have seen in the previous discussions that the material culture of the Lower Xiajiadian community includes a wide variety of non-local features that have not been seen in northeast China before 2000 BC. Genetic studies of human samples from the Dadianzi cemetery and Erdaojingzi site suggest there was genetic admixture from the Central Plain during the Lower Xiajiadian period.[364] Late Neolithic genomes associated with the Lower Xiajiadian culture overlap with the ancient Yellow River cluster in Central China, suggesting a substantial northward influx from a Yellow River-related population between the Middle and Late Neolithic periods.[365] A physical anthropological study on the Dadianzi population has also been undertaken after the excavation of the cemetery, which seems to correlate with such a cultural complex. There were two groups of people who were morphologically different have been buried at Dadianzi cemetery: Group I has a close relationship with populations distributed in the Yellow River area, while Group II communities were similar with north Asian types of Mongoloid.[366] This division, together with the adoption of Longshan-type tripods in the local pottery inventory, prompts this thesis to review the Lower Xiajiadian material remains in relation to other contemporary cultures. The following sections each take a different perspective to deconstruct the Lower Xiajiadian ceramic vessels, metal artifacts, and

[364] Cui, Y. Q. et al. 2013: 216; Li, H. J. et al. 2011: 815-22.
[365] Ning, C. et al. 2020: 2700.
[366] IA CASS 1996: 250.

stone constructions, hoping to see what had pushed and contributed to the formation of the Lower Xiajiadian culture.

5.3.1 Hydrological Change and its Profound Influence on Northeast China

Having highlighted extensively in section 5.2, the new elements that appeared in the Lower Xiajiadian pottery assemblage, especially interesting for their association with Longshan tripod-using groups, we now look at the Late Neolithic communities residing in Hebei province, investigating whether they could be one of the direct contributors of the changes in the Lower Xiajiadian inventory.

Deviating from ceramics, we first review the landscape and hydrology of the area just south of northeast China, constituting the North China Plain 華北平原, an area of northern Henan and Hebei province features the largest alluvial plain of China (40,950,00 ha) (Figure 5.16). Bordered to the north by the Yan Mountains 燕山, to the west by the Taihang Mountains 太行山 and to the south by the Dabie



Figure 5.16 Map showing the location of the North China Plain and related archaeological sites.

Mountains 大别山, the North China Plain is basically built up along the shore of the Yellow Sea by the deposits of the Yellow River. Most of this flat yellow-soil plain is less than 50 meters above sea level.

Famous for its heavy sediments load, the Yellow River runs through the Loess Plateau in its middle reaches with a fragile ecological environment and serious soil erosion, even before it reaches the North China Plain. For the prehistoric periods, we have geoarchaeological and paleoenvironmental data from Taosi 陶寺 in the eastern edge of the Loess Plateau (Figure 5.16).[367] Taosi was a Miaodigou II-Longshan period (2900-2000 BC) large-scale residential site (300 ha at its peak) (Figure 1.11).[368] During its late phases (ca. 2400-1900 BC), the stratigraphic evidence points to human-induced erosion and the subsequent formation of gullies across the landscape.[369]

Investigations in other locations along the middle Yellow River also demonstrate that surface erosion and material re-deposition were common ca. 4400–3900 BP.[370] For instance, two Holocene loess profiles near present-day Xi'an city yielded evidence of soil erosion and re-deposition events corresponding to the end the Holocene Climatic Optimum (ca. 9400-4500 BP).[371] However, in contrast, no obvious soil erosion phenomenon has been recorded in the middle Yellow river area that corresponded with climatic fluctuations in the loess soil sequence during the Holocene Climatic Optimum.[372] This means that the early and middle Neolithic human activities did not cause such apparent erosion and re-deposition as the Longshan communities did.

[367] Kidder, T. R. and Zhuang, Y. J. 2015.
[368] Liu, L. and Chen, X. C. 2012: 222.
[369] He, N. 2013: 264 and Li, T. Y. et al. 2013: 445-7.
[370] Huang, C. C. et al. 2006 and 2007.
[371] Huang, C. C. et al. 2002 and 2006.
[372] Huang, C. C. et al. 2006: 848.

Eroded materials from Taosi and contemporary sites were thought to be have been transported into the Yellow River. Based on Shi, C. X. et al. 2002's reconstructive model, the sedimentation-rate changes in the lower reaches of the Yellow River had a three-stage evolution of average sedimentation rates from 0.2 cm/yr. from ~11,000 to 7500 BP, through 0.25cm/yr. from ~7500 to 3000 BP, to 0.22cm/yr. from ~3000 BP to the present.[373] These sediment increases suggest that increasing deposition in the North China Plain is the result of greater erosion in the upper and middle reaches of the Yellow River, some of which appear to be enhanced by human landscape modification as seen at Taosi.

Another strand of evidence for landscape erosion comes from the dramatic aggregation of Longshan period (2600-1900 BC) settlements and constructions of large walled sites on the eastern edge of the Loess Plateau. According to the Chinese National Archaeological Survey, the number of sites in Henan and Shanxi rose from 800 and 716 for the Yangshao and Miaodigou II period (ca. 4200-2600 BC) to 1000 and 1102 for the Longshan period (2600-1900 BC).[374] With the construction of large walled sites and housing greater concentrations of people than in earlier times, timber consumption likely increased dramatically. Much more wood would have been needed for wall construction, house building, and fuel for fires for heating, cooking and many sorts of craft production.

In addition to the anthropogenic reasons mentioned above, geological study shows that when late Neolithic communities occupied the south loess tableland and the Central Plains, a global event of rapid climatic change (ca. 2200-1800 BC) impacted the area. Known as the Holocene 3 Event, the Longshan period coincided with a major episode of a severe climatic anomaly in the northern hemisphere.[375] The weakening of Asian monsoons, caused by variability in solar output, altered the

[373] Shi, C. X. et al. 2002: 278.
[374] Zhongguo Wenwuju 1991: 32-7 and 2006: 101-5.
[375] He, Y. Q. et al. 2004; Wu, W. X. and Liu, D. S. 2004; Wang, S. W. 2005; Arz, H. et al. 2006.

hydrological regime and led to cooler and drier conditions in the late third millennium BC.[376]

Severe droughts resulting from a shortage of rainfall and extraordinary floods were part of the extreme climate variability during this period.[377] In this context, climatic instability combined with human disturbance could result in strong overland flows, causing intensive episodic flooding in the lower reaches of the Yellow River.
Such a hypothesis is further supported by a recent study of the variations in the intensity of the East Asian monsoon during the Holocene 3 Event. In Wu and Liu's paper (2004), they outlined the changes in the distributional pattern of monsoon-related rain belts in eastern China (Figure 5.17), arguing that this climatic anomaly significantly altered the hydrological regime and might cause a large-scale collapse of Neolithic cultures before and around 2000 BC.[378]



Figure 5.17 Correlation of the 4000 yr BP climatic event. (A) Daihai Lake, Inner Mongolia; (B) Yema Lake, Minqing Basin; (C) Arid and semiarid areas of China (after Figure 4 of Wu, W. X. and Liu, D. S. 2004).

[376] Li, M. 2018: 83.
[377] Han, J-C. 2017: 1382.
[378] Wu, W. X. and Liu, D. S. 2004: 162-3.

Field archaeology at the Guchengzhai 古城寨 (2600-2000 BC, 0.18 sqkm^2) site (Figure 5.1) in central Henan revealed that its west enclosure was destroyed by floodwater from the Zhen River 溱水.[379] A similar situation is seen at Wangchenggang 王城崗 (2500-2100 BC, 0.3 sqkm^2) (Figure 5.1), where both the eastern and western city walls were heavily damaged by the Wudu River 五渡河.[380]

In the North China Plain, several Longshan walled settlements at the foot of Taihang 太行 mountain suffered severe flood damage. A square-shaped rammed-earth walled settlement (0.3 sqkm^2) was discovered at Mengzhuang 孟莊 (2400-2100 BC) (Figure 5.1) in Hui county 輝縣, in which archaeologists found evidence that floods washed away many parts of the settlement.[381] A large gap of over 15 meters in width has been found in the Mengzhuang western wall, where a two-meter thick layer of heavy sediment was deposited.[382] Surrounding the wall is a moat (20 m wide and up to 4.8 m deep from the ancient ground level), which has been filled with a thick deposit of flood silts.[383] Multiple layers of thick alluvium sediment mixed with Longshan pottery sherds provide evidence of flooding, and they covered most of the lowland areas inside the Mengzhuang enclosure. The rammed-earth enclosure at Mengzhuang was initially built in ca. 2400 BC and appears to have been destroyed by floods near the end of the late Longshan period (ca. 2100 BC).[384]

Section profiles from Xijincheng 西金城 site (2300-2000 BC, 0.308 sqkm^2) in northern Henan (Figure 5.1) also reveal a one-meter thick layer of heavy sediments overlying the whole area of the south and east wall and some regions inside the walled area.[385] As these sediments overlay Xijincheng's Longshan layer and there

[379] Henansheng Wenwu Kaogu Yanjiusuo 2002: 57.
[380] Henansheng Wenwu Kaogu Yanjiusuo 1992: 28; IA CASS 2010: 834.
[381] IA CASS 2010: 835.
[382] Henansheng Wenwu Kaogu Yanjiusuo 2003: 87.
[383] Henansheng Wenwu Kaogu Yanjiusuo 2003: 87; IA CASS 2010: 835.
[384] Yuan, G. K. 2000: 39-44.
[385] Henansheng Wenwu Kaogu Yanjiusuo 2010: 24-6.

was no cultural deposition above these sediments, local archaeologists conclude that it was the sediment-clogged flood water that forced people to abandon Xijincheng.

Flood and waterlogging will raise ground-water levels, leading to the saturation of soils. This situation, in turn, causes a deficit in oxygen for plant root systems, which would have resulted in sharp declines in crop production or even failure.

All these Longshan sites mentioned above were regional centers that were built on relatively high lands with walls and moat structures, but still, they were heavily damaged by water and silt to the degree that some sites were abandoned after the flood event. Hence, it is assumed that the medium and smaller Longshan settlements in the North China Plain, which were in lower ground and unwalled, could have been swamped by the water. Even more catastrophically, the whole lowland area was inundated.

5.3.2 Shifts in the Course of the Yellow River

Another significant hydrological impact on the North China Plain Longshan communities is the shifts of Yellow River courses during the general environmental deterioration at the end of the third millennium BC. As a result of the heavy landscape erosion discussed above, the lower reaches of the Yellow River have been characterized by frequent course changes, floods, and overflow in history. According to the records in historical documents, there have been over 1500 occurrences of breaching and overflowing events, and at least 26 events during the last 3000 years when the river courses shifted dramatically.[386] The shifting pattern of the Yellow River has also been analyzed and visualized from a geo-hydrological perspective in Wang and Su's paper (2011).[387] Their project integrates geophysics and historical documents related to the course shifts, flooding, and overflow of the Yellow River

[386] Shen, Y. 1935.
[387] Wang, Y. J. and Su, Y. J. 2011.

from the prehistoric period to the present day. Changes in the Yellow River flow can be divided into two periods: the period shifting towards the south (before 1494 A.D.) and that shifting to the north (from 1494 A.D. to now) (Figure 5.18).[388] This result suggests that during the prehistoric period, the influence of the Yellow River regime was entirely within Hebei province and the main river course flowed entirely through the North China Plain. In addition, radiocarbon dating of four shell ridges in the northern part of the Bohai gulf 渤海灣 suggests that the Yellow River flowed through this region into the Bohai sea from 2540 to 2200 BC.[389]

As the Yellow River gradually shifted to the south, the areas south of the previous river courses were exposed to the constant danger of overflow. Small Longshan sites could even be wiped out by a sudden flood event. We have seen the cases of flooding causing huge damage to large walled settlements at Guchengzhai 古城寨, Wangchenggang 王城崗, Mengzhuang 孟莊, and Xijincheng 西金城, and the huge flood challenges may account for large scale population dislocation from these regional centers. In stark contrast, areas north of the main Yellow River course would be favored for people to dwell and a hypothetical view would be that some communities, if not all, that originally lived in northern Henan and Hebei may have resettled to the north.

[388] Wang, Y. J. and Su, Y. J. 2011: 1029.
[389] Zhao, X. T. and Zhang, J. W. 1981: 29.



Figure 5.18 The shifts of the course of Yellow River over time (after figure 8 of Wang, Y. J. and Su, Y. J. 2011).

Compatible data has been offered by Wagner, M. et al. 2014 and Hosner, D. et al. 2016, which show that there was a radical north-eastern shift in high site density from the middle and lower Yellow River to the Lower Xiajiadian culture area sometime between 2350 BC and 1750 BC (Figure 1.8).[390] It has also been argued by Zhang Chi (2017a) that around 2000 BC, the crescent-shaped borderlands did not show a site number/population decline, but appeared to be a preferred destination area for out-migrations from the disaster-struck Yellow River valleys.[391]

The highest number of sites in northeast China across all prehistoric times is registered as being between ca. 2000 BC to 1500 BC, or even to 1300 BC. The Chinese National Archaeological Survey (2003) shows that the number of sites assigned to the end of the Xiaoheyan culture 小河沿文化 (ca. 3000-2000 BC) still remain very low (ca. 100 sites reported) in comparison to ca. 3000 sites assigned to the Lower Xiajiadian period. On a smaller regional scale, the same result was obtained by the Chifeng International Collaborative Archaeological Project, which also confirmed an increase in the number of sites from 36 (Xiaoheyan) to 379 (Lower Xiajiadian) in the area of 765 km^2 surveyed from 1999 to 2001.[392]

5.3.3 Hougang Phase II and the Lower Xiajiadian

In the light of these tremendous changes in site densities and distribution patterns in northern China at the onset of the Bronze Age, the new elements which appeared in the Lower Xiajiadian ceramic inventory were very likely reflecting a northeastward replacement of the North China Plains' Longshan population.

With the continuous influx of southern immigrants, intensive dry-land farming started in northeast China (Chapter Three) with the new set of Longshan pottery

[390] Wagner, M. et al. 2013: 351; Hosner, D. et al. 2016: 13.
[391] Zhang, C. 2017a: 55-6.
[392] Wagner, M. et al. 2013: 353.

assemblage. Hayden has argued that agriculture presented a unique opportunity for people to increase resource production and feasting "being the single most important strategy of utilizing agricultural resources to obtain other forms of wealth and power".[393] That is to say, the prosperity of agricultural production in northeast China with the employment of Longshan style cooking, serving and feasting system gradually brought this area into the Longshan period "tripod-using community". Burial data from the Dadianzi cemetery clearly shows that there was a ubiquity of burying ceramic tripod vessels (Chapter 4.3.4). More significantly, we know that the practice of burying a *guan* jar with an upturned tripod in the foot niche was a standardized mortuary behavior in the Lower Xiajiadian culture and that 366 out of the 468 niched tombs yielded at least one such set (Chapter 4.3.4).

More than simply a postulation, similar material remains as those of Lower Xiajiadian were found in the North China Plains, attesting to the argument that it was the southern influx of Longshan population that contributed to the boom of Lower Xiajiadian culture and, in some way, triggered the reconstruction of the pottery inventory in northeast China.

In Yan Wenming's framework (1981), the Longshan cultural subtypes with respect to northern Henan and Hebei province are named as the Hougang II culture 后崗二期文化.[394] Identified in 1931, the black and grey pottery excavated at the Hougang 后崗 site near present-day Anyang city shows striking similarities to the Neolithic remains from Chengziya 城子崖, the type site of Shandong Longshan culture. The Hougang II stratigraphic layer was found directly on top of the layer that yielded Yangshao painted ceramics (Hougang I culture 后崗一期文化), but beneath the Shang cultural remains (1500-1045 BC).[395] Type site of this archaeological culture includes Hougang 后崗 and the above-mentioned flood-damaged Mengzhuang 孟

[393] Hayden, B. 2014: 18.
[394] Yan, W. M. 1981: 43.
[395] IA CASS 1972, 1982 and 1985b.

莊 and Xijincheng 西金城 sites.[396] Seventeen C14 dates from five different locations ranging from early to late Hougang occupation indicate that the Hougang II culture cluster lasted from ca. 2600 to 2100 BC (Figure 5.19).[397] Featuring the ceramics of plain and polished surfaces typical of the Shandong Longshan tradition, the Hougang II culture sites also yielded pottery impressed with cord marks, basket, and check patterns that were local in this region. Major ceramic vessels include tripod *yan* 甗*, jia* 罍, pedestal *dou* 豆, jar *guan* 罐 with a deep body and small base, and plate *pan* 盤 with big flat bases and low sides (Figure 5.20).

Situated along the Huan River 洹河 valley, the Longshan-period site cluster showed a dramatic increase from the earlier Yangshao period (4200-3000 BC), when major sites like Hougang and Mengzhuang appeared in this region during the late half of the third millennium BC.[398] Being a representative of Shandong Longshan expansion into the North China Plains, Hougang II culture also pushed its material assemblage to regions further north. As has been noted in Chapter Three, houses at Hougang and many nearby Longshan sites, such as Balizhuang 八里莊, Nangang 南崗, and Baiying 白營 exhibited an interesting technological combination of lime-plastered floors with mudbrick walls, which might be a source of the mudbrick construction and lime-floors seen in the Lower Xiajiadian area.

[396] IA CASS 1985b; Henansheng Wenwu Kaogu Yanjiusuo 2003; Henansheng Wenwu Kaogu Yanjiusuo 2010.
[397] IA CASS 2010: 549 and Figure 4.34.
[398] Tang, J. G. et al. 1998: 16-7; Dai, X. M. 2013: 566-9.

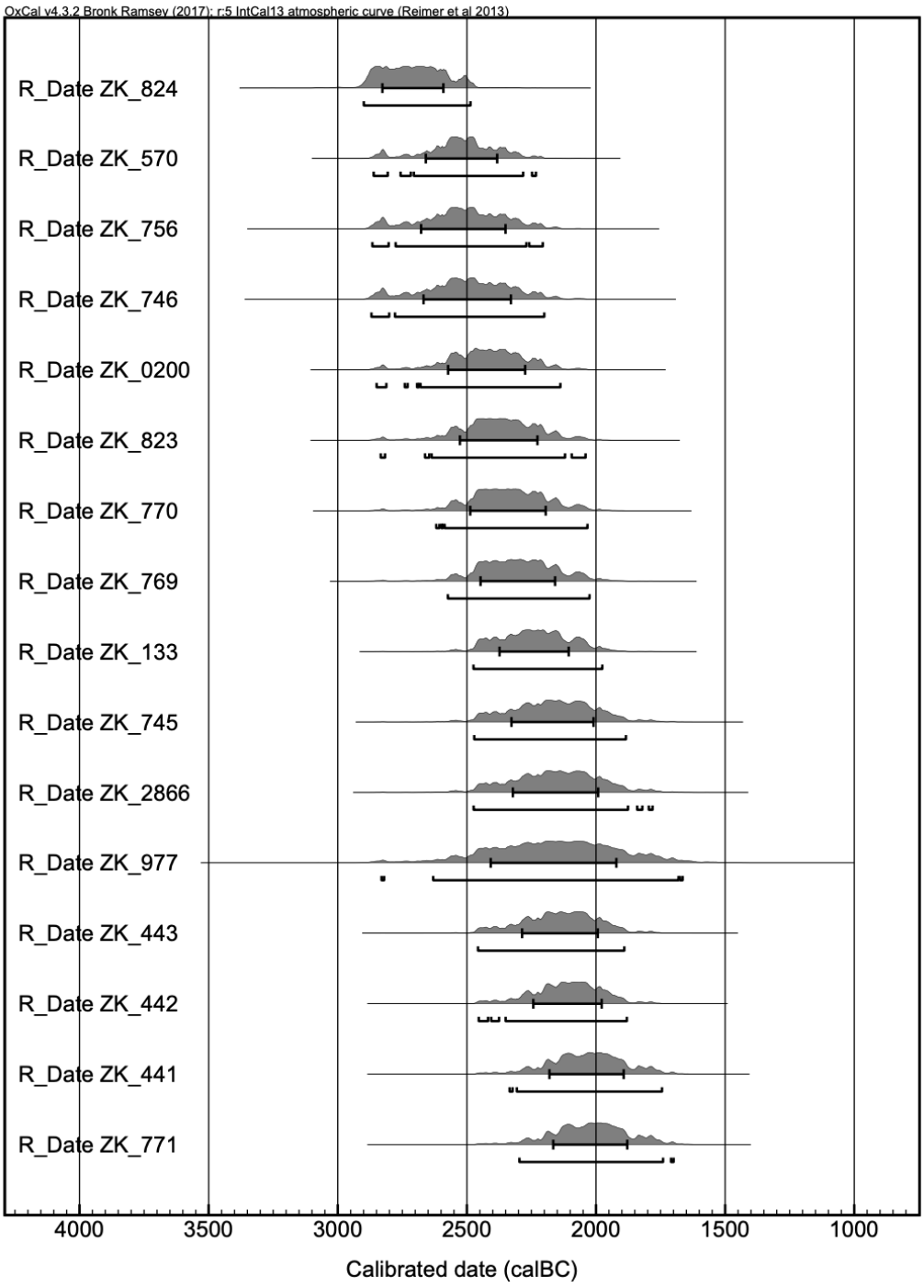


Figure 5.19 Radiocarbon dates for the Hougang II culture period
(data source from Table 2-31 of IA CASS 2010).



Figure 5.20 Pottery assemblage of the Hougang II culture (after Figure 6-15 of IA CASS 2010).

The major point here of raising special attention to the dates, ceramic inventory, and settlement construction techniques of the Hougang II culture is to illustrate its strategic position as one of the most likely candidates for the source of the new cultural elements seen in northeast China. In stark contrast to the Hougang II cluster in the North China Plain, almost no Miaodigou II (ca. 2900-2600 BC) or early-middle Longshan period (ca. 2600-2300 BC) sites have been reported in central Hebei and the Beijing area (northern Hebei).[399] This might suggest a period of weak north-south connection and possibly a cultural vacuum in this area.

Since the beginning of the second millennium BC, it seems that people gradually moved into central Hebei and the Beijing area, given that several sites contemporary

[399] Han, J. Y. 2015: 91; Wagner 2013: Figure 5.

with the Lower Xiajiadian have been reported south of the Yan mountains 燕山 which displayed significant similarities with cultures in the Yellow River area and northeast China. For example, at the Zhangying 張營 of northern Beijing (Figure 5.21), *li* 鬲 tripods with straight silhouette highly resemble the diagnostic Lower Xiajiadian tripods 直腹鬲 and *zun* 尊 basins featuring wide brims that were characteristic of northeast China, are frequently encountered in archaeological records in this area (Figure 5.22).[400]

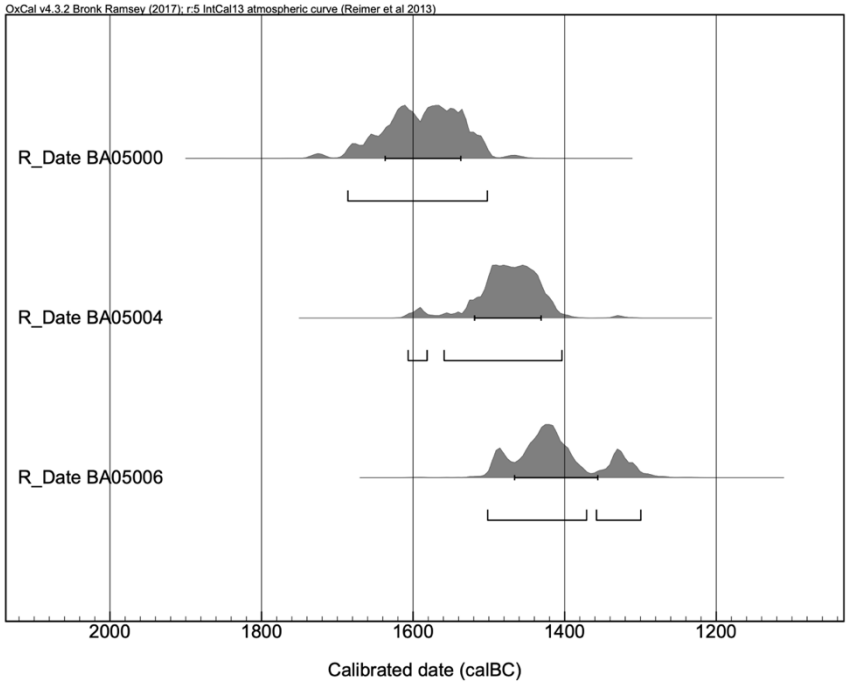


Figure 5.21 Radiocarbon dates for Zhangying site
(data from Beijingshi Wenwu Yanjiusuo 2007).

[400] Beijingshi Wenwu Yanjiusuo 2007: 28-9 and 39.



Figure 5.22 Pottery assemblage of the Zhangying site (after Figure 27, 28 and 132 of Beijingshi Wenwu Yanjiusuo 2007).

Located in the northern part of the North China Plain, Yabazhuang 哑叭莊 is a crucial site hosting a ceramic assemblage that produced hybrid vessel shapes, mixing different styles from surrounding regions.[401] Compared with other Central Plains sites that have produced radiocarbon dates, Yabazhuang is dated to the late Longshan period (ca. 2300- 1900 BC) based on pottery typology.[402] On one hand, Yabazhuang inherited many vessel types from Shandong, especially from sites in the western part of the peninsula. Large *guan* 罐 jars with high collar and two side handles, shallow-dished pedestal *dou* 豆, and the general shape of Yabazhuang *bei* 杯 mugs and *ding* 鼎 tripods all bear obvious resemblance with discoveries from Wangyoufang 王油坊, Chengziya 城子崖 and Yinjiacheng 尹家城 (Figure 5.23). In addition, at Yabazhuang and several western Shandong Longshan culture sites, we have the prototype of Lower Xiajiadian style *li* 鬲 tripods of straight silhouette and

[401] Hebeisheng Wenwu Yanjiusuo 1992.
[402] Hebeisheng Wenwu Yanjiusuo 1992：210

short cylindrical legs (Figure 5.9: 13 and 14; Figure 5.23: 7). These straight-shaped *li* tripods were found in western Shandong at an early date and displayed a full typological sequence there.[403] Then they appeared at Yabazhuang and Zhangying sites, which were located south of the Yan mountains before enjoying much wider popularity in the Lower Xiajiadian area from the beginning of the second millennium BC. Their striking similarities with later characteristic Lower Xiajiadian tripods indicate that this special form of *li* was a major vessel type that traveled north as the population shifted during the late half of the third millennium BC.

[403] Wang, Q. 1995: 83.



Figure 5.23 Comparison of the Yabazhuang ceramic assemblage (1-9) with the Shandong Longshan assemblage (10-17) (after Figure 2 and 3 of Wang, Q. 1995, Figure 11-21 of Hebeisheng Wenwu Yanjiusuo 1992, Figure 6-21 and 6-39 of IA CASS 2010).

On the other hand, Yabazuang seemed to have borrowed the *yan* 甗 tripod steamers from the Hougang II culture tradition, and in the second millennium BC, this unique ceramic type was introduced into the Lower Xiajiadian area (Figure 5.12: 5). One feature that differentiated the *yan* steamers in northern Henan, Hebei, and the Lower Xiajiadian area from those found in other parts of China is the lack of a grate, placed between the upper basin and tripod legs. Clearly shown in Figure 5.8, the *yan* vessels excavated from the Loess Plateau (no.1-5) all contained a pierced separator, which was either placed upon or attached to the lower part of the vessel. The holes on the grate-like plate ensured that the water vapor could rise to the upper section of the vessel and steam the food. It is therefore assumed that the Lower Xiajiadian communities followed the Hougang II culture line of *yan* production system and used removable grates that were made of organic materials, such as

wooden plates or textile strainers. Hence, a strong connection is seen from multiple distinctive features that were shared among Longshan culture variants in the North China Plains with the Lower Xiajiadian region.

We can see different strands of Longshan culture contributions in the Lower Xiajiadian records and they seem to indicate that the Lower Xiajiadian culture partly derives from multiple southern origins. Three main types of tripods, the *li* 鬲, *yan* 甗, and *ding* 鼎, as mentioned, together with several other vessel shapes, *zun* 尊 basins, *dou* 豆 pedestal and *pan* 盘 plates were new cultural features in the Lower Xiajiadian ceramic inventory but they all had their deep roots in other earlier cultures of Shandong and North China Plains. However, the mudbrick technology and the practice of using lime-plastered floors frequently seen in the Hougang II culture clusters (detailed discussion in Chapter Three) and the Lower Xiajiadian settlements have never been reported from Hebei province or the Yan Mountains region. This is a particularly interesting point that seems to suggest the process of population resettlement in northeast China was far more complex and indirect than we might expect. The changes of the lower Yellow River hydrological regime during the Longshan period (2600-1900 BC) and prominent flood events shown in archaeological records contributed to the push of North China Plains populations further north into the Lower Xiajiadian area. However, more data is still needed to account for these large-scale population shifts.

5.4 Contact as seen from Pottery and Metals

5.4.1 Erlitou-style Tripods from Dadianzi

The relationship between the Lower Xiajiadian culture and Central Chinese polities has been a long-discussed and controversial topic. This section studies the 24 Central Chinese style ceramics excavated from the Dadianzi cemetery, to see how this Central Plains-borderland relation is observed in the archaeological context of northeast China.

Burials at the Dadianzi cemetery contain astonishing quantities of pottery vessels, especially the standardized *guan* tripod set marked the Lower Xiajiadian community's unique cultural attribute. However, there is a clear absence of liquid pouring/drinking vessels in the local assemblage. The only pieces concerning liquid consumption excavated from Dadianzi are 24 ceramics, namely 11 *gui* 鬹, 12 *jue* 爵 and 1 *he* 盉 vessels (Figure 5.24: 1-9), all bearing close resemblance to the typical Erlitou pottery found at the Central Plains (Figure 5.24: 10-17).

See from a diachronically perspective, it is worth pointing out that the *gui* 鬹 tripod pitchers belonged to the early Erlitou assemblage and were only excavated from burial contexts. Starting from Erlitou Phase II, it seems that *gui* was replaced by another tripod pitcher, the *he* 盉 (Figure 5.25: 1, 2, 4, 5), which has a perfectly designed spout for pouring liquids. The huge advantage of *he* over *gui* is the installation of a spout separate from the rim of the vessel and a semi-enclosed cover, making it more suitable for storing and pouring hot drinks. Once *he* appeared in Erlitou, it became closely associated with *jue* tripod beaker, forming the standardized set of drinking vessels down to the end of Erlitou occupation around 1500 BC. The *jue* 爵 tripod beaker (Figure 5.25: 3 and 6), like *he*, was a distinctive Erlitou innovation. Consisting of a small cup with a long, pointed spout and three slender supporting legs, the *jue*'s presence with *he* tripods, shows Erlitou's

deliberate effort to produce new forms from the Shandong prototypes, for elite drinking and ritual offering.



Figure 5.24 Comparison of pottery tripod vessels from Dadianzi (1-9) and Erlitou (10-17).
1-9: after Figure 41 and 42 of IA CASS 1996;
10, 12,14: after Figure 81.9, 81.7 and 80.1 of IA CASS 1999;
11: after Figure 4.2 of Erlitou Gongzuodui, IA CASS 1984;
13, 16: after Figure 4.3 and 4.8 of Erlitou Gongzuodui, IA CASS 1992;
15: after Figure 2-3-2-1B of IA CASS 2014.
17: Zhongguo Shehui Kexueyuan Kaogu Yanjiusuo Erlitou Gongzuodui 1985: figure 5.15



Figure 5.25 Examples of ceramic *he* and *jue* tripods of Phase II and III of the Erlitou site.
(1-3: from Plate 60.2 60.3 and 61.3 of IA CASS 1999;
4-6: from Plate 122.1, 122.3 and 123.7 of IA CASS 1999).

At Dadianzi, the juxtaposition of a ubiquitous local *guan*-tripod set with stylistic tripod *gui-jue* pottery is only seen in 13 elaborate burials, of which 12 were in the northern sector of the cemetery (Figure 4.48). Considering the number of tombs in each of the Dadianzi sections differ significantly (north: 496; middle: 140; south: 109), it is necessary to calculate the probability of having Erlitou-style vessels in each section: it turns out the chance to hold Central Chinese ceramics is 2.4% in the northern sector and 0.7% in the middle sector. Given that 92.3% of the tombs with Erlitou vessels occurred in the northern part of the Dadianzi cemetery, it seems that the occupants buried in the northern sector were much more likely to belong to the high-status group among the Lower Xiajiadian community and to have non-local *gui* and *jue* tripod vessels. In Dadianzi tomb M677, the location of the placement of the

vessel assemblage in the niche also reveals a clear division of the origins of these vessel shapes: with a large *guan* jar deposited in the middle, the Central Plains type pouring and drinking vessels were placed in the eastern corner of the niche, and the other local food vessels on the western side (Figure 4.12). The evident difference in the deposition of Erlitou-style ceramics from the *guan*-tripod assemblage indicates that these vessels were clearly differentiated in the Dadianzi burial context and did not belong to the local ritual system.

Considering the period of *gui*'s presence at Erlitou, if these Erlitou-like vessels were indeed imported from the Central Plains, the connection between Erlitou and Dadianzi could only have taken place no later than Erlitou Phase III, which was 1600 BC. In this sense, the Dadianzi community might be one of Erlitou's eastern peers, but their contact did not last for a very long time and was presumably more sporadic than archaeologists have previously thought.

The intricate decorations on these Erlitou-like vessels tell us something more than a simple story of vessel inputs directly from the Central Plains. None of these 24 Erlitou-style vessels have been painted but were all richly engraved over the middle part of the vessel body, with incised comb pattern stripes, diagonal lines, and triangles (Figure 5.24). This stylistically rich ornament is apparent evidence that the local community in northeast China had its aesthetic framework. Even though the shapes are unambiguous of Erlitou style, the combed geometrical patterns on these 24 vessels should be categorized as having local features.

Unlike the Lower Xiajiadian painted ceramics, heavy surface ornamentation does not appear on typical Central Plains ceramics. A single band of ornament in the middle as a separator between the upper and lower part of the vessel is usually seen on the *gui* and *he* vessels of the Erlitou culture. A *gui* tripod, excavated from Dadianzi tomb M905, merits special attention (Figure 5.26 left). The upper section of this vessel is embossed with 12 crescent-shaped clay dots. This type of design clearly did not

originate from a ceramic decorative repertoire but makes sense as an echo of a leather-working process. This *gui* also has a thick rim with a circle of little curves along the edge that might well imitate the rim of a leather vessel (Figure 5.26 right). The use of borrowed decorative patterns on pottery during the Chinese Late Neolithic period is very limited,[404] but we have seen on this Dadianzi *gui* vessel a clear hint of leather production. This observation allows us to suggest that the Lower Xiajiadian community might be a major group of this period who considered adopting ornamental features from other media.



Figure 5.26 Ceramic *gui* tripod from Dadianzi tomb M905
(photo by author in the Chifeng Museum, Inner Monglia).

Li Min (2018) argues that the consistent decorative pattern on these Erlitou-like tripod vessels found at Dadianzi suggests this distinctive ornament was invented by

[404] Vainker, S. 1991: 25.

the Lower Xiajiadian community and was later incorporated into the repertoire of ceramic and bronze vessels by the artisans at Erlitou.[405] However, for now, we do not have sufficient data to show whether this full-body decoration had entered the Erlitou pottery repertoire. But it clearly was employed in the bronze decorative system of later Shang and Zhou periods, when the famous *taotie* faces, and multiple other patterns dominated.

A *he* vessel from the above-mentioned tomb No.2002VM3 at Erlitou (Figure 1.19) displays undeniably Dadianzi style surface decoration (Figure 5.27). Featuring a rim base, this *he* vessel has a special configuration and ornamentation that was likely esteemed among Erlitou's northern peers, given that a very similar, but less elaborate pottery *he* was excavated from northwest China, at a Qijia (2200-1600 BC) sites in Gansu and Qinghai provinces (Figure 5.28).



Figure 5.27 Ceramic *he* vessel with delicate surface decoration from Erlitou tomb V2002VM3 (photo by author).

[405] Li, M. 2018: 224.



Figure 5.28 Ceramic *he* vessel from Wushan, Tianshui, in Gansu province (photo by author in the Gansu Provincial Museum).

Above and beyond the issue of decoration, there was a general contrast in the clay material used to produce typical Erlitou *gui*/*jue* tripods and the 24 Dadianzi counterparts. Largely following the Shandong tradition, the Erlitou tripods were made from very fine silt and exhibited a gray/white color (Figure 5.29). From as early as the Dawenkou period (4th millennium BC), white pottery made from high-quality kaolin clay was especially associated with *gui* pitchers and mugs for drinking in Shandong (Figure 5.30) and this tradition continued into the Erlitou culture. However, the 24 Erlitou-style tripods found at Dadianzi were less well made in terms of raw material. Characterized by a dark brown or greyish-black surface, the *gui*/*jue* from Dadianzi used a much coarser type of clays than the authentic Erlitou tripods. Appearing to have a harder surface, it is also assumed that the Erlitou *gui*/*jue* were fired at a higher temperature.

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 5.29 Pottery assemblage of Erlitou tomb V2002VM3
(after Color Plate 123 of IA CASS 2014).



Figure 5.30 Tripod pitchers made with kaolin clay from the Shandong area
(1: Dawenkou period (4th millennium BC) *gui*, excavated from the Jiaojia site, photo by author in the National Museum, Beijing; 2 and 3: Longshan period (2nd millennium BC) *gui*, excavated from the Yinjiacheng site; photo by author in the National Museum, Beijing).

Overall, the unmistakable *gui/he* and *jue* vessel shapes and their presence as a set assembly in the Dadianzi cemetery show a distinctive Erlitou influence. This Erlitou cultural projection can be viewed as part of the Central Plains' network which involved interactions with communities well beyond the broadly defined Erlitou world.[406] Deeply rooted in the previous Longshan tradition, the cultural development at Erlitou exhibited a more powerful synchronic connection with far-flung regions than any previous period. The idea of elite liquid consumption, mostly likely alcoholic beverages, clearly spread into northeast China, adding new elements to its existing food-vessel-dominated ritual structure. On the other hand, we know from the surface decoration, raw material, and handicraft technology that these 24 Erlitou-style vessels excavated from Dadianzi were more likely highly valued locally manufactured products rather than directedly imported from Erlitou. On top of this, they were treasured because of their foreign connections, in that the shapes and the concept of elite ritual drinking were both embedded with cultural patterning from central China.

[406] Li, M. 2018: 220-5; Liu, L. and Chen, X. C. 2012: 274-8.

5.4.2 Early Penetration of Metal Objects into Northeast China

Based on the modern copper ore distribution in China, we see the Lower Xiajiadian area is a metal-rich region (Figure 5.31).[407] Along the Greater Khingan Mountains to the west, there are abundant concentrations of copper, tin, and other minerals over an area of 100,000 square kilometers between the Xilamulun 西拉木倫 and the Tao'er 洮兒 Rivers.[408] Especially worth noting is that there are good deposits of tin mines in the southern edge of the Greater Khingan (Figure 5.32).[409] Along the Xilamulun River valley, Huanggangliang-Haobu 黃崗梁-浩布 metal belt is one of the so-far-known largest high-tin deposits in northern China.[410] The presence of tin in some of the Lower Xiajiadian metal artifacts might have been the result of anthropic reasons or the local tin-containing polymetallic mineral deposits were exploited by the Lower Xiajiadian populations.

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 5.31 Map of the major copper deposits in China
(after Figure 1 of Ying, L. J. et al. 2014).

[407] Ying, L. J. et al. 2014.
[408] Li, Y. X. et al. 2003: 83.
[409] Xia, Q, L. et al. 2018: 60-61.
[410] Li, Y. X. et al. 2002: 125



Figure 5.32 Distribution of tin deposit in China
(after Figure 1 of Xia, Q. L. et al. 2018).

Early metallurgy production in northeast China began in the Lower Xiajiadian period with small metal artifacts discovered and documented from graves and settlements. These metal items are mostly small artifacts, such as personal ornaments, earrings, rings, and finger protectors. Since the Dadianzi cemetery and Erdaojingzi site are the only two sites with full chemical analysis, they are discussed with special focus in this section.

A total of 60 metal objects (Figure 5.33) have been excavated from 25 graves in the Dadianzi cemetery (Figure 4.51).[411] Among them are 25 bronze and 1 gold earrings, most of which are made in a simple round shape.[412] A female burial, M677 (Figure 4.12), yielding 11 copper rings, is the tomb with most metal artifacts at Dadianzi. The

[411] IA CASS 1996: 188-91. In the Dadianzi metal assemblage, 52 pieces (50 bronze, 1 lead and 1 gold items) are found from the northern part of the cemetery, 5 pieces (4 bronze and 1 lead items) from the central section and another 3 bronze artifacts were reported from the southern part of the burial ground.
[412] Li, Y. X. et al. 2003: 79.

only gold item, an earring, was excavated from tomb M516 in the northern section of the burial ground.



Figure 5.33 Examples of the metal artifacts from the Dadianzi cemetery (after Figure 86 of IA CASS 1996).

A special type of trumpet-shaped earring that is frequently reported from locations in China's northern borders, has also been excavated in Dadianzi (Figure 5.34: 1). The similarity between these Lower Xiajiadian earrings with the other comparable ones found in contemporary cultures in northwest China indicates a wide sphere of contact along the borderlands (Figure 5.34).[413] Considering that the rings (Number=25) and earrings (Number=26) account for 85% of the total number of the Dadianzi metal assemblage, this thesis argues that the Lower Xiajiadian metal assemblage remained largely within the personal decorative catalog, and no vessels have been found in clear association with northeast China before the first millennium BC.[414]

[413] Bunker, E. 1998: 611 and Linduff, K. M. 2000: 13.
[414] In northeast China, several hoards containing Central Plain style bronze ritual vessels have been excavated and dated to early first millennium BC. They reflect long-distance interactions between the communities in northeast China with the Zhou 周 polity (1045-



Figure 5.34 Earrings with trumpet-shaped design found in northern China and Andronovo remains (1: after Figure 88.1 of IA CASS 1996; 2: excavated from Ganguya site, after Color Plate 4.6 of Beijing Daxue Kaogu Wenbo Xueyuan and Gansu Sheng Wenwu Kaogu Yanjiusuo 2012; 3: excavated from Erdaojingzi site, after Figure 2 of Wang, Y. L. et al. 2013; 4- 6: from Andronovo culture sites in south Siberia, after Figure 6.1, 6.5 and 6.7 of Wu, E. 2008).

In the Dadianzi assemblage, four items with socket holes and rivet-like decorations (three in bronze and one lead) (Figure 5.33: 1-4) were unearthed.[415] They were believed to be made by two-piece mold casting as there are traces of mold seams on the surface. Item of Figure 5.33: 4 has wooden remains in the socket hole and a raised edge along which detailed decorations can be identified.[416] The shape of these artifacts suggests that they may be used for decorating the tops of wooden poles. It may also be the case that, as argued in the Dadianzi report, these four artifacts were mace head covers.[417] As a kind of weapon suitable for close-range

221 BC) in central China. In these hoards there are also "northern-style" bronzes of the Upper Xiajiadian period (ca.1000-600 BC).

[415] IA CASS 1996: 141-2.

[416] IA CASS 1996: 142.

[417] IA CASS 1996: 141-2. Considering the size of these four artifacts (less than 5 centimeters in length), they were less likely to be mace-head covers than ornaments mounted on short staves. As early as the fourth millennium BC, figures of bronze stag and gold or silver-made bull had been used to decorate the tops of silver and wooden poles in southern Russia (found in the elite burials of Maikop) and the Pontic region. These poles may altogether hold up a fabric canopy in the steppe.

hand-to-hand fighting, mace heads have been found in many archaeological remains of Egypt and Mesopotamia (Figure 5.35)[418] and spread across a vast area of Eurasia before they reached the borders of central China in the late third millennium BC (Figure 5.36).[419] Long before mace heads came into China's borderlands, it has been associated with individual prowess and high social status. The presence of mace heads, especially metal mace head covers in the Dadianzi cemetery during the mid-second millennium BC, should be viewed in a broad context of the early penetration of steppe weaponry into northern China.[420]



Figure 5.35 The representation of ruler with mace heads on the Narmer Palette (ca. 3100 BC) found at Hierakonpolis (after https://zh.wikipedia.org/wiki/File:Narmer_Palette_smiting_si de.jpg.).

[418] Wendrich, W. 2010: 29 describes the earliest known mace head as an iconographic element appeared on white cross-lined potteries in ancient Egypt before the First Dynasty, ca. fourth millennium BC. Victory scenes depicted on tomb paintings of Hierakonpolis include a male, a ruler possibly, smiting his enemies on the head. The representation of ruler with mace heads had been fully developed on the Narmer Palette (ca. 3100 BC) found at the same site. Mace heads were then seen very often employed on Egyptian images of the First Dynasty and material remains of later periods, representing dominance, control and military power.

[419] For detailed studies of mace heads found in the borderlands of China, see Li, S. C. 2004: 8-20 and 2010: 7-12.

[420] Rawson, J. 2015: 43-4.



Figure 5.36 Map of the arc area and the eastern steppe showing the distribution of mace heads in the steppe and on the borders of central China (after Figure 8 of Rawson, J. 2015).

The metal remains unearthed from Erdaojingzi 二道井子 show a similar configuration with the Dadianzi assemblage.[421] Nine bronze items have been unearthed from Erdaojingzi, including one trumpet-shaped earring and three knives with slightly curved blades (Figure 5.34: 3 and Figure 5.37: 2), though most of them were heavily corroded. Typologically speaking, the form of these knives closely resembled the early ones found in northwest China. Bronze knives from the Ganguya 干骨崖 (1800-1600 BC) cemetery in Gansu and sites along the Hexi corridor bear an almost identical form with the one excavated from Erdaojingzi, suggesting a common origin of metalworking tradition from the Eurasian steppe (Figure 5.37).[422]

[421] Wang, Y. L. et al. 2013: 283-92.
[422] Beijing Daxue Kaogu Wenbo Xueyuan and Gansu Sheng Wenwu Kaogu Yanjiusuo 2012; Wang, B. and Cheng, Z. G. 1989: 95-6.



Figure 5.37 Early forms of bronze knives found along China's borderlands
(1: excavated from Kangjiatun site, after Figure 20.1 of Liaoning Sheng Kaogu Yanjiusuo 2001; 2: excavated from Erdaojingzi site, after Figure 1 of Wang, Y. L. et al. 2013; 3: from Ganguya cemetery, after Color Plate 4.2 of Beijing Daxue Kaogu Wenbo Xueyuan and Gansu Sheng Wenwu Kaogu Yanjiusuo 2012; 4: from Anaiersen site in Gongliu county, Xinjiang, after Figure 2.2 of Wang, B. and Cheng, Z. G. 1989).

Scientific analysis on the production technique of the Dadianzi bronze assemblages has revealed that 21 out of the total 26 earrings were reworked by heat forging and all 11 bronze rings analyzed were made by cast technique.[423] A few other small bronze items, such as the above-mentioned four artifacts with socket holes and three bronze pegs (presumably for decorating the wooden handles for the stone axes found in tomb M683 and M715) are also thought to have been cast.[424] For the Erdaojingzi assemblage, Wang, Y. L. et al. analyzed five bronze objects and reported that three of them were hot foraged while one knife was cast, while the other knife blade was too damaged for analysis.[425]

[423] Li, Y. X. et al. 2003: 80.
[424] Li, Y. X. et al. 2003: 80-2.
[425] Wang, Y. L. et al. 2013: 285.

Based on a survey project conducted by Li Yanxiang 李延祥 and his team from 2011 to 2013 in the Niuheliang protective zone 牛河梁保護區 of western Liaoning, 13 Lower Xiajiadian period metal production sites have been identified.[426] Smelting slags and fragments of burnt furnaces found in these locations indicate that at least by the mid-second millennium BC, numerous small-scale metal industries were operating near the Chifeng area.

More direct evidence for bronze production has been revealed with the discovery of casting molds in northeast China during the Lower Xiajiadian period. One half of a two-piece ceramic mold was excavated in the Dongshanzui 東山嘴 settlement site, on which a funnel-shaped sprue was found on one end with a core shaped as two round segments in the middle (Figure 5.38).[427] Similar to the bronze production in the Eurasian steppe, stone molds were used by the Lower Xiajiadian craftsmen that a two-piece stone mold has been reported from the Kangjiatun 康家屯 site (Figure 5.39). One of the two pieces is flat and smooth, while the other has a hemispherical depression (presumable for a personal ornament) in the upper section, and the depression is linked through a pouring gate with the sprue (Figure 5.39). Four sunken marks can be seen on both stone pieces, by which the position of the two stone molds could align with each other during casting.[428]

[426] Li, Y. X. et al. 2014: 2. Niuheliang protective zone was originally designated for preserving Hongshan culture remains in the Chaoyang region, western Liaoning. In the year of 1987, local archaeologists reported findings of furnace fragments and slags on top of an artificially built pyramid-shape terrace. These fragments were dated by thermoluminescence (TL) to 3100-3400 BP and therefore, falls into the range of Lower Xiajiadian culture (Li, Y. X. and Han, R. B. 2000: 80-3). According to the National Archaeological Survey result, there are at least 40 Lower Xiajiadian period locations in the Niuheliang protection zone. From 2011 to 2013, Li Yanxiang launched a regional survey in the Niuheliang area, with the aim of sorting out the archaeometalical data in this region. In 2014, Li reported 13 Lower Xiajiadian period sites with clear remains concerning metal production, including Xiaobeishan 小北山, Miaotaidi 廟台地, Fengshan 封山, Gegou Dongshan 葛溝東山 and Gegou Nanshan 葛溝南山. Based on these findings, Li argues that there was a group of locations in the Niuheliang region which were extensively used by the Lower Xiajiadian community to smelt pure copper (Li, Y. X. et al. 2014: 2).

[427] Liaoning Sheng Bowuguan 1983: 427.

[428] Liaoning Sheng Kaogu Yanjiusuo 2001: 39-40.

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 5.38 Ceramic mold from the Dongshanzui site (after Figure 11 of Liaoningsheng Bowuguan 1983a).



Figure 5.39 A two-piece stone mold excavated from the Kangjiatun site, Liaoning province (photo by author in the Liaoning Provincial Museum).

These lines of evidence all point to a conclusion that some of the metal artifacts were produced, or at least cast, in northeast China during the second millennium BC, though the scale of this local production needs further archaeological work to confirm. However, the possibility that there were metal objects imported from other regions into northeast China should not be excluded completely.

In terms of the chemical composition of Erdaojingzi metal assemblage, we note that seven out of the eight bronze objects analyzed contain tin and two of them were

made with as much as 29.7% and 47.4% of tin.[429] Only one ring was pure copper and none of them has been identified containing lead.[430] For the Dadianzi metal assemblage, tin is widely presented that all of the 11 objects being metallographic analysis contained tin, ranging from 8.7% to 18.7%.[431] A total of 15 artifacts have been through SEM analysis and all of them showed a tin-copper profile, with tin content ranging from 2.2% to 19.5%. Ten objects in the Dadianzi assemblage were reported to have lead (less than 6%). Lead has also been present in the bronze artifacts unearthed from Sanzuodian and Dashanqian, and the ones in Dashanqian are thought to be heavily leaded (as much as 36%).[432]

It has been noticed by many scholars that the Lower Xiajiadian bronze assemblages are mostly tin-copper alloys, belonging to the Late Bronze Age (ca. 1700-1400 BC) metallurgical system of Eastern Eurasia, which was characterized by the widespread use of tin bronzes.[433] The use of tin in bronze production has a long history in the steppe area and before the Late Bronze Age, the Seima-Turbino metal assemblage was the only group featuring developed tin-bronze technology with primary tin alloying (10-13%), and this metal working practice was further applied by the Andronovo pastoralists in south Siberia.[434] The prevalence of tin-bronze corresponds to the increasing exploitation of tin deposits in eastern Kazakhstan and Mongolia.[435] According to Hsu, Mongolia, especially its eastern part, may play an important role in providing tin for the Baikal region and even the northern frontiers of dynastic China.[436] As mentioned above, the distribution of tin profiles is a feature

[429] Wang, Y. L. et al. 2013: 286-7.
[430] Wang, Y. L. et al. 2013: Table Three.
[431] Li, Y. X. et al 2003: 80-2.
[432] Jia, H. X. 2001.
[433] Mei, J. J. 2003, Hsu, Y. 2016 and Chernykh, E. N. 2008 have all noticed a unified archaeological horizon took shape during the Late Bronze Age (ca. 1700-1400 BC) with specific metallurgical practices, characterized by the wide use of tin bronzes, new metal working techniques and a typological standardization of metal artifacts across the steppe and forest steppe region.
[434] Hsu, Y. 2016.
[435] Sergevyva, N. F. 1981: 52.
[436] Hsu, Y. 2016.

of the Lower Xiajiadian bronze assemblage, and the local metal ore distribution also shows an interesting coexistence of copper with tin. In contrast with the strong cultural continuity in habitation structures and burial practice, the metallurgical production in the Lower Xiajiadian context showed evident similarities (both in terms of artifact types, shapes, and the metallurgical composition) with the Eurasian steppe region. This suggests strongly that the technology was adopted from specialists outside the local community. People in northeast China might adopt the practice of copper-tin alloy from the Mongolian steppe or it may simply be a chance that they had availability of poly-metallic minerals containing copper, tin, and lead, which provided convenient sources to produce leaded tin-bronze alloys.

Xiquegou 喜鵲溝 in Hexigten Banner 克什克騰旗 of eastern Inner Mongolia is a well-reported copper mining site discovered in northeast China that partly contemporary with the Lower Xiajiadian culture (Figure 5.40).[437] At Xiquegou, six mining pits on top of a shallow hill have been found, with stone mining tools, grinding hammers, and plates nearby (Figure 5.41). Analysis of the slags found on site suggests that Xiquegou features a polymetallic deposit of copper, arsenic, and tin, with a very small amount of lead.[438] Two stone walls and some housing remains were also identified, where archaeologists found clear evidence of fire. Seven samples were taken from the wood charcoal at the fireplace for radiocarbon dating,

[437] For a brief report see Neimenggu Wenwu Kaogu Yanjiusuo 2014. Another site located in nearby area, known as Yihewomente 依和沃門特, has also been surveyed and documented by Li Yanxiang and his group. Yihewomente is much larger in scale in comparison with Xiquegou. By only surface examination, more than 100 mining pits has been identified and one of which is approximately 500 meters long. Based on surface collection, the archaeological remains suggest a similar cultural outlook with Xiquegou and therefore it is believed that Yihewomente was also exploited by the Lower Xiajiadian community during the contemporary time period with Xiquegou. Yihewomente is first mentioned in Li, Y. X. et al. 2014: 2.

[438] Li, Y. X. 2014: 448. It has been noted in the brief archaeological repot on Xiquegou that very few slags remain were identified. Some scholars argue that the slags found on site were simply remains of some test smelting process conducted by the ancient miners to confirm the quality and composition of the ores. After the ores were mined from Xiquegou, they were probably either taken to other smelting and metal-working locations in nearby areas to produce artifacts, or they were put in interregional trade system and transported to areas where large scale bronze production took place.

and the results suggest a range from 13th to 10th century BC for the Xiquegou site (Figure 5.42).[439] In and around these houses, fragments of typical Lower Xiajiadian pottery and large quantities of animal bones (fish and goats) were found, pointing to a conclusion that this local mining site had been under intensive use in the final period of the Lower Xiajiadian culture.[440]

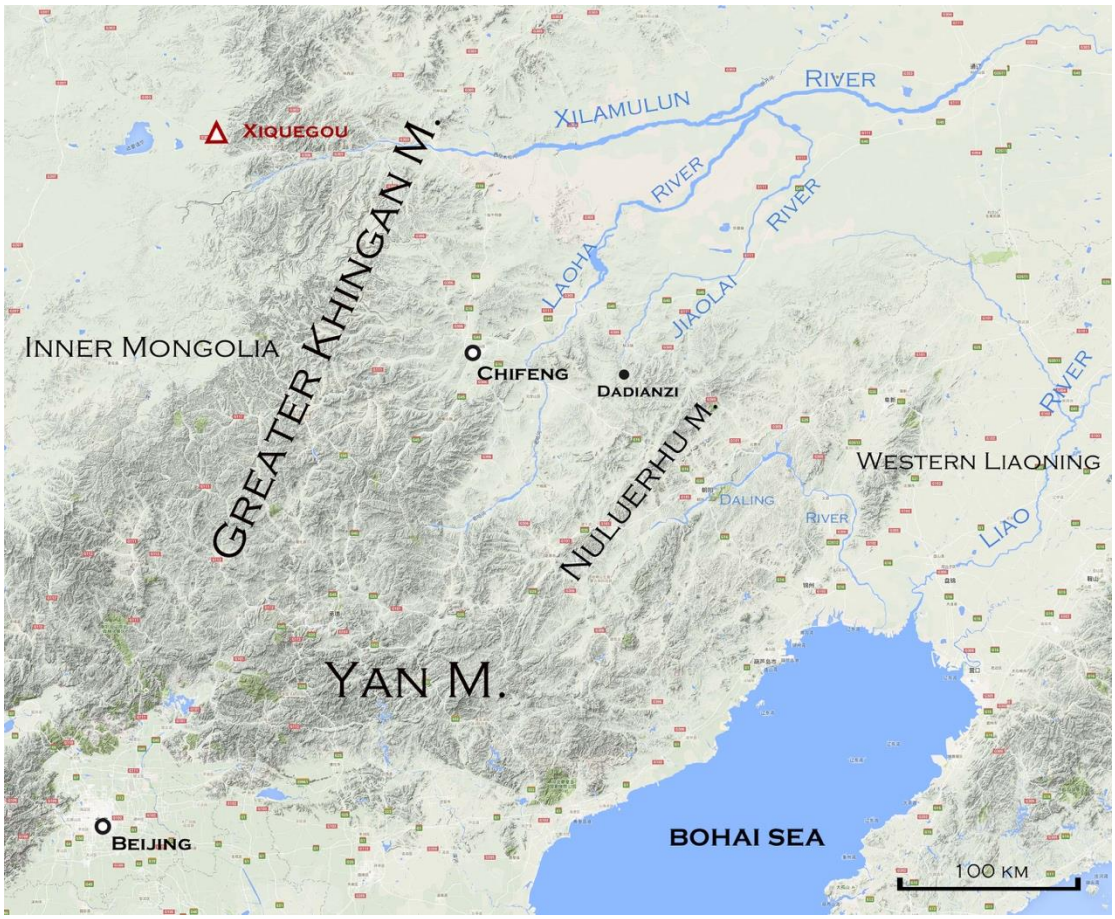


Figure 5.40 Map showing the location of the Xiquegou site, marked with red triangle (Map by author. Background pale red and green symbols indicate the modern motor road and national highway systems).

[439] Neimenggu Wenwu Kaogu Yanjiusuo 2014: 13.
[440] Wang, L. X. and Fu, L. 2015: 85.



Figure 5.41 1-3: grinding hammers and stone plates, surface collected from the Xiquegou site (photo by author); 4-5: stone mining tools excavated from the Xiquegou site (after Figure 10 and 11 of Neimenggu Wenwu Kaogu Yanjiusuo 2014); 6: one of the six mining pits found at Xiquegou (photo by author).

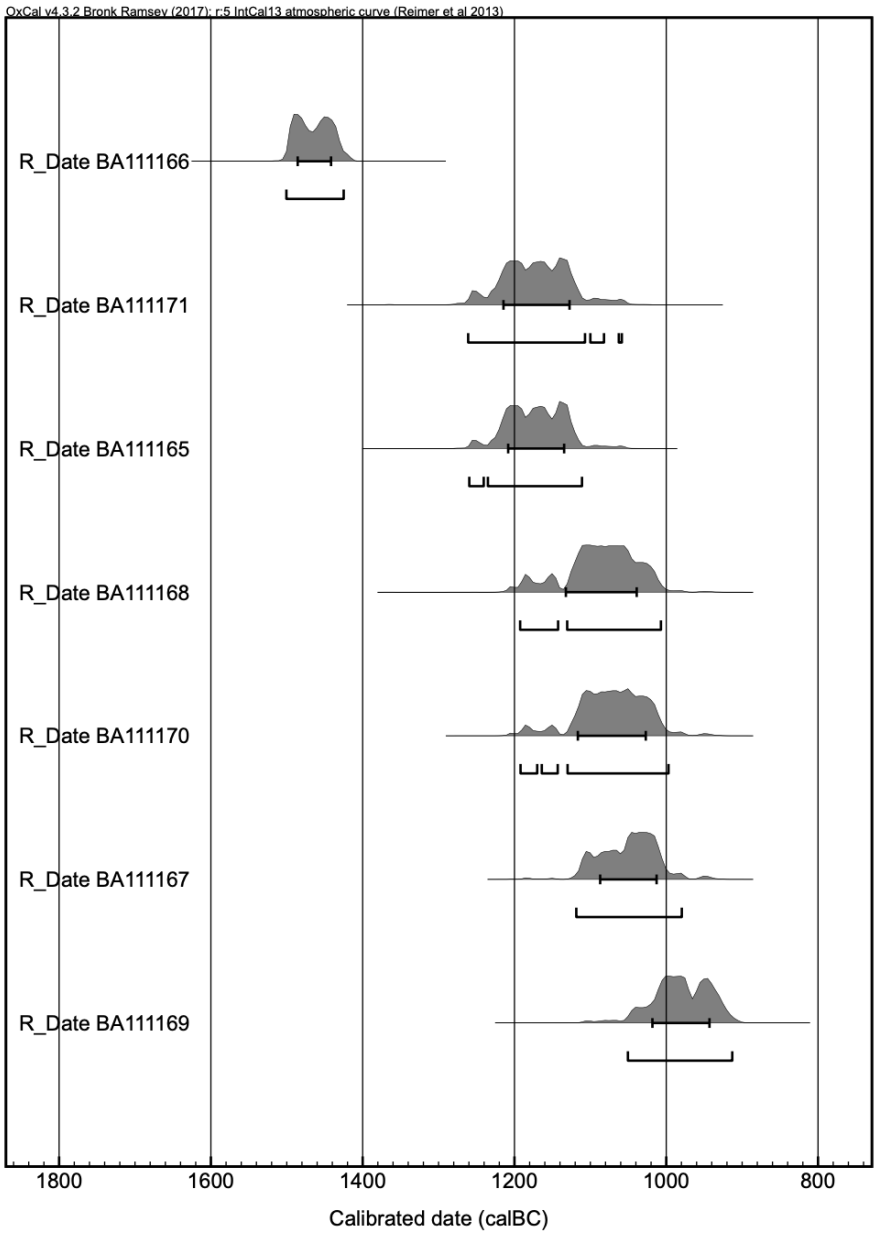


Figure 5.42 Calibrated radiocarbon dates for the Xiquegou site (data source from Table 1 of Neimenggu Wenwu Kaogu Yanjiusuo 2014).

Another recently reported location in Hexigten Banner, the Habaqila site, also reveals abundant metallurgical remains, including ore fragments, slags, ceramics, and some stone implements.[441] It is less than 20 kilometers away from the Xiquegou site and was discovered during an archaeological investigation near the copper and tin deposits recorded by modern prospection. Many of the modern mining activities

[441] Li, C. Y. et al. 2019: 1-15.

in this area follow remains of the earlier periods so that more contemporaneous sites with ancient mining relics are expected to be found.

Habaqila was dated by pottery typology to the Lower Xiajiadian period, though C14 results have placed the site to late 13th to 11th century BC (Figure 5.43), which correspond with the period after the decline of Lower Xiajiadian and the rise of a brand new metal-using Upper Xiajiadian culture in northeast China. Metallurgical analyses of the ore samples and slag remains demonstrated that at Habaqila, polymetallic ores were smelted to produce arsenical copper.[442] The mass ratio between arsenic and copper in ore could reach as high as 28% and the slags reflect a production process in which tin was barely involved.[443] However, as we have seen in the chemical composition of the bronze artifacts unearthed from the Dadianzi cemetery and Erdaojingzi settlement, that they contained only tin bronze or pure copper with no trace of arsenic. It has been argued by many that the Lower Xiajiadian people did not use arsenical copper in contrast to the contemporary cultures in northwest China.[444] The views presented by Li et al. 2019 challenges both previous thoughts on metallurgical technology of northern China and the current archaeological data of the Lower Xiajiadian remains. It is therefore worth rethinking the date of the Habaqila site and its relative chronology within the archaeological sequence of northeast China. Based on the data of this site along, we could not say for sure that there were different technological practices between Dadianzi, Erdaojingzi, and Habaqila, nor the local metallurgical technology was subject to change over time. As the subsequent Upper Xiajiadian culture was a period featuring extensive bronze production and close connection with the Eurasian steppe, more research needs to be done on the change of metallurgy from Lower to Upper Xiajiadian.

[442] Li, C. Y. et al. 2019: 5-6.
[443] Li, C. Y. et al. 2019: 5-8.
[444] Pollard, M. et al. 2017: 674-87.



Figure 5.43 Calibrated dates of coexisting animal teeth with the ore and slag from Habaqila site (after Figure 5 of Li, C. Y. et al 2019.)

The presence of tin in northeast China is especially crucial in the discussion of the tin source and metal transport routes for Shang 商 (1500-1045 BC) and Zhou 周 (1044-221 BC) regimes and their bronze vessel-making industry. Centered in the Yellow River area, dynastic China is thought to have developed various transportation routes and a stable trading system to acquire metals.[445] As has been touched upon in previous studies, that tin availability is fairly poor in Shaanxi, Shanxi, and Henan provinces, so there must have existed several tin supply sites outside the Central Plains area.[446] A fragment of a bronze inscription found on a *fu* vessel of Eastern Zhou 東周 period (475-221 BC), "Jin Dao Xi Hang 金道錫行" (With the

[445] Liu, L. and Chen, X. C. 2003: 37-9.

[446] Liu, L. and Chen, X. C. 2003: 37-9. More detailed research on the possible Shang metal routes is seen in Yi, D. S. 2011 and 2013, and Chen, G. Z. 2012. Scholars have proposed several locations with rich tin deposits as candidates for dynastic center. Most of them favor a southern route system as explanation for tin supply. Professor Jin Zhengyao's research is the most influential one in the Chinese academia. In his 2008 book (Jin, Z. Y. 2008), Jin emphasized the importance of Yunan province in southwest China as the possible tin origin for the Central Plains, because in the bronzes of late Shang capital Anyang there existed high radiogenic lead isotope. This lead composition resembles very closely to the lead deposits in Yun'nan 雲南. Going beyond lead, Jin argues that the central Chinese dynasty might also exploited the tin resource from Yunan, possibly not by direct control but through indirect trading network in south China.

conquest of the communities living south of the Yangzte, the royal Zhou acquired copper and tin resources and brought them back to its metropolitan center) (Figure 5.44), may imply an exchange system in which different resources, mostly different metals, were circulating from places outside the Central Plains into the dynastic center.[447] The supply network of metal that was drawn into the Central Plains from neighboring areas, both north and south, definitely brought the communities in central China into contact with borderland societies.

As mentioned above, southeastern Inner Mongolia and western Liaoning remain the largest proven reserves of tin resources in northern China[448] and are much closer in distance with major bronze-using societies in the middle Yellow River valley. These metal resources may also have attracted dynastic central Chinese states to establish long-distance networks with the borderland communities.

[447] The vessel Zeng Bo *fu* (*fu* vessel of Lord Zeng) 曾伯簠 is a collected piece identified during the late imperial period and is now at Chinese National Museum in Beijing. On the vessel lid, there are inscriptions reading "克狄淮夷，印燮繁汤，金道锡行 (With the conquest of the communities living south of the Yangzte, the royal Zhou acquired copper and tin resources and brought them back to its metropolitan center)" (Figure 5.44). Guo Moruo 郭沫若 studied this inscription and argued that it may be describing the tributary or trading system between the periphery and the Central Plains, see Guo, M. R. 1999: 186.

[448] Zhang, J. B. et al. 2015: 848; Xia, Q, L. et al. 2018: 60-61.



Figure 5.44 Inscriptions showing “金道錫行” on a bronze *fu* vessel of the Eastern Zhou period (475-221 BCE).
(after http://www.chnmuseum.cn/DesktopModules/Museum_Show_Antique/Image.aspx?TabID=212&Image=YRzmsI55BM6rxssEPUg8bwERDuQKCbWIOw %2bHcxR5K6804BIOnZxc0O0eelnLbsGxeLuDdvrc% 2bv4lihdIlh6NPscD0WpxxIii&Url=%2fIDOprojuzV6 %2foaYwavtMA%3d%3).

As a possible tin metal supplier for the Central Plains, archaeological data in northeast China has confirmed unambiguous central Chinese impact from the late second millennium BC. At Pinggu district of northern Beijing, a mid-Shang (14th-13th century BC) tomb site at Liujiahe 劉家河, has been excavated and the grave assemblage contains a mixture of artifacts, some of central Chinese and others of borderland origin.[449] The material from this tomb suggests that there were considerable communications in northeast China between the Eurasian steppe and Chinese Central Plains. Across China's borderlands were various channels, which might serve as transportation routes for south-north contacts. Thus far, this thesis suggests that the impetus for these long-distance connections stretching between the Lower Xiajiadian area and the Central Plains was very likely to be the Chinese states' huge demand for metal resources, but whether these networks were purely trading relationships or part of some larger and complex political realm is at present impossible to determine.

[449] Beijingshi Wenwu Guanlichu 1977.

5.5 The Band of Northern Settlements: Shared Stone Constructions in China's Frontier

Since the mid-third millennium BC, a large number of stone-constructed Neolithic sites have been found on China's northern frontiers. Below, this thesis describes and analyses settlements of two key sites in the Ordos region: Shimao 石峁 and Bicun 碧村. What is most stressed in this section is the importance of acknowledging a shared stone-construction entity across northern China. The unusual practice of building similar large-scale stone fortifications was clearly shared among northern communities, and these activities, mostly predating Lower Xiajiadian, shed light on the cultural flourish in northeast China.

5.5.1 Huge Increase of Archaeological Sites

The concentration of Late Neolithic sites in the Loess Plateau is as astonishing as the Lower Xiajiadian culture in northeast China. More than 2,200 Longshan periods (2600-1900 BC) sites have been found in Shaanxi province, with a great spatial contrast between the north (Ordos region) and the south.[450] There are more than 1400 Longshan sites reported from northern Shaanxi, while only 44 locations have been found in the southern part of the province.[451] A cross-country archaeological survey confirmed that among the 820 Neolithic sites found in Yulin area 榆林地區 (northern Shaanxi), 125 belong to the Yangshao culture and 695 to the Longshan culture period.[452] That is to say, compared with the Yangshao and Miaodigou II periods (ca.4200- 2600 BC), the distribution of archaeological sites during the Longshan era displayed a tremendous north-ward expansion into the highlands.

[450] Zhongguo Wenwuju 1998: 100.
[451] Zhongguo Wenwuju 1998: 100.
[452] Zhongguo Wenwuju 1998: 100-1.

As with the extension of the Longshan culture area, there was also the expansion of stone-constructed settlements moving from north to south. Since the early third millennium BC, southern central Inner Mongolia was a region where stone-walled settlements were distributed.[453] During the subsequent Longshan period, stone sites began to appear in northern Shaanxi and it seems that this area was drawn into an ever-growing northern sphere of activity, featuring the construction of large stone-walled settlements.[454]

Plotted in Figure 5.45 is the distribution of 48 identified stone-built sites along the middle Yellow River. The earliest ones have been dated based on pottery typology from Miaodigou Phase II (2900-2600 BC), but most of them belong to the Longshan period (2600-2000 BC).[455] As far as archaeologists know, the majority of these stone settlements are less than 50 ha, except for Houchengzui 後城咀 in south Inner Mongolia (138 ha), Baiyagou 白崖溝 in Shanxi province (120 ha) and Shimao (400 ha).[456] According to Sun Zhouyong, there was a complex settlement system in the Loess Plateau, with Shimao, the largest site of over 400 ha, being at the center (Figure 5.45: 26).[457]

[453] Dai, X. M. 2016: 61-4.
[454] Tian, G. J. and Han, J. Y. 2003: 227-59.
[455] Wang, X. Y and Zhang, G. H. 2016: 85-6.
[456] Wang, X. Y and Zhang, G. H. 2016: 85.
[457] Sun, Z. Y. 2016: 70-1.



Figure 5.45 The 48 identified stone-built sites in the Ordos Region (after Figure 9 of Wang, X. Y and Zhang, G. H. 2016).

As in northeast China, the huge increase in site numbers from Yangshao to Longshan in the Loess Plateau indicates significant population growth and this may also be attributable to an incoming population from other regions. At the Huoshiliang 火石梁 site (ca. 2150–1900 BCE) of northern Shaanxi, domesticated animals (81% of NISP) are mainly sheep/goats (59.22%), followed by pigs (12.62%) and cattle (8.74%), making this site one of the earliest locations across northern China that shows clear signs of herding animals.[458] A similar pattern has also been revealed from Shimao, where the number of cattle, sheep, and goats accounts for 52.4% of the total faunal profile.[459]

Featuring a higher percentage of herd animals than that of the Lower Xiajiadian sites (which was less than 40%), the sheep, goats, and cattle in the Ordos region are believed to have been introduced from the Eurasian steppe at an earlier date than northeast China. Since the end of the third millennium BC, sheep, goats, and cattle have appeared widely in northern China and this allows many scholars to argue that these herd animals came via different routes from the Eurasian steppe area into the crescent-shaped area with their herders.[460]

5.5.2 Shimao, Bicun and Their Stone Constructions

Located on the northern edge of the Loess Plateau and bordering the Mu Us desert to the north, the site of Shimao 石峁, featuring large stone fortifications (Figure 5.46), jades and early metal artifacts have been under excavation since 2011.[461] Several pits containing human skulls excavated under the main structure of the east gate have produced radiocarbon dates between 2300-1800 BC.[462]

[458] Hu, S. M. et al. 2008: 232-48.
[459] Hu, S. M. et al. 2016: 119.
[460] Liu, L. and Chen, X. C. 2012: 105-8; Zhang, C. 2017b: 96-7.
[461] Shaanxisheng Kaogu Yanjiuyuan 2013: 15-27.
[462] Shao, J. 2016: 102.



Figure 5.46 Remains of the stone walls at Shimao (photo by author).

In stark contrast to the rammed-earth technique incorporated in contemporaneous sites of the Central Plains, most enclosures and architecture at Shimao were built of stone. Excavations on site have revealed an area of over 400 ha, comprising two walled areas (Figure 5.47) and a stone-lined rammed earth terrace, the *Huangcheng Tai* 皇城檯 (Figure 5.48) at the center of the inner enclosure. In the form of a stepped pyramid, the *Huangcheng Tai* terrace was constructed out of a loess hill,

which was modified into 11 platforms of decreasing size built atop one another (Figure 5.49).[463] Lined with a stone buttress and reinforced by large timber beams (more than 2 meters long) between stone blocks, *Huangcheng Tai* is more than 70 meters high and has a base of 24 ha.[464] Considering the size and prominent location within the Shimao inner wall, archaeologists argued that *Huangcheng Tai* was a place where important ritual and political gatherings were held.[465]



Figure 5.47 Map showing the landscape and location of the Shimao's enclosures and the Huangchengtai terrace (after Figure 3 of Sun, Z. Y. et al. 2018.).

[463] Shaanxisheng Kaogu Yanjiuyuan 2017: 52-4.
[464] Shaanxisheng Kaogu Yanjiuyuan 2017: 46; Shaanxi Sheng Kaogu Yanjiuyuan 2013: 16.
[465] Jaang, L. et al. 2018: 1010.

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Figure 5.48 Sideview of the Huangchengtai location
(after Figure 7 of Shaanxisheng Kaogu Yanjiuyuan 2017).

Figure Redacted in Digital Publication of the Oxford Research Archive for Copyright Reasons

Figure 5.49 The detail of the stone-lined platforms at the Huangchengtai terrace (after Figure 15 of Shaanxisheng Kaogu Yanjiuyuan 2017).

Adjacent to the *Huangcheng Tai* terrace-shaped complex were houses, burials, pottery kilns, and pits used for storage and disposal of domestic debris.[466] Compared with the *Huangcheng Tai*, these structures were much more modest, in terms of size and construction techniques, suggesting that the Shimao settlement also functioned as a place for residential purposes. The houses were in the form of either cave dwellings or subterranean/semi-subterranean dwellings.[467]

Debris of bone working, and bronze casting have been identified amongst refuse near the terrace, including stone molds for a ring-pommel knife, bronze arrowheads, and awls. As they are scattered outside the main *Huangcheng Tai* mound in the refuse deposition, the date of these objects might not be as reliable as the excavator claimed, before 1800 BC.[468] But they are of an unmistakable early form of metalwork that usually appears on China's northern borderlands, which surely places Shimao as one of the early metal-production sites before the rise of Erlitou in the 18th century.

Another relatively fully excavated location at Shimao is the East Gate of the outer enclosure (Figure 5.50). Covering a total area of 2500 square meters, the gate is characterized by an inner and an outer barbican.[469] Built with rammed earthen cores and stone outer linings, two large bastions were situated on the north and south sides of the East Gate, each covering an area of 224 and 187 square meters.[470] Enclosed by a 21-meter-long stone curtain wall, an L-shaped passageway of more than 50 meters in length prohibited any direct entry into the East Gate (Figure 5.50).[471] Reflecting a high concern for defense, this is a heavily fortified baffled gate that is exceptionally well-designed and constructed. Extra protection for the gate has been achieved by the construction of additional stone bastions along the outer

[466] Shaanxisheng Kaogu Yanjiuyuan 2017: Figure 1.
[467] Shaanxisheng Kaogu Yanjiuyuan 2016: 15-7.
[468] Shaanxisheng Kaogu Yanjiuyuan 2017: 55.
[469] Shaanxisheng Kaogu Yanjiuyuan 2013: 18-21; Sun, Z. Y. and Shao, J. 2016: 50-1.
[470] Shaanxisheng Kaogu Yanjiuyuan 2013: 20-1; Guo, Q. H. et al. 2016: 89-91.
[471] Sun, Z. Y. and Shao, J. 2016: 52-3.

enclosure, located approximately 30-40 meters from each other (Figure 5.50).[472] In the East Gate area, two pits, K1 and K2, each containing 24 human skulls (mostly female skulls) have been found (Figure 5.51). Both are situated beneath the base layer of the East Gate.[473] Another four pits buried with decapitated human heads have also been found under the foundation of the northern enclosure at Shimao. Analysis shows clear traces of violence on these skulls and they may be remains of war victims being used by the Shimao community for ritual activities before the construction of the bastions and stone walls.[474]



Figure 5.50 East Gate of the Shimao site (after Page 77 of and Shenmuxian Shimao Yizhi Guanlichu 2016 and Figure 5 of Sun, Z. Y. et al. 2017).

[472] Sun, Z. Y. et al. 2018: 37.
[473] Shaanxi Sheng Kaogu Yanjiuyuan 2013: 21-2.
[474] Chen, L. et al., 2016: 134-42.

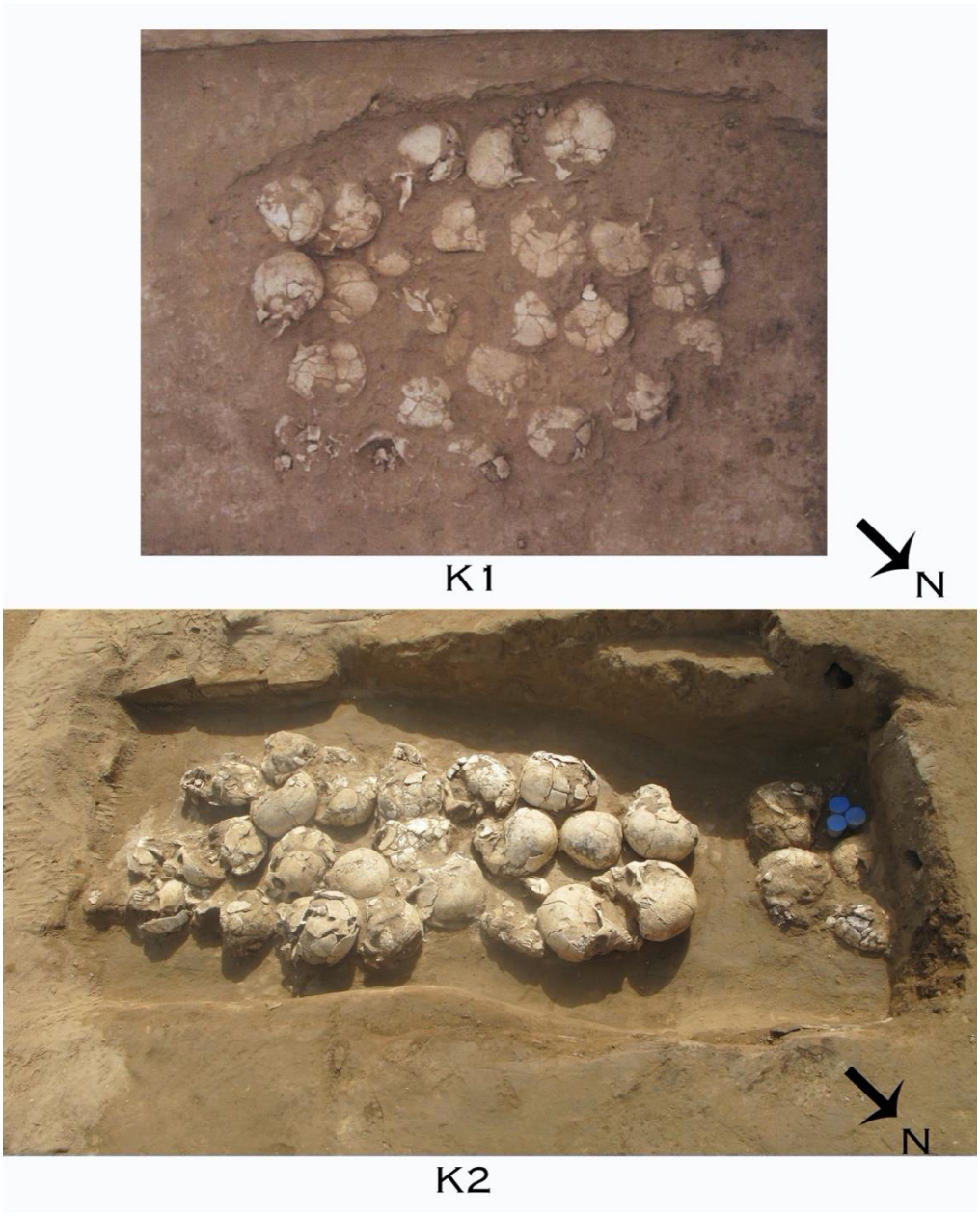


Figure 5.51 Two skull pits in the foundations of the East Gate at Shimao (photo by author).

In the Khakass-Minusinsk depression north of Altai, the construction of stone fortifications intensified in the late third millennium BC, indicating increased competition for resources, pastures, people, and trade.[475] It is also from the mid-third millennium BC that networks of stone fortresses first flourished along the northern edge of China's loess highlands. Featuring extensive stone-built settlements, archaeological remains of the Laohushan culture are distributed from the Ordos to Daihai region, constituting the southern counterparts to the stone fortifications from Tuva to the Cis-Baikal region north of Altai.[476] In this narrative, the construction of Shimao's stone-walled enclosures and platforms appeared to have incorporated architectural traditions from south Siberia and may also directly benefit from its predecessors north of the loess highlands.

Visually impressive, Shimao fortifications also exhibit many sophisticated and well-designed features that show both similarities and differences with the Lower Xiajiadian stone settlements. Firstly, the stone blocks exploited in Shimao were believed to be quarried from locally available sandstones and had been carefully selected and polished to produce a good consistency.[477] Especially, the stones used for building the Huangchangtai terrace and the East Gate were carefully shaped, forming a very neat and well-structured surface (Figure 5.52A, B). By comparison, the stone walls and external towers of Lower Xiajiadian settlements were constructed with unshaped natural stones, thus producing quite uneven surfaces. In the Chifeng area, the lack of surface finishing at large stone-walled sites, such as Sanzuodian 三座店, Shangjifangyingzi 上機房營子 and Kangjiatun 康家屯 could considerably limit the investment of labor.

[475] Gotlib and Podol'skii 2008.
[476] Neimenggu Wenwu Kaogu Yanjiusuo 2000b and Han, J. Y. 2007: 20-6.
[477] Guo, Q. H. et al. 2016: 89.



Figure 5.52 Surviving stone walls at the Huangchengtai terrace (A) (after Figure 4.1 of Sun, Z. Y. et al. 2017) and the East Gate (B) (photo by author) of Shimao.

Secondly, at both Shimao and Lower Xiajiadian settlements, semi-circular stone-built external bastions (*mamian* 馬面 towers) were incorporated into the fortification system. These outward-facing towers could hold several defenders and their weapons to inflict flanking fire on the attackers.[478] However, the stone walls and bastions of Shimao were significantly larger, both in length and volume, than the ones of the Lower Xiajiadian culture. The total length of the walls at Shimao (both the inner and outer enclosures) measures about 10 kilometers, while Kangjiatun 康家屯, the largest so-far-known Lower Xiajiadian settlement, has an enclosure wall of fewer than 400 meters.[479] Chronologically later than the Shimao external towers, the bastions found at the Lower Xiajiadian stone settlements are much smaller but show the same construction methods as those of Shimao: rammed-earth cores and stone linings. As has been mentioned in Chapter Three, the average size of Sanzuodian and Kangjiatun bastions is 5 meters by 5 meters with regularly spaced intervals of no more than 7 meters, while those at Shimao can reach 12 meters by 11 meters with much longer intervals of 30 to 40, or even 50 meters.[480]

Thirdly, in thinking about the scale of the Shimao enclosure and the possible ritual function of the *Huangcheng Tai* terrace and skull pits, it is likely that it was a primary center within its long period of occupation. Although there have been houses and storage facilities reported near the *Huangcheng Tai* terrace, further archaeological work is needed at Shimao to confirm the inner structure and function of the site. As for the Lower Xiajiadian sites, we have seen in Chapter Two that there were functional variations between different sized settlements, but on the whole, the stone fortified Lower Xiajiadian sites were more used as residential space and were less ritually significant, nor did they reflect such strong internal hierarchical stratification as Shimao.

[478] Keeley, L. H. et al. 2007: 67-70.
[479] Li, W. Y. 2015: 41.
[480] Sun, Z. Y. et al. 2018: 37.

Only 50 kilometers east of Shimao, the Bicun 碧村 site of Xing county 興縣 in west Shanxi province (Figure 5.45: 41), is a contemporary Late Neolithic site with potentially massive stone structures. Located on the east side of the Yellow River bend, four stone houses with stone enclosures have been found at Bicun (Figure 5.53).[481] These findings were only the results from a test excavation on the top of two hills, where clear stone remains have been identified. On the eastern corner of the stone wall, archaeologists recognized a square stone terrace, measuring 4.3m by 4.8m and 1m in height, which was constructed with a rammed earth core and then packed with stone slabs along the outsides surface.[482]

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Figure 5.53 Plan of the stone houses and walls at Bicun
(after Figure 20 of Shanxisheng Kaogu Yanjiusuo 2016).

A recent publication of the latest excavation season reports five terraced stone houses found on the Xiaoyuliang 小玉梁臺地 mound at Bicun.[483] Covering an area of 400 square meters, houses F1, F2, F3, and a small part of F4 were built on the ground level in a neat row (Figure 5.54).[484] Stratigraphic evidence suggests the

[481] Shanxisheng Kaogu Yanjiusuo 2016, 2017.
[482] Shanxisheng Kaogu Yanjiusuo 2016: 28.
[483] Shanxi Sheng Kaogu Yanjiusuo 2017
[484] Shanxi Sheng Kaogu Yanjiusuo 2017: 5.

middle house F2 was the earliest building. Then the walls of houses F1 and F3 were erected before the construction of F4 and F5.[485] Although with square shapes, the arrangement and layout of these five houses at Bicun resemble those found in Lower Xiajiadian settlements: an identical style of lime-plaster pavement has been reported from all five Bicun houses; remains of extra walls were erected outside houses F5 and F3, constituting a shared doorway for the residents, reminding us of the "house complex" structure usually seen at Lower Xiajiadian sites. A similar idea of building residential house units with stone lining and lime pavement could yield interesting information about the connection between northeast China and the Ordos region.



Figure 5.54 Plan of the four stone houses found at Xiaoyuliang mound at Bicun (after Figure 2 and Color Plate 1 of Shanxisheng Kaogu yanjiusuo 2017).

[485] Shanxi Sheng Kaogu Yanjiusuo 2017: 15-6.

As with Shimao and Lower Xiajiadian, lengthy walled structures have also been identified at Bicun, which extends to places at least one kilometer away from the stone houses (Figure 5.55). In a location called Chengqiang Geduo 城墻圪垛, archaeologists found a series of stone walls as wide as three meters.[486] This should be viewed as part of a large-scale and complicated stone wall complex, as there are evident remains of repairs and expansion, such as sidewalls, built at several vulnerable spots to reinforce the main structure.[487]



Figure 5.55 Remains of the stone walls at Bicun
(adapted after Figure 20 of Shanxisheng Kaogu Yanjiusuo 2016).

[486] Shanxi Sheng Kaogu Yanjiusuo 2016: 29.
[487] Shanxi Sheng Kaogu Yanjiusuo 2016: 29.

When looking at Shimao and Bicun as a whole, their shared practice of using stone constructions indicates close associations between the two communities, or perhaps they were constructed by people with kin relationships. From a pottery perspective, both Shimao and Bicun belonged to an Ordos Neolithic ceramic entity, in which specific types of tripods and high-collared jars were shared among ancient communities throughout northern Shaanxi and western Shanxi (Figure 5.56).[488] Tripods *jia* 斝 and *li* 鬲 with large, inflated legs are the major cooking vessels in Shimao and Bicun (Figure 5.5: 1-7 and 5.9: 1-11). Suitable for boiling crops, the special configuration of these *li* tripods is thought to have originated in this northern highland region during the Longshan period.[489]

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Figure 5.56 Late Neolithic pottery assemblage in western Shanxi and northern Shaanxi (after Figure 23 of Shanxisheng Kaogu Yanjiusuo 2016, Figure 7 of Shao, J. 2016 and Figure 8 of Sun, Z. Y. 2016).

To summarize, the close proximity both in chronology and construction, between Shimao, Bicun, and Lower Xiajiadian clearly present us with a shared stone construction entity across northern China. Featuring large-scale stone fortifications,

[488] Shanxi Sheng Kaogu Yanjiusuo 2016: 29-31 and Yan, H. D. 2010: 3-5.
[489] Li, M. 2018: 116.

these massive northern sites and large population aggregations have significantly changed our perspectives on the social developments that took place north of the Central Plains before the rise of Erlitou 二裡頭 (1750-1530 BC) and subsequent Shang 商 dynasty (1500-1045 BC).[490] The ability to gather and manage labor on such a large scale indicates that these northern communities had high-level social organizations that were not at all inferior to the Central Plain cultures.

5.6 Chapter Summary

The first section of the current chapter traces the development and increasing distribution of typical Miaodigou II (ca.2900-2600 BC)-Longshan (2600-1900 BC) tripods across northern China, suggesting that the cultural assemblage originated from the middle and northern Yellow River region was pushed into northeast China at the beginning of the second millennium BC.

Hydrological data from the North China Plains and archaeological records of the late third millennium BC flood events in the Hougang II area are drawn together and linked with the resettlement of flood-driven population into northeast China. In the light of this evidence, this chapter argues that southern communities from the Henan and Hebei region contributed to the increase of sites and populations in the Lower Xiajiadian period and, in some way, triggered the reconstruction of local pottery inventory. With the reference to recent mitochondrial DNA analyses, this

[490] A crucial issue that has not been paid proper attention to previously is how and why large-scale stone fortifications were built along the crescent-shaped area north of large Chinese urban centers. Both dated to the early to mid-half of the second millennium BCE, early Bronze Age settlements Taosi 陶寺 (280 ha) and Erlitou 二裡頭 (300 ha) were in areas just adjacent to Shimao and Bicun in the south. They are both much better studied than the northern sites, for the discovery of the earliest known bronze cast vessels and palace-like architecture in central China. However, the geographic location of these massive stone fortified sites just outskirts Chinese Central Plains raise the importance to think about what role did these northern groups play in the cultural transition from Neolithic to Bronze Age in China.

chapter combines both the ancient genetic and archaeological data, suggesting that the lower Xiajiadian population included immigrants from the Yellow River valley.

By examining the 24 Erlitou-style pouring/drinking vessels excavated at Dadianzi and the bronze assemblage of the Lower Xiajiadian culture, this thesis argues that the idea of liquid consumption and the technology of making bronzes were clearly introduced into northeast China from two directions: the Central Plains and the Eurasian steppe. Such a material cultural complex seems to indicate that the Lower Xiajiadian people were participating in cross-regional contacts with different cultural groups.

We also see that during this period, along China's borderlands, there was an extensive northern network, which employed extensive energy in constructing large-scale stone settlements. Although it is not clear at this stage whether there was a strong east-west communication system between the Ordos region and the Lower Xiajiadian area, this thesis emphasizes the value to look at the area north of the Chinese Central Plains and examine how these borderland activities of Late Neolithic and early Bronze Age worked and influenced the agricultural polities in the south.

Chapter Six: Discussion

In this thesis, I review the material remains of a Late Neolithic-Early Bronze Age archaeological culture in northeast China—the Lower Xiajiadian (ca. 2000-1300 BC), and present new conclusions based on these archaeological data, considering especially the cultural links with other regions.

A fundamental background to the discussion is a recent assessment by some scholars of the long-known details of the collapse of Neolithic societies in the late third millennium BC across China.[489] This huge calamity led to dramatic shifts in cultural development from the south (the Yangtze River Basin) and the east (especially Shandong peninsula) to the northern borderland.[490] Numerical evidence shows that population and settlements increased dramatically along all parts of the crescent-shaped borderland.[491] This movement is fundamental to our appreciation of the population increase and prosperity of archaeological groups in the northern highlands. Therefore, the Lower Xiajiadian culture of northeast China is placed within an important complex of northern activities that included the Ordos region (Shimao site complex) and northwest China (Qijia).

Chapter Three to Five each addresses a distinctive aspect of the Lower Xiajiadian material remains and discusses from different angles how northeast China was related to other cultures and regions.

The principal argument is that the major impetus of Lower Xiajiadian's prosperity in the second millennium BC can be attributed to the Longshan legacy in the middle Yellow River area. At the same time, people in northeast China also incorporated

[489] Wagner, M. et al. 2013: 344-57; Zhang, C. 2017a: 50-9.
[490] Dai, X. M. 2013: 539-81; Dai, X. M. 2016: 60-9; Zhang, C. 2017a: 50-9; Zhang, C. et al. 2019: 588-603.
[491] CICARP 2011. Zhongguo Wenwuju 1991, 1998, 1999, 2003 and 2006.

new technologies/traditions from northern and western areas into their local cultural system. With benefits from contacts with a variety of regions, what we see from the Lower Xiajiadian records is a society that was deeply engaged with its southern predecessor—Longshan, as well as in contact with cultural entities in the north and west.

Based on the detailed discussions presented in each chapter, the main threads of the thesis are brought here together:

I. New Features in Residential Structures

Lower Xiajiadian material remains have been found in a wide geographical distribution from the western part of Liaoning to southeastern Inner Mongolia. The settlement sites especially, preserve evidence of the lifeways of the Lower Xiajiadian people. The large body of settlement data exhibited several features that were unlike any archaeological cultures previously known:

1. The Lower Xiajiadian settlement sites were built with integrated internal plans, but are found within distinctive landscapes, built with different construction methods, and dated to different chronological periods.

Chapter Three has classified the Lower Xiajiadian settlements into three categories based on their locations and construction materials: Type A low-platform sites built with mudbricks and rammed earth, Type B stone-constructed high hillforts, and Type C stone-built hill-slope sites. Type A sites built on low-platforms were dispersed in the eastern side of the Lower Xiajiadian cultural area, while the Type B and Type C stone-constructed settlements showed a very high concentration in southeastern Inner Mongolia.

The division into three architectural groups has been shown to have both chronological and environmental parameters. Radiocarbon dates and archaeological stratigraphy have confirmed that Type A sites in western Liaoning were the earliest sites being constructed and occupied, followed by stone settlements in southeastern Inner Mongolia. Till around 1600 BC, settlements in western Liaoning were still in use (probably until late 16th century BC), but people started to move gradually into southeastern Inner Mongolia. That was the reason why radiocarbon dates overlapped greatly between sites in western Liaoning (eg. Dashanqian) and Chifeng (Location 342) from ca. 1600 to 1400 BC. The evidence of stone being used as repair or reinforcement material in several Type A settlements may take place contemporaneously with the later stone episode seen in the Chifeng region. However, without further radiocarbon dates on materials from both late Type A and early Type B locations, we are difficult to say how long the period is between large-scale stone fortifications in Chifeng and the early stone layers of Erdaojingzi. Undisputedly, it was after 1500 BC that stone gained ultimate importance in the Lower Xiajiadian culture and large-scale stone-fortified sites, best represented by Sanzuodian and Kangjiatun, were built and used until around 1300 BC.

Although constructed with different materials and techniques, the inner structures of the residential facility remained largely the same throughout the whole Lower Xiajiadian cultural period: most houses were built in a circular shape and usually equipped with a hearth; outside the main house were storage pits and associated side-houses, which were all enclosed by a wall, forming a courtyard-like residential unit. In some centrally located sites, courtyard structures are significantly larger and more complex. Several courtyards located within close range formed residential zones and they were further enclosed by a wall (and/ or ditch) for protection. As the most recognizable functional quarter, divided courtyards were thought to be used by people with clan relationships and were separated from each other by roads and drainage systems.

The internal residential structure seen in the earliest Lower Xiajiadian settlements such as Shuiquan and Fengxia (ca. 1900-1800 BC) had been kept and brought into Inner Mongolia as people moved and settled in new locations. This great consistency in suburban construction over seven hundred years shows that the residential pattern of the later phase of the Lower Xiajiadian community was not dramatically different from that of the early periods, suggesting significant aspects of the society: there were strong technological styles across northeast China during the Lower Xiajiadian period. The way dwelling sites were planned, constructed, and used seems to be highly predetermined and was part of the acquired community culture (probably through social communication).[492]

2. By comparing data between Type A and Type B settlements, it is also noted that the different construction materials and methods employed in Lower Xiajiadian residential structures were signaling contacts with other cultures.

In the construction of Type A sites, mudbricks and lime-plastered floors were two new techniques extensively exploited for both semi-subterranean pit dwellings and ground-level houses. Before the Lower Xiajiadian period, subterranean pits were the only house type in northeast China, when people used the natural sides of the pit as interior walls and floor area. Therefore, it would be almost impossible to see these new construction technologies as representing any of the local traditions. Their sudden appearance in the Lower Xiajiadian records surely indicated that they were introduced from elsewhere outside northeast China. Considering that lime-plastering has been a long-established Longshan culture practice in the Central Plains and Shandong peninsula, I regard it was brought into northeast China by a population that previously resided in the Yellow River region.

[492] Lemmonier, P. 1992: 105-15. Mauss, M. 2006: 97-140.

Compared with lime-plastering, mudbrick technology showed less of a cultural impact associated with the Central Plains, though mudbricks of an early date have been reported in the Central Plains.[493] The introduction and use of mudbricks may also be taken as a western contribution from the Eurasian continent, and its presence in northeast China indicates two possibilities: a) it was first introduced from the western end of crescent-shaped territory and taken into the center, appearing in early 3rd millennium BC Central Plain houses and Longshan period dwellings at Hougang, before it was introduced into northeast China around 2000 BC; b) the mudbricks seen in the Lower Xiajiadian records resulted from long-distance northern contacts with Central Asia, and in this case, the ones appeared in Chinese Central Plains could either be locally invented or reinvented in the Longshan context by stimulation from the west.

The extensive use of stones in Type B settlements for constructing walled enclosures appears to have incorporated architectural traditions from the loess region and south Siberia. Stones were used in northeast China during the Hongshan culture period (ca. 4500-3000 BC) exclusively for elites' burials and ceremonial constructions, but never for ordinary residential buildings. Stone continued to be used solely for burials in the period from 3000 to 2000 BC in the Xiaoheyan period. In this sense, the way in which stone was used in the Lower Xiajiadian context seemed

[493] A newly published site Xichengyi 西城驛 in Gansu province, northwest China, has reported to yield mudbrick housing remains in phase II. The layer in which mudbrick houses were found was dated and calibrated to ca. 1880-1680 BC (Gansu sheng Wenwu Kaogu Yanjiusuo 2014: 3-17; Chen, G. K. et al.2015: 66-84; Zhang, X. L. et al. 2015: 38-45.). By far, Xichengyi is the earliest known location of mudbricks in northwest China. Considering the date and form of constructions, we cannot affirm that these mudbricks predate the ones found in Lower Xiajiadian area and they are definitely later than the mudbrick remains of Yangshao period (ca. 4200-2900 BC)(discussed in Chapter Three). The presence of Xichengyi mudbricks points to an interesting possibility that communities along the crescent-shaped territory were all, in one way or another, receiving Western Asian contribution. Even though, it is almost impossible to argue that the introduction of mudbrick techniques in Xichengyi or Lower Xiajiadian was a direct input from the area of origin. Instead, more archaeological data and concrete radiocarbon dates are needed to suggest a close communication route (routes) between people in China's northern borders and population in the eastern steppe and Central Asia.

to be a completely new practice, though people might have robbed stones from Hongshan and Xiaoheyan remains to build Lower Xiajiadian settlements. And this certainly has continued into the Upper Xiaojiadian period when stones were taken to build tombs (Chapter Three) post-1000 BC. One could argue that employing stone as a major constructive material was independently invented after 1500 BC in northeast China. However, this seems quite unlikely given the whole entity of large-scale stone settlements in the loess highlands since 2500 BC, which reached their apogee in the 400-hectare Shimao site (ca. 2000 BC). Another way to view this phenomenon would be to see the stone constructions found in northeast China and those in the Ordos region as a network of stone settlements that flourished along the northern edge of the crescent-shaped area, which constituted the southern counterparts to the stone fortresses from the region north of Altai.

3. Site Size and Functions

Lack of thick cultural layers and artificial defensive structures commonly seen in Type A and Type B sites, Type C settlements are located further from the river valleys and have a rather high topographic relief. They are small (500-1000 square meters) and identified with sparse occupational debris: normally are a few potsherds inside the houses, indicating that these hill-slide sites were much less populated compared with Type A and Type B settlements. All these features did not seem to fit Type C sites into the category of a common long-term residential location and they probably had functions that differed from other large settlements.

Diverging from Shelach's site size/hierarchy-oriented argument, I suggest that the different sizes, spatial distributions, and archaeological deposits of variously sized Lower Xiajiadian settlements reflect a functional variation, rather than a pure hierarchical stratification. This interpretation receives considerable support from Lewis Binford's notion of the "Logistical Subsistence-Settlement" system, which describes a situation that special task groups leave a large central residential location

and establish a field camp or a station where food-procurement operations took place. In addition, the land-use strategy of the Bronze Age tell-based settlement system in Upper Mesopotamia is referenced in this thesis as a more related model to the Lower Xiajiadian settlement pattern. The case of Tell al-Hawa and multiple other similarly structured Bronze Age sites show that small locations capable of agricultural production provided the basic food supplies for the large central site but did not constitute a socially administrative affiliation.

In the Lower Xiajiadian settlement system, Type A and Type B sites are large central and highly visible locations with rich residential deposits for long occupation; Type C small sites are less fortified but situated on hill slopes along small tributaries and arable agricultural lands. The existence of large numbers of Type C settlements in the Chifeng region suggests the overriding importance of hill-slope sites' advantage in agricultural production and their function as food suppliers. On top of this, most Type C sites are relatively difficult to access, indicating that they may also be used to provide protection to people during conflicts.

II. A Burial System Exhibited Strong Local Features and Placed High Values to Foreign Items

As the only thoroughly excavated and reported burial site of the Lower Xiajiadian culture, Dadianzi burial ground is dated to the mid-second millennium BC and provides important information on the mortuary treatment of northeast China:

1. Social differences can be detected from various aspects of the burials at Dadianzi: how tombs were built and furnished, the type/quantity of grave goods, and their deposition all provide important information about the organization of the Lower Xiajiadian society.

Simple-pit graves constitute most of the burial type across Dadianzi, and the others were either furnished with wooden chambers or mudbrick linings. The volume of burial shafts varied dramatically among the graves and therefore is viewed as a major indicator of vertical social hierarchy in the Lower Xiajiadian community. Through the distribution of tomb sizes for different tomb furnishings, we see strong correlations between the degree of labor expenditure in grave construction and grave volume: wooden chamber tombs were more than three times larger than the other two burial types. Ceramics deposited in the foot niches at Dadianzi ranged in number from 1 to 12 vessels per grave and reflect a hierarchical pattern very similar to that of the grave sizes. Further reference with the volume of tombs indicates that 5 ceramics per grave remains a good social division across the cemetery. I, therefore, argue that the ubiquity of pottery vessels at Dadianzi shows that ritual activities concerning food consumption and ritual offerings were a universal practice in the Lower Xiajiadian culture, and the scale of such activity varied and reflected a person's vertical social position in the society.

2. In the Dadianzi burial assemblage, the local set of ceramic *guan*-tripod and painted pottery is characteristic of the Lower Xiajiadian culture, but both matter in a quantitative sense.

Firstly, the composition of a ceramic *guan* jar with an upturned tripod forms standardized pottery set across the Dadianzi cemetery, which is never found in other areas of China: 365 out of 470 Dadianzi tombs equipped with a foot niche were buried with more than one *guan*-tripod set. Thirty-six tombs were found with two or more sets, accounting for 9% of the total graves that yielded such pottery sets. Multiple sets of ceramic food containers were found in the foot niches of tombs with larger chambers while fewer *guan*-tripod sets were commonly deposited in smaller tombs. This suggests that using a set was an important part of Lower Xiajiadian food consumption and was widely shared by different social classes for mortuary rituals.

Secondly, burying painted ceramics in foot niches is another local characteristic of the Lower Xiajiadian culture, but Chapter Four suggests that the presence of painted ceramic pots alone cannot fully indicate a person's position in the hierarchical sequences. Instead, the quantity of the painted ceramics is a more significant factor in determining the social status of the deceased at Dadianzi. This argument is based on calculations of shaft sizes of the tombs with different numbers of painted ceramics. Histogram of painted ceramics and tomb sizes shows that one to five painted pots did not exhibit great variations in shaft sizes. In contrast, tombs with six or more pieces of painted ceramics have a much larger tomb chamber than those with fewer painted vessels.

3. In contrast to the local *guan*-tripod pottery set and painted ceramics, the distribution of six other types of grave goods—Erlitou tripod vessel, metal, jade/stone artifact, turquoise, cowrie/copy, lacquer—across the Dadianzi cemetery reflected a complex system in which foreign objects were more highly valued in the Lower Xiajiadian material culture:

In order to single out the largest and the most valued grave goods across the Dadianzi burial ground, I have listed out the tombs with a shaft larger than the upper whisker (5.8275 m^3) at Dadianzi. Comparisons are then made on the percentage of presence of grave attributes between the 53 graves larger than 5.8275 m^3 and the rest 692 tombs of the Dadianzi cemetery. Results show that the presence of Erlitou-style ceramics and lacquer remains were remarkably higher in the 53 large graves: the chance of having an Erlitou vessel is even 69 times higher. Erlitou tripods and lacquer wares were much more likely to be associated with high-class individuals. In comparison, turquoise and cowries (including copies) were relatively more common than Erlitou ceramics or lacquer artifacts in smaller graves, though they were also five and eight times more likely to be found in tombs larger than 5.8275 m^3. For the painted pottery, one out of four tombs in the smaller group were buried with at least

one such vessel. However, the proportion in the larger tombs of having painted ceramics can reach as high as 94.3%, and we also notice that 92.3% of the tombs having more than five pieces of painted pots were larger than 5.8275 m^3. It is further suggestive when we look at the distribution pattern of turquoise and jade/stone artifacts. The distribution of turquoise items shows a higher correlation with large graves than the other decorative beads or stone ornaments. Contrastingly, stone/jade decorations were more likely to be found in smaller graves, and this may be because the raw materials used for producing such stone and jade ornaments were largely local. However, metal artifacts are surprisingly found to be the least associated with large graves in the Dadianzi cemetery. The overall suggestion from these calculations and comparison is that the larger a tomb shaft is, the more likely the tomb occupant had foreign-originated objects at Dadianzi.

Erlitou-style tripods, lacquers, cowries, and turquoise were surely imported material from other regions (maybe procured at high cost through long-distance trade networks or cross-region social/political connections). The concentration of these artifacts in large graves at Dadianzi suggests that the object of foreign origin were most valued and prominently integrated into elites' tombs. Their non-local background was clearly treasured in the Lower Xiajiadian society and made them valuable artifacts that can generate social prestige.

Taken as a whole, all the above observations on the Dadianzi burial ground suggest that vertical social stratification has already emerged within the community. The account of the grave sizes and types of tomb furnishings demonstrates a value system that was consistent with the possession of foreign objects (non-local ceramics, cowries, turquoises, and lacquerwares), while other forms of material manifestations were more quantitatively significant and locally defined (painted ceramics, stone/jade objects).

III. Material Culture and Cross-Regional Links

The Lower Xiajiadian people were in contact with their neighbors as well as with more remote cultures. Five sets of archaeological data have been discussed and framed to show that borrowed customs/material culture were core aspects of the Lower Xiajiadian community.

In the first place, the increasing distribution of typical Miaodigou II (ca. 2900-2600 BC)-Longshan (ca. 2600-1900 BC) tripods and their incorporation in northeast China from 2000 BC have revealed an early and fundamental aspect of the Lower Xiajiadian-Central Plains connections. I have shown in Chapter Five that from the onset of Lower Xiajiadian culture, ceramic tripod vessels that had long been established in the Yellow River region (the tripod idea started first from Shandong while the lobed-shape cooking vessels came into being under northern influence from Shanxi and Shaanxi regions), such as *li*, *yan,* and *ding* became common vessel shapes in Lower Xiajiadian settlements and burials. Replacing the previous flat-bottom ceramics, these new tripod vessels gained importance in people's daily life and their death rituals among societies in the northern borderlands, including Lower Xiajiadian and Shimao. Complete changes observed in northeast China's ceramics inventory also reveal the introduction of new configurations to produce, use, and treat their cooking vessels. I, therefore, argued that this new socio-technological framework as seen from the Lower Xiajiadian record suggests large, sustained influence from the Yellow River area.

To look for the specific mechanism of how these third-millennium BC tripod vessels were introduced into northeast China, Chapter Five investigates the archaeological remains and hydrological conditions of the North China Plains in the latter half of the third millennium BC. Three main types of ceramic tripods, the *li* 鬲, *yan* 甗, and *ding* 鼎, together with several other vessel shapes, *zun* 尊 basins, *dou* 豆 pedestal and *pan* 盘 plates were new cultural features in the Lower Xiajiadian ceramic

inventory but they all had their deep roots in Longshan communities of Shandong peninsula and North China Plains. From the angle of pottery alone, we see different strands of Longshan culture contributions in Lower Xiajiadian and they surely indicate that the Lower Xiajiadian culture derived from multiple southern origins.

The sustained southern influences from Central China were also reflected from the 24 Erlitou-style ceramic tripod vessels unearthed from the northern section of the Dadianzi cemetery. The shape of these *gui* and *jue* tripods is identical to those found at Erlitou and the idea of liquid consumption was clearly introduced from regions outside northeast China, where drinking was part of the high culture. However, these 24 tripods themselves appeared to be made locally by craftsmen of the Lower Xiajiadian group, because they were fired at a lower temperature than those in the Erlitou site, and their surface decorations showed local characteristics that may have been related to cultures of the Eurasian steppe in the northwest, instead of Central China.

Another stream of evidence for Lower Xiajiadian's southern connection is the frequent changes of the Yellow River hydrological regime in the late third millennium BC. Has never been brought to attention in past research, these hydrological events took place largely within Hebei and parts of northern Henan and had huge impacts on the population movement from North China Plain into the Lower Xiajiadian area. As the Yellow River gradually shifted to the south, the areas south of the previous river courses were exposed to the constant danger of overflow. I have shown several cases of flooding caused huge damage to large walled Longshan settlements by the end of the third millennium BC, at Guchengzhai 古城寨, Wangchenggang 王城崗, Mengzhuang 孟莊, and Xijincheng 西金城 sites. Small Longshan sites in this area could even be wiped out by a sudden flood event. Therefore, I argue that the areas north of the main Yellow River course would be favored for people to dwell and a

hypothetical view is, some communities that originally lived in northern Henan and Hebei may have resettled to northeast China.

Thirdly, the technology of producing and using metal artifacts was not indigenous in northeast China and must have been transmitted into this region from the west. The shape and object type in Lower Xiajiadian assemblage were undeniably different from Central China, whereas I have mentioned, has a strong obsession with cast bronze vessels. This thesis has compared examples of metal earrings excavated from northeast China and the Hexi corridor. These earrings showed tremendous similarities in both appearance and constructions, which suggest that they originated from the same metalworking tradition of the Eurasian steppe.

Another fold of this issue is the metal itself. With the discovery of mining sites like Xiquegou and potentially more from other regional surveys, I tend to think the raw material for metal production was local in northeast China. On top of this, we may also regard the above-mentioned presence of typical Central Chinses elements in this metal-rich eastern periphery as more than coincidental. The abundant resources of copper, tin and lead found in the Lower Xiajiadian area may have attracted Erlitou elites who were searching for precious metal alloys in outlying lands. This proposition hints at the possibility that some of the cross-regional contacts Lower Xiajiadian had were part of an exchange network for this area's metal resources. However, this suggestion needs to be tested by more evidence in the future.

Except for metallurgy, available faunal remains from Lower Xiajiadian locations revealed that herded animals were also part of the north and western influences that contributed to the population increase in northeast China since 2000 BC. The incorporation of herded animals in Lower Xiajiadian is almost certainly resulted from a western origin in the Eurasian steppe zone. Managing the herds required systematic knowledge of the local environment and sustained investment in time

and effort. Most importantly, it expanded the geographical range of Lower Xiajiadian society's activities and facilitated resource procurement and cross-regional connections. However, recognizing that Lower Xiajiadian is the earliest archaeological period that had undeniable evidence of herded animals did not resolve the question of when steppe animals were first introduced into this area. I would assume that this was a long process that started in the late half of the third millennium BC before the onset of Lower Xiajiadian culture and intensified after 2000 BC.

Archaeologists studying large communities of the northern borderlands have all reported the recovery of herded animals in local faunal profiles since 2000 BC. Therefore, I argue that the introduction of sheep and cattle from the Eurasia steppe is a key supporting element for the local livelihood and promotes economic prosperity in the Lower Xiajiadian area. On top of this, horse as another non-local species is also reported from two Lower Xiajiadian cultural sites. Mitochondrial DNA and comparative analysis suggest that these horse remains were not local species but imported from the eastern Eurasian steppe. This is a further strand of evidence indicative of the long-distance connections the Lower Xiajiadian community had with the steppe herders.

The last aspect of interactions I have discussed is the close proximity, in chronology and the form of large-scale stone constructions, between the Ordos region and the Lower Xiajiadian. I regard that these close proximities as part of an extensive northern network from the third to early second millennium BC, which featured employing extensive energy in building massive stone settlements. It is also argued that the Lower Xiajiadian community was actively engaged in east-west connections with other borderland groups, and these cultural linkages have significantly changed our perspectives on the social developments that took place north of the Central

Plains before the rise of Erlitou 二裡頭 (1750-1530 BC) and Shang 商 dynasty (1500-1045 BC).

Throughout the second millennium BC, the Lower Xiajiadian community was entangled in multidirectional contacts with its neighboring societies. I have shown from five different perspectives that the material cultural complex of Lower Xiajiadian was the result of constant participation in cross-regional contacts with cultural groups in the south, north, and west. The convergence of artifacts, technologies, and practices from other cultural spheres contributed to the making of the Lower Xiajiadian in northeast China.

Chapter Seven: Final Remarks

Based on Zhang and Wagner's observations on the population movement and settlement change around 2000 BC, this study analyses the archaeological records of Lower Xiajiadian culture and shows that it benefited hugely from the continental-scale Late Neolithic declines in south and coastal China. With the Chapter Two to Five each investigating a specific aspect of the Lower Xiajiadian culture, I have shown that except for the Central Plains, the peoples of northeast China were also making use of the cultural benefits from a number of areas in the north and west.

Chronologically, the date at which Lower Xiajiadian's distinctive material culture appeared in northeast China was concurrent with the period when major Neolithic societies in the south were being swept away and dramatic population decrease happened in the Yellow and Yangzi Rivers. These often-unrelated continental-scale social events are specially addressed and taken into consideration to examine the rise of the Lower Xiajiadian culture in the second millennium BC.

Throughout the analysis, I have been attending to the differences between local practice in northeast China and innovations introduced from elsewhere. Lower Xiajiadian's cultural distinctiveness reveals many characteristics that were well attributed to the third millennium BC Longshan period (2600-1900 BC). This includes the incorporation of Yellow River area's vessel types (and associated steaming cooking methods), mudbricks constructions and lime-floor techniques. It is also revealed from the mortuary data at Dadianzi that the status manifestations were structured to emphasize a higher value on nonlocal artifacts (Central Chinese ceramics, cowries and turquoise) than the local-type painted pottery and *guan*-tripod ceramics. Overall, during the Lower Xiajiadian culture period, a wide range of

materials, technologies and activities originating outside the area were brought into northeast China and were employed in a local fashion that was different from other contemporary borderland communities.

Assemblage diversity and the adoption of items of nonlocal background are regarded in this thesis as a measure of the contacts between groups of people. Among the hybrid cultural traditions as seen from both settlement and burial contexts, we note that the Lower Xiajiadian people were selective in adopting introduced materials and practices. Erlitou-style pottery, cowrie shells and turquoise artifacts were incorporated to enhance their status within the Lower Xiajiadian society, while other nonlocal items, such as the metal objects, lime-floor plastering and mudbrick techniques were less frequently associated with status manifestation. This reflects the different attitudes which Lower Xiajiadian people had towards specific foreign items within their own cultural framework.

On a regional and temporary scale, for sure, the Lower Xiajiadian community exhibited their special interest in being part of the central Chinese social sphere. Compared to other areas (Qijia in the Gansu corridor and Shimao in the Ordos highland) that prospered along the northern borderland at the turn of third millennium BC, the Lower Xiajiadian community was clearly more willing to incorporate central Chinese cultural elements and also more successful in sustaining long-term social development.[494] We know from the radiocarbon dates that after

[494] Climate change is one of the most likely issues that caused the decline of Lower Xiajiadian culture and the rise of a more mobile Upper Xiajiadian period after 1300 BC. Environmental archaeological studies show that the warm and humid climate might have promoted the early expansion of the Lower Xiajiadian community in northeast China (Kong et al. 1991; Teng, M. Y. 2004; Yang, Z. R. and Suo, X. F. 2000: 81-8.). The local vegetation system before 1500 BC indicates a noticeably higher temperature and annual rainfall than present-day (Wang, S. Z. et al. 2004; Kong, Z. C. et al. 1991; CICARP 2011: 42.), which can be interpreted as favorable for local millet farming. This favorable climate in the early to middle phase of Lower Xiajiadian culture was followed by a noticeable environmental deterioration, in the form of climate instability with periodic drought events after the mid second millennium BC. Quite a number of climatic reconstructions have characterized northeast China as subject to decreasing precipitation after the mid second millennium BC, to a degree

1500 BC, there were still large sites being constructed in northeast China and this area was clearly occupied beyond the end of the Erlitou culture (1500 BC), while the western communities like Qijia and Shimao were long collapsed before the mid-second millennium BC.

From a diachronic perspective, in studying the rise of the Lower Xiajiadian culture and its associations with Central China, this thesis gives a new account to Tong and Rawson's crescent-shaped/Arc theory. Drawn into the Longshan material culture legacy, Lower Xiajiadian characterized this period as a unique episode during which the eastern end of the Arc was gradually drawn into the Central Chinese behavioral sphere. Although the northern borderlands have received growing academic attention in recent years, previous scholarship has rarely studied thoroughly the changing role of these borderland communities—were they more like the agricultural Chinese, the agropastoralists or pure pastoralists?[495]

In terms of research material, this thesis revisits and challenges traditional understanding of the Lower Xiajiadian settlement and cemetery data. By bringing together and reorganizing all published archaeological reports and radiocarbon dates concerning the Lower Xiajiadian culture, this study is hence of value for future work on related topics.

As one way to continue this study, it would be fruitful to employ a GIS-based analysis on the Dadianzi cemetery to identify in more detail the spatial patterns on burial attributes and artifact distribution. Beyond the current approach, it will benefit a

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that might have substantially depleted subsistence resources (Kong et al. 1991; Teng, M. Y. 2004; Yang, Z. R. and Suo, X. F. 2000: 81-8.).

[495] Inspired by Rawson, J.'s talks in Wuhan and Lanzhou, 2018, in which she points out the huge importance of examining the activities in the Arc over three periods from early Bronze Age (ca. 2200-1500 BC), Shang (1500-1045 BC) till the Zhou (1045-221 BC). Rawson highlights that during different periods, the social and cultural energy generating from the borderlands exhibited various features and they should be treated as both influenced by the Eurasian steppe and Central China.

great deal with a digital examination and cluster analysis of the Dadianzi burial ground. Possible spatial patterning of tomb volumes, locations, occupants' age/gender distribution, artifact association, grave goods diversity can be observed and incorporated to further discuss the material remains of the Lower Xiajiadian society.

The archaeology of northeast China was much under studied compared with the Yellow and Yangzi River areas. Apart from new excavations, more analysis and publication on individual sites, animal/ plant remains, radiocarbon dates, metallurgy and pottery composition can make crucial contributions to a comprehensive understanding of the social development in northeast China. At present, in my view, of paramount importance to the study of China's borderland area are a higher regional chronological resolution (local particularities) and a comparative perspective to integrate data from different regions (interregional histories). With a combination of both, we can have more concrete archaeological information released and thus ask new questions about the social mechanism of this crescent-shaped territory.

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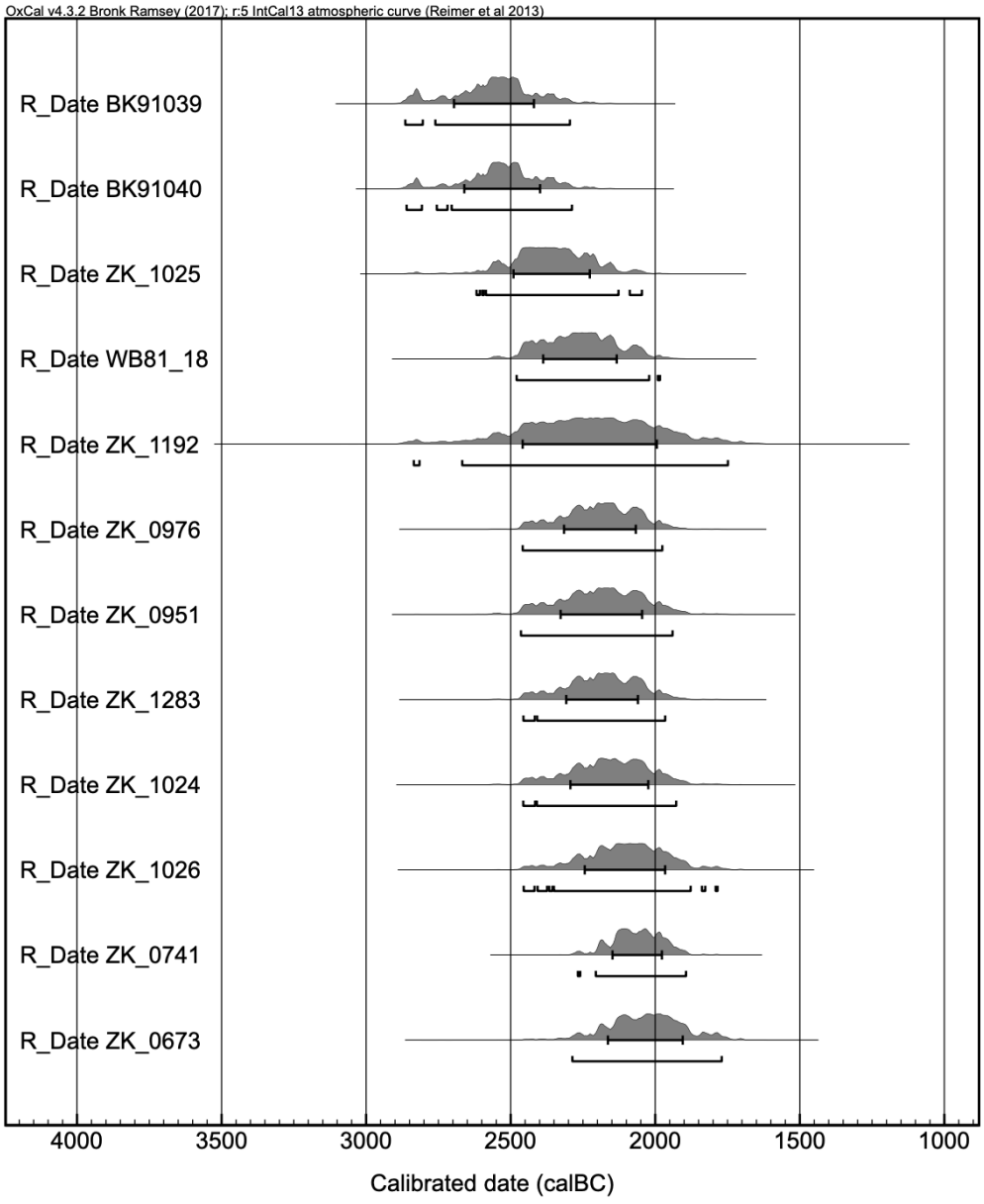
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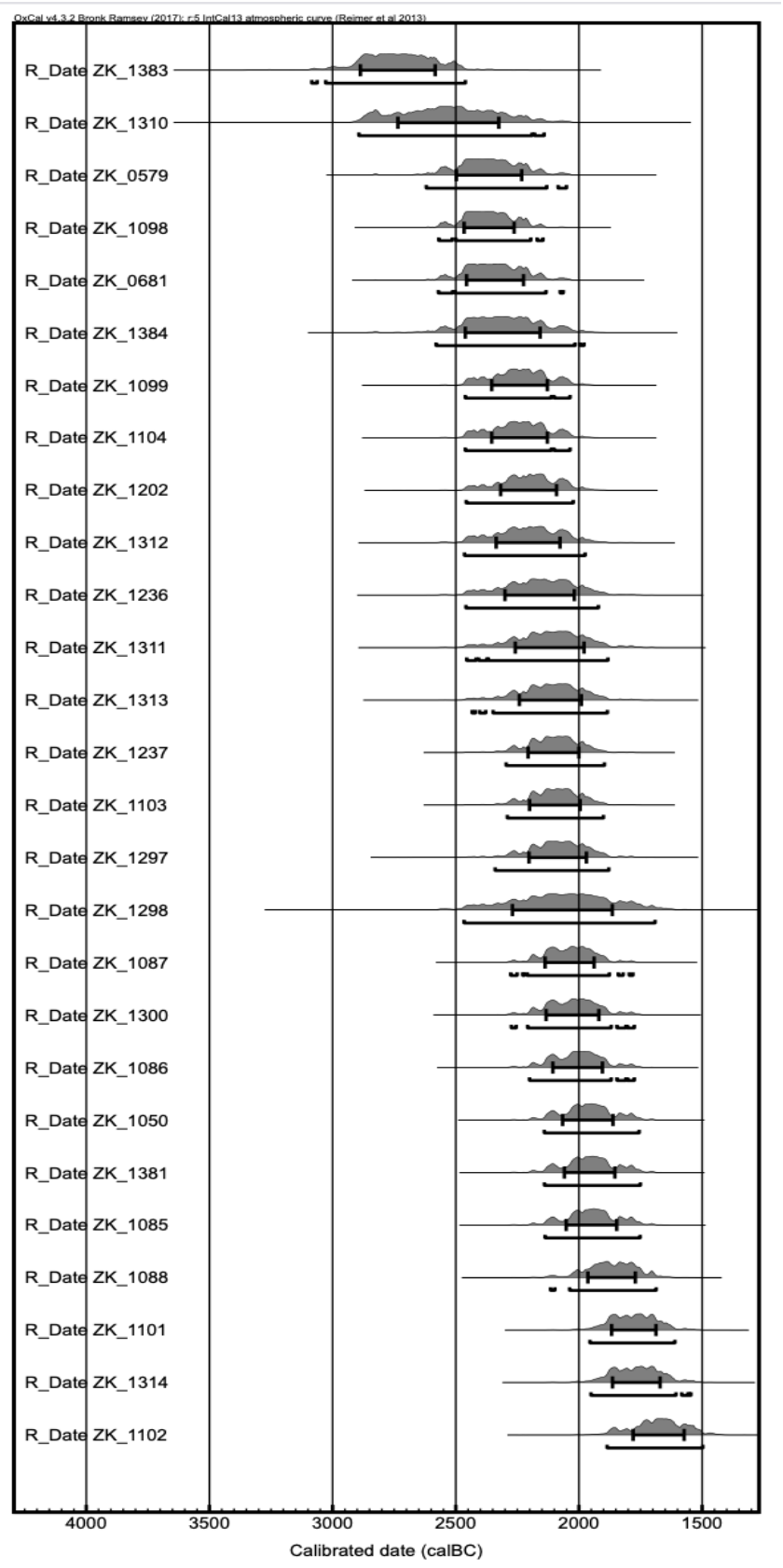
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Appendix

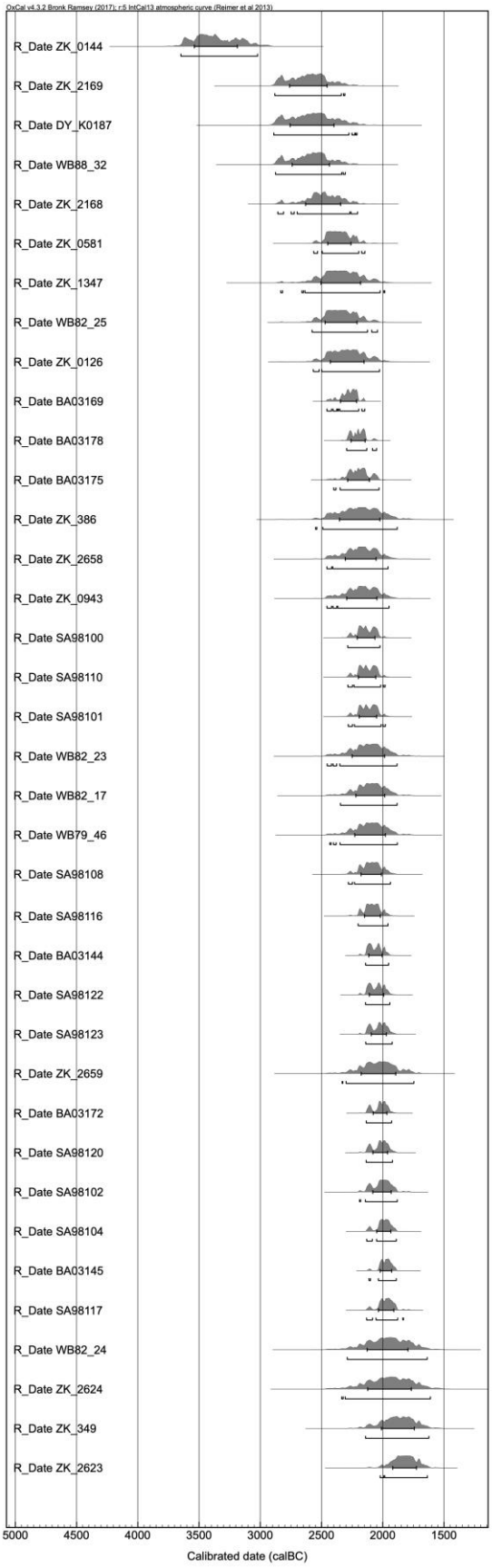
Appendix I. Calibrated Radiocarbon Dates for Keshengzhuang II Type Longshan Culture (data sources from Table 2-34 of IA CASS 2010).



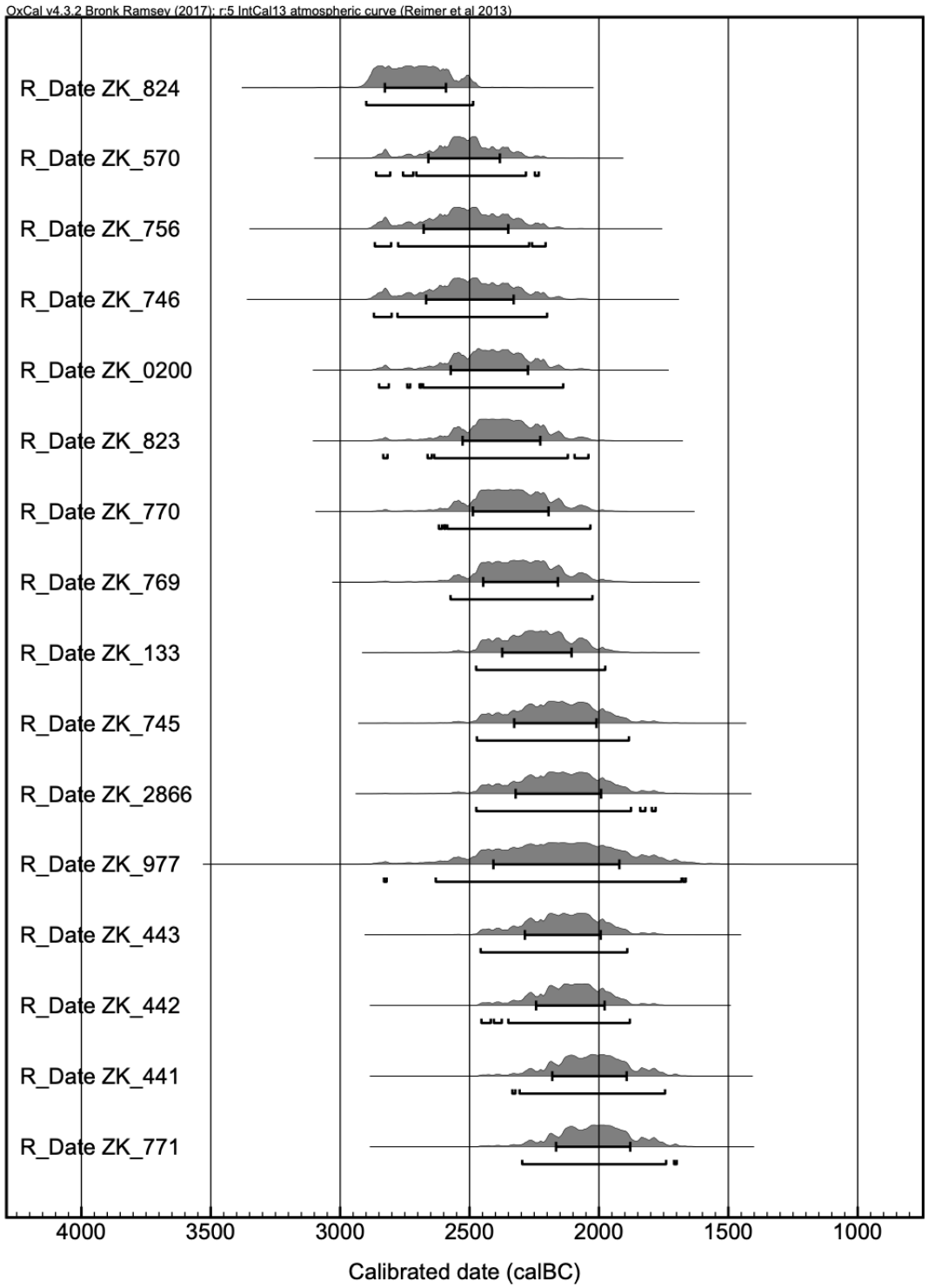
Appendix II. Calibrated Radiocarbon Dates for Taosi Type Longshan Culture (data sources from Table 2-33 of IA CASS 2010).



Appendix III. Calibrated Radiocarbon Dates for Wangwan III Type Longshan Culture (data sources from Table 2-30 of IA CASS 2010).



Appendix IV. Radiocarbon Dates for the Hougang II Type Longshan Culture (data source from Table 2-31 of IA CASS 2010).



Appendix V. List of Reported Type A Semi-Subterranean Houses of the Lower Xiajiadian Culture.

The site and house No.	Size (sqm)
Kalaqin Hedong F2	22.9
Dongshanzui F9	12.8
Kalaqin Hedong F4	12.6
Kalaqin Hedong F5	11.6
Kalaqin Hedong F1	10.7
Dongshanzui F8	9.9
Dongshanzui F6	8.8
Kalaqin Hedong F3	7.8
Xidachuan F3	7.5
Dongshanzui F1	7
Dadianzi H3	5.7
Dadianzi F3	5.3
Xidachuan F2	4.9
Dongshanzui F2	4.2
Shuiquan F61	3.8
Dashanqian F86	3.8
Dadianzi H2	3.8
Dongshanzui F5	3
Mean Size	**8.11**
Standard Deviation	**4.88**

Appendix VI. List of Reported Type A Ground-floor Houses of the Lower Xiajiadian Culture.

The site and house No.	Size of Ground-level Houses (sqm)
Xiaoyushulinzi F2	33.2
Xidalizi F1	28
Xiaoyushulinzi F1	27.3
Erdaojingz F75	22.9
Erdaojingz F54	19.6
Fengxia F12	16
Fengxia F4	13.7
Erdaojingzi F69	13.2
Dashanqian F28	12.6
Fengxia F5	11.3
Erdaojingz F55	11.3
Redianchang F21	10.2
Erdaojingzi F61	7.01
Shuiquan F25	4.9
Fengxia F2	4
Mean Size	**15.7**
Standard Deviation	**8.77**

Appendix VII. List of Reported Houses in Type B Settlements of the Lower Xiajiadian Culture.

The site and house No.	Size (sqm)
Sanzuodian F11	51.76
Sanzuodian F60	40.02
Sanzuodian F9	47.76
Sanzuodian F29	6.606
Sanzuodian F7	18.09
Sanzuodian F27	5.066
Kangjiatun F4	8.55
Kangjiatun F18	8.04
Kangjiatun F19	30.18
Kangjiatun F23	21.23
Danangou F1	22.89
Danangou F2	51.51
Danangou F3	36.30
Danangou F4	15.90
Danangou F5	19.63
Danangou F6	22.89
Shangjifangyingzi F1	14.51
Shangjifangyingzi F3	22.89
Shangjifangyingzi F4	89.87
Dongbajia F1	15.90
Dongbajia F2	12.56
Dongbajia F3	12.56
Dongbajia F4	12.56
Dongbajia F5	7.07
Dongbajia F6	19.63
Dongbajia F7	12.56
Dongbajia F8	12.56
Dongbajia F9	23.75
Dongbajia F10	7.07
Dongbajia F11	15.90
Dongbajia F12	70.85
Dongbajia F14	17.34
Dongbajia F15	19.63
Dongbajia F17	22.05
Dongbajia F18	21.23
Dongbajia F19	21.23
Dongbajia F20	13.85
Dongbajia F22	15.90
Dongbajia F23	14.51

Dongbajia F24	2.25
Dongbajia F25	19.63
Dongbajia F26	63.59
Dongbajia F27	50.24
Dongbajia F28	11.34
Dongbajia F29	19.62
Dongbajia F31	12.56
Dongbajia F34	13.85
Dongbajia F36	8.04
Dongbajia F37	15.20
Dongbajia F39	19.63
Dongbajia F40	78.5
Dongbajia F41	15.90
Dongbajia F44	19.63
Dongbajia F45	11.34
Dongbajia F49	50.24
Dongbajia F50	50.24
Dongbajia F52	7.07
Dongbajia F54	8.039
Dongbajia F55	19.63
Dongbajia F56	12.56
Dongbajia F57	19.63
Dongbajia F58	12.56
Dongbajia F59	7.065
Dongbajia F61	7.065
Dongbajia F62	7.065
Mean Size	**22.5**
Standard Deviation	**18.5**

Appendix VIII. List of Tombs with Turquoise Artifacts in the Dadianzi Cemetery.

Tomb No	Gender	No. of Turquoise artifacts
4	M	5
43	M	3
316	M	3
322	M	1
371	M	4
383	M	4
398	M	1
401	M	3
429	M	1
433	M	1
492	M	1
499	M	2
507	M	4
516	M	1
522	M	3
610	M	3
612	M	2
645	M	2
648	M	2
650	M	1
659	M	6
666	M	4
684	M	3
715	M	1
726	M	5
727	M	1
744	M	1
762	M	1
781	M	1
782	M	2
803	M	1
821	M	1
822	M	2
827	M	1
840	M	2
853	M	4
882	M	2
886	M	4
905	M	2

1115	M	3
1145	M	1
1147	M	1
1203	M	1
1229	M	1
1234	M	1
201	F	1
317	F	17
373	F	2
377	F	25
421	F	1
453	F	24
653	F	1
675	F	1
677	F	22
691	F	3
756	F	6
761	F	15
779	F	6
810	F	11
817	F	4
818	F	14
830	F	6
1120	F	2
1150	F	3
1244	Unknown	1
911	Unknown	1
930	Unknown	3
936	Unknown	1
773	Unknown	1
705	Unknown	3
735	Unknown	2
747	Unknown	1
482	Unknown	2
503	Unknown	1
651	Unknown	3
665	Unknown	1
672	Unknown	4
428	Unknown	1
430	Unknown	5
434	Unknown	1
444	Unknown	1

454	Unknown	17
458	Unknown	1
461	Unknown	14
419	Unknown	1

Appendix IX. List of the 745 Grave Sizes, Tomb Constructions, Sex Information, and Burial Objects at the Dadianzi Cemetery (data from IA CASS 1996). W- Wooden chamber tomb; SP- Simple pit grave; MB- Mudbrick tomb; M- Male; F- Female.

Tomb No.	Size	Sex	Tomb Type	Niche	Ceramics	Painted ceramics	*Guan-tripod* in the niche	Erlitou vessel	Metal	Jade	Bead	Turquoise	Real cowrie	Cowrie copy	Lacquer
1	3.12	M	W	1	1	1					2				
3	1.8368	F	S	1	3		1								
4	9.894	M	W	1	2	2	1					5		296	
5	7.5348	M	W	1	3	3	1								
6	0.86	F	S		2										
7	0.5225		S		2										
8	0.2964	F	S		1										
9	1.638	F	S	1	2	1	1								
10	1.2648	F	S	1	2										
11	0.75075	F	S		0		1		1						
12	2.268	F	S	1	2	2	1								
13	0.6825	F	S	1	2										
14	1.0304	M	S	1	2	1									1
15	0.2432		S		0				1						
16	3.0096	M	W	1	3	1	1								
17	2.22075	M	S	1	1	1									
18	1.9467		S	1	1	1					1				

20	0.385		S		1	1									
21	0.5859	F	S	1	2										
23	1.5375	F	S	1	3	2					1				
24	1.0395	M	S		0										
25	1.728	F	S	1	3		1			1					
26	0.666	F	S		2										
27	0.924	F	S	1	1										
28	0.513		S		0										
29	0.82875	F	S		3										
30	0.234	F	S		2										
31	0.72688		S	1	3		1								
32	1.42131	F	S	1	2		1								
33	0.7163	M	S		2	2					2				
34	0.3612	M	S		1										
35	2.12296		W	1	3		1			1			2	3	
36	0.0011		S		1						26				
37	0.1632		S		2										
38	3.784	M	S	1	2		1								
39	2.4156	F	W	1	2	1	1								
40	3.08568	F	W	1	3	1				1					
41	0.94705	F	S		0										
42	1.45	F	S	1	1										
43	5.43116	M	W	1	5	2	1		1			3		7	
44	12.7182		S	1	3	2	1							3	

45	0.2088		S		0										
47	1.2675	F	S	1	2	2	1								1
48	0.108	M	S		0										
49	0.080376	M	S		0						1				
50	1.87265	F	W	1	3		1			1					1
51	3.6179	M	W	1	3	1	1							3	
52	1.083	F	S		1										
71	0.73899	F	S	1	2		1								1
72	1.8304	F	S	1	2		1								
73	0.828	M	S	1	2		1								
74	0.162	M	S		0										
75	0.6	F	S		1										
76	0.20664		S		1										
77	2.1172		S	1	2		1								
78	6.9696		S	1	3	3	1				1				
79	3.92175	F	W	1	3	2	1								
80	0.8613	F	S	1	2										
81	2.32848	M	S	1	2		1								
82	0.99066	F	S		2	1									
83	2.66815		S	1	3	2	1								
84	0.135		S		0										
85	1.223664	M	S		1	1									
102	0.00002		S		0										
103	0.2088		S		1										

201	0.105		S		0						1	1			
202	0.85595	M	S		2										
203	0.6174		S	1	1										
204	4.77	M	S	1	2		1								
205	4.032	F	S	1	5	1	1								
206	0.80295	F	S	1	2	1	1							2	
207	0.4094	M	S		1										
209	1.8924	M	S	1	2		1								
210	4.58136		S	1	3		1								
299	0.0495		S		0										
301	1.35218	M	S	1	3		1								
302	0.132		S		0						3				
303	2.97		W	1	3	1	1								
304	2.25225	M	S	1	2	1	1								
305	2.9568	F	W	1	2	2	1			1					
306	3.05515	M	S	1	2		1								
307	0.385	F	S	1	3	2	1								
308	3.31144	F	S	1	1	1				1					
309	1.122		S	1	1										
310	1.617	F	S	1	2		1								
311	2.233944	M	S	1	2	1	1								
312	2.43432	F	S	1	3		1								
313	1.1286	M	S	1	2		1				1				
314	1.25856	F	S	1	2		1								

315	1.8357	M	S	1	3		1								
316	4.715	M	W	1	3	3	1					3			
317	2.856	F	W	1	3	3	1			3	80	17	6		
318	0.798	F	S	1	3		1								
319	1.584	M	S	1	2		1								
320	1.68	F	W		2		1								
321	3.9675	F	S	1	2	2	1								
322	5.07	M	S	1	3	3	1					1			
323	1.5792	F	S	1	2		1								
324	1.425425	M	S	1	2		1								
325	2.856	F	W	1	2		1								
326	4.048		S	1	3	2	1								
327	1.0165		S	1	4		1								
328	1.5015		S	1	2		1								
329	2.772	F	S	1	2		1								
330	0.399		S		0										
331	2.812	M	S	1	3		1								
332	0.75168		S	1	2	1	1								
333	1.932	M	S	1	2										
334	2.12608	F	S	1	2		1								
335	1.764	F	S		0										
336	1.1808	F	S	1	1										
337	1.40544	F	S	1	2		1								
338	1.6875	M	S	1	2		1								

339	0.26676		S	1	2		1								
340	0.176625		S	1	1								1		
341	2.0838	F	S	1	4		1								
342	4.15584	F	S	1	3		1								
343	5.0715	M	S	1	4		1								
344	0.06435		S		0										
345	0.54		S		3										
346	1.8564	M	S	1	2		1								
347	1.0659	F	W	1	3		1								
348	1.10682	F	S		1										
349	1.623375		S	1	2	1	1				1				
350	0.462		S		1										
351	3.84	M	S	1	3		1								
352	0.81696	F	S	1	2		1								
353	1.045	M	S	1	2		1								
354	2.415	F	S	1	4		1								
355	5.5332	M	W	1	4		1								
356	2.0286	F	S	1	2		1								
357	1.365	F	S		2										
358	0.568168	F	S	1	3		1								
359	1.73128	F	S	1	2		1								
360	5.25	M	S	1	3	3	1						5	3	
361	2.268	M	S	1	2	1	1								
362	0.02739		S		0										

363	1.083	F	S	1	2		1								
364	3.30624	M	S	1	3		1				1				
365	3.102	M	W	1	4		1								
366	2.6334	F	S	1	3		1								
367	0.576	F	S		0										
368	1.5523	F	S	1	3	1	1								
369	0.16	M	S		0										
370	0.07392		S		0										
371	16.767	M	W	1	7	7	3		1	4	1	4	4	2	2
372	1.32	F	S	1	3		1			1					
373	3.26196	F	W	1	2	2	1			1	13	2	8		
374	0.2		S		1										
375	1.1438		W	1	3	1	1								
376	2.601	F	W	1	3		1								
377	2.07648		W	1	2	1					21	25			
378	1.812525		S	1	4	2	2								
379	1.224	F	S	1	2		1								
380	0.9028		W	1	3		1								
381	2.11554	M	S	1	2		1								
382	0.50688		S	1	2										
383	1.5048		W	1	2	2	1			2		4	1		2
384	1.2675	F	S	1	2		1								
385	1.34784		W	1	3		1								
386	2.166	F	S	1	4		1								

387	2.394	F	W	1	3	2	1								
388	7.584	M	W	1	5	5	2						1	2	1
389	1.92357	M	W	1	2		1								
390	0.928		S		0										
391	2.6752	M	S	1	3	1	1								
392	0.6384	M	S		2										
393	1.5408		W		1										
394	5.5223	M	W	1	5	2	1								
395	1.784727		S	1	3		1								
396	0.228		S		0										
397	1.152		S	1	2		1								
398	4.5496	M	S	1	5		1					1			
399	2.432	M	W	1	2	1	1								
400	3.8016	F	W	1	2	1	1								
401	7.2	M	W	1	4	2	1					3			
402	1.976	F	W	1	4	2	1								
403	0.11475		S		1										
404	0.22		S		1										
405	0.195		S		0										
406	0.0833		S		2										
407	0.0729		S		0										
408	0.135		S		1										
409	0.8652	F	S		0										
410	0.49036		S		0										

411	0.6435	F	S		2										
412	1.159		S	1	3		1								
413	0.00864		S		1										
414	1.617		S		1										
415	1.21905	M	S	1	2		1								
416	5.71872	F	W	1	3		1								
417	2.97024	F	S	1	3		1								
418	1.566	F	W	1	2		1								
419	12.168		W	1	9	7	3					1	1		1
420	1.3786	F	W	1	3	2	1								
421	8.736	F	W	1	4	3	2					1			
422	3.738	M	W	1	3		1								
423	0.9775	F	S		0										
424	0.27		S		2										
425	0.450846		S	1	2										
426	1.694		S	1	2		1								
427	0.24		S		1										
428	0.2304		S	1	1							1			
429	0.83296	M	S		0							1			
430	1.065568		S	1	1	1						5	1	1	
431	1.938275	M	S	1	2		1								
432	2.1056	F	S	1	4		2								
433	5.612	M	S	1	3	2	1					1			
434	1.2296		S	1	0							1			

435	0.23584		S		0										
436	0.7	F	S		1										
437	3.968	M	W	1	3	1	1								
438	4.08672	F	W	1	3	1	1								
439	3.846816	M	S	1	3		1								
440	1.55925		S		0						1				
441	1.05105	M	S	1	2		1								
442	4.16208		W	1	2	2	1								
443	1.2096	M	S	1	2		1				1				
444	8.7048	M	S	1	3	2	1					1			
445	1.176	F	S	1	3		1								
446	1.3775	F	S	1	2		1								
447	2.364	F	W	1	3	1	1								
448	0.1978		S		1										
450	1.046032	F	S	1	2		1								
451	3.366	F	W		0						1				
452	2.22768		W	1	3	2	1								
453	10.64	F	W	1	3	2	1		4	4	70	24			
454	5.2		W	1	3	2	1		5	1	35	17			
455	0.4725		S	1	2										
456	3.06	M	S	1	3		1								
457	2.432	F	W	1	3		1								
458	0.35376		S	1	0					3		1			
459	12.3552		W	1	6	5	1				1		10		

460	0.5481		S		0										
461	1.0075		S	1	2	1					21	14			
462	1.89		W	1	3		1								
463	1.63944	F	S	1	5	1	2		1		6				
464	0.216		S		0										
465	0.42075	F	S		0										
466	1.45794	F	W	1	4		2								
467	4.4856	M	S	1	3		1								
468	1.386	F	W	1	2										
469	1.3475	M	S	1	2		1								
470	3.9715	M	W	1	3	2	1								
471	1.064		W	1	2		1								
472	6.87516		W	1	4		1								
473	0.32802		S		2										
474	5.30725	F	W	1	3		1								
475	0.66495		S	1	2										
476	0.6		S	1	1										
477	0.2925		S		1										
478	0.92		S		0										
479	2.088	M	W	1	3		1								
480	1.6065	F	S	1	3		1						2		
482	1.4448		W	1	2	1	1					2			
483	3.6225	M	W	1	3		1								
484	3.256	M	S	1	3		1								

485	2.91375	M	S	1	3		1								
486	4.968	M	S	1	3		1								
487	2.85768	F	S	1	3		1								
488	0.48256		S	1	1										
489	0.9435	F	S		0										
490	0.07866		S		1										
491	0.07381		S		0										
492	1.235		S	1	3		1					1			
493	3.75596	M	W	1	3		1								
494	2.52	F	S	1	0										
495	0.2451	F	S	1	2										
496	4.0832	M	S	1	3		1								
497	1.632		W	1	2										
498	1.39954	F	S	1	1									1	
499	2.64	M	W	1	4	2	1					2			
500	0.546	F	S	1	2	2	1						4		
501	1.188684	M	S		0										
502	4.16		W	1	3	2	1								
503	0.77		S	1	3	2	1					1	5		
504	1.47	F	S	1	2		1								
505	1.666	M	S	1	3		1								
506	0.066092		S		1										
507	5.632	M	W	1	4		1		2		108	4			
508	1.87005	F	S	1	3		1								

509	0.063		S		1										
510	0.068		S		0										
511	0.03		S		1										
512	2.58048	F	W	1	4		1								
513	0.012915	F	S	1	4	2	1								
514	1.665	M	S	1	2		1								
515	1.20384		S	1	2	1	1				1				
516	2.1525	M	W	1	3	2	1		1		103	5			
517	0.19008		S		2										
518	2.002		S	1	2	1									
519	4.275	M	S	1	5	1	2			1					
520	1.0175		S	1	2		1								
521	0.17264		S		0										
522	3.36	M	W	1	4	2	2					3			
523	0.34398		W	1	1				2		1				
524	0.42408		S		1										
603	3.08	M	S	1	3	1	1								
604	0.858	F	S	1	1										
605	1.003	M	S		0										
606	3.741615	M	S	1	3		1						1		1
607	2.5872	F	S	1	3		1								
608	0.11388		S		0										
609	1.91488	F	S	1	3	2	1								
610	3.872	M	W	1	1	1					1	3			

611	0.26775	M	S		2										
612	15.3615	M	W	1	10	6	4	2		1	42	2	5		1
613	1.128	M	S	1	3		1								
614	0.8688		S	1	3		1								
615	1.2075	F	S	1	2		1								
616	0.1748		S		1										
617	1.92	F	S	1	3		1								
618	1.5732	F	W	1	3		1				1				
619	1.563952	M	S	1	2		1								
620	1.394	F	S	1	2		1								
623	0.3042		S	1	1										
625	0.37905	F	S	1	2		1				1				
626	1.408	F	W	1	2		1								
628	2.81204	M	W	1	5		2								
631	1.1682	F	W		2										
632	0.84196		S		1										
634	1.5444	M	S	1	2		1								
635	1.48005	F	S	1	2		1								
636	2.5116	M	W	1	3		1								
637	0.5913		S		2	1									
638	0.7296	M	W		1										
639	1.248	M	W		2		1								
640	0.7161	M	S	1	2		1								
641	2.112		W	1	3	1	1								

642	1.8	M	S	1	4		2								
643	2.21	F	S	1	3		1								
644	0.29		S		0										
645	6.656	M	W	1	2	2	1					2			1
646	7.2	M	W	1	6	2	2								
647	2.2016	F	S	1	3		1								
648	4.354875	M	W	1	3	2	1					2			1
649	1.037	M	S	1	3	1	1								
650	1.1448	M	S	1	3		1					1			
651	0.0756		S		1							3			
652	7.722	F	W	1	3		1				1		5		
653	1.33	F	S		4						1	1			
654	0.588		S		0										
655	0.8436	F	S		3										
657	3.4454	M	S	1	3	1	1								
658	4.7532	M	W	1	4	1	1							2	
659	6.63	M	W	1	2	2	1			1	1	6			
660	1.3	F	S		3										
661	1.32	M	S		2										
662	0.624		S		0										
663	5.46375		W	1	2	2	1								1
665	0.03872		S	1	1							1			
666	6.24015	M	W	1	6	3	2	2				4	4		3
667	1.32	F	S		3										

668	0.782	F	S		0										
670	4.67856	M	S	1	3		1								
671	1.716		S	1	3		1								
672	15.345		W	1	7	5	1	2	2			4	226	1	2
673	0.86436	M	S	1	2		1								
674	0.84	M	W	1	3	1	1								
675	1.3464	F	S		0				2			1			
676	0.3016		S		1	1									
677	12.37885	F	W	1	8	6	1	2	11		15	22	4		
679	0.8415	F	S		0										
680	0.47232	M	S	1	1										
681	0.017304		S		1										
682	8.7348	F	W	1	2	2	1								1
683	2.3562	M	S	1	3	1	1		1				2		
684	2.392	M	S	1	3	3	1					3			
685	0.139264	M	S		1										
686	0.0516	M	S		1										
687	1.3728	F	W	1	3		1								
688	1.73745	F	S	1	2		1								
689	0.384		W		1										
690	0.378		S		4	1									
691	2.08	F	W	1	4		2				1	3			
692	1.47		S		0										
693	0.468		S		0										

694	0.583825	F	S		0										
695	0.665		S		0										
696	0.42		S		0										
697	1.5228	M	S	1	4		1								
698	1.9272		W		1										
699	0.13608		S		0										
700	1.32	F	S		2										
701	0.252	F	S		2										
702	2.42		S	1	4	1	1								
703	0.972	F	W		2										
704	0.156		S		1										
705	1.2903		W		0							3			
706	3.3464	M	W	1	7	5	2	2		1					
710	2.0475	F	S	1	3		1								
711	0.8415		W		0										
712	1.04		S		3										
713	12	M	W	1	6	1		2						2	
714	0.216		S		0										
715	10.5	M	W	1	6	6	2		2			1	4		
716	0.0063		S		2										
717	1.5648	M	S	1	2	1	1								
718	0.04368		S		0										
719	1.134	M	S		3	2									
721	0.06972		S		1										

722	5.8275	F	W	1	3	2	1						3		
723	3.9984	F	W	1	4	2	1								
724	0.522		S		0						2				
725	0.9		W		0				2						
726	43.68	M	W	1	11	9	3	2		1		5	255		3
727	0.675		S	1	2		1					1			
728	4.91625	M	W	1	3	2	1								
729	0.89355	F	S	1	1										
730	6.07948	F	W	1	3	1	1								
731	1.8326	M	S		0										
732	9.4944	M	W	1	6	2	2							2	
733	0.046875		S		1										
734	1.94472	F	S	1	2		1			1					
735	0.04032		S		1							2			
736	0.48		S	1	0										
737	1.662375		S	1	3	1	1								
738	1.25398	M	S	1	3		1								
739	1.0725	M	S	1	2		1								
740	1.08	M	S	1	2	1	1								
741	1.14	M	S	1	2	1	1								
743	0.8526		S	1	1	1									
744	4	M	S	1	4	2	2					1			
745	2.16	F	S	1	2		1								
746	0.33		S		0										

747	0.7		S		2	2						1			
748	1.54	M	S	1	1										
749	1.584	F	S	1	3	1	1								
751	6.0372		W	1	4	1	1						1		
752	0.055		S		1										
753	0.468		S		1										
754	0.06		S		1										
755	0.168		S		1										
756	5.17		W	1	3	1	1		3		853	6			
757	0.108		S		1										
759	4.9245	M	W	1	4		2								
760	3.15	F	S	1	3	2	1								
761	3.45	F	W	1	4	1	2					15	3		
762	3.42		W	1	4	4	2				4	1	21		
763	0.0432		S		1										
764	0.108		S		1										
765	0.02625		S		1										
766	0.1		S		0										
769	2.1736	F	W	1	4		1								
770	0.9639	F	S	1	2		1								
771	5.474	F	W	1	3	3									
772	3.55696	M	S		3	1									
773	2.07		W		0							1			
774	0.26		S		2										

775	0.756	M	S		1										
776	0.198		S		0										
777	0.2472	F	S		0										
779	3.285		S	1	4		2					6			
780	0.099		S		1										
781	0.6885	M	S		2							1			
782	2.1976		S	1	2		1		1			2			
783	0.8		W	1	3	2	1								
784	1.96	M	S		2										
785	1.44	M	W		2										
787	4.1	F	W	1	2		1								
788	0.27		W		0				1						
790	1.2996		S		2										
791	9.234	M	W	1	3	3	1								
792	1.74	F	S	1	3	3	1								
793	0.078		S		0										
794	0.048		S		1										
795	1.96	M	W		1										
796	0.68		S		0										
797	1.566		S	1	2		1								
798	0.1575		S		0										
799	1.91425	F	S	1	3		1								
800	0.1365		S		0										
801	0.3375		S		1										

802	0.273375		S		0										
803	1.6835		S	1	3		1					1			
804	1.44	F	W	1	1										
805	0.620928	F	S		2										
806	3.1122	F	W	1	3	2	1								
807	1.275	M	W	1	2		1								
808	2.85975	M	S	1	2	1	1								
809	4.32	F	W	1	3	1	1								
810	1.8	F	S	1	2	2				1	25	11	1		
811	2.583		S	1	3		1								
812	0.11		S		0										
813	1.638		S		2	1			1						
815	1.12		W		0										
816	1.404	F	S	1	2		1				1				
817	1.512		W	1	1	1				2		4			
818	8.584	F	S	1	6	4	1	2				14			1
819	0.648		S		0										
820	0.16		S		0										
821	1.33		S	1	1	1				2	2	1			
822	2.624	M	S	1	3	1	1		2			2		2	
823	1.705	M	S	1	0										
824	2.415	M	S	1	4		2								
825	0.54		S		0										
826	0.76	M	S	1	1	1									

827	7.072	M	W	1	3	3	1					1			
828	2.96	M	S	1	3	1	1								
829	0.28	F	W	1	1	1				1					
830	2.107	F	S	1	2	2	1		3		8	6	2		
831	1.6835	F	S	1	2	2	1			1			2		
833	1.995	F	S	1	3	1	1			1					
834	1.56	M	S	1	1										
835	0.1292		S		0										
836	0.99	F	S		0										
837	0.85	F	S	1	3		1								
838	7.176	F	W	1	3	2	1								
839	4.35		S	1	3		1								
840	5.88		S	1	3	2	1					2			
841	0.002079		S		0										
842	1.4756	M	S	1	2	1	1								
843	2.835	M	W	1	3		1								
844	0.672		S		0										
845	0.14		S		0										
846	0.84		S		0										
847	2.737	M	W	1	1	1									
848	0.378		S		0										
850	0.00504	F	S		0										
851	2.728	M	S	1	2	1	1								
852	1.425	M	S		2										

853	9.7119	M	W	1	8	6	1	2		1		4			1
854	5.424		S	1	3	3	1								
855	5.67	M	W	1	3	2	1								
856	1.512	F	S		2										
857	1.84275		S	1	3	1	1								
858	10.535	M	S	1	2	1	1								
859	7.68		S	1	4	3	2								
861	3.35592	F	S	1	3		1								
862	0.08325	M	S		0										
863	0.36162	F	S		0										
866	4.6956	F	S	1	4	1	1								
867	11.9808	F	W	1	5	3	1	1					8		1
868	4.048	M	W	1	3		1								
869	0.462		S		0										
870	0.55	M	S		0										
872	1.0044		S		0										
873	0.24426		S		0										
874	1.08		W		0										
875	1.3065	F	S		2										
876	2.0706	F	S	1	2		1								
877	0.525		S		0										
878	1.265		S	1	4	1	1								
879	0.12		S		0										
880	1.02	M	S	1	2		1								

881	6.336		W	1	3	2	1								
882	6.624		W	1	3		1					2			
883	0.4558		S		0										
884	1.254		W		0										
885	6.336	F	W	1	4	1	1								
886	4.8	M	W	1	4	4	1					4			
887	2.28		W	1	3	1	1								
888	1.44	F	W		0										
889	0.1155		S		0										
890	0.09		S		0										
891	4.44	M	W	1	3		1								
892	0.504		S		0										
893	0.51	F	S		0										
894	0.12		S		0										
895	1.485	F	W		0										
896	0.78	F	S		0										
897	0.0264		S		0										
898	1.32	M	S		0										
899	4.68	M	W	1	3		1								
900	1.5652		S		0										
901	3.04	F	W	1	3	1	1								
905	15.12	M	W	1	12	10	4	2		1		2	17		1
906	0.351		S		0										
907	1.68	M	W		0										

908	0.15		S		0										
909	1.2		S	1	0										
910	4.784	F	W	1	2	1									
911	3.76164	F	W	1	2		1					1			
912	0.6912	F	S		0										
913	0.77256		S		0										
914	3.2412	M	W	1	3		1								
915	0.0224		S		0										
916	0.4617		S		3										
917	0.251328		S	1	1										
918	0.64	M	S	1	3	1	1								
919	4.7232	M	W	1	3		1								
920	1.275		S	1	3		1								
921	0.1755		S		0										
922	2.24	F	W	1	2	1	1								
925	1.512	F	S	1	2		1								
926	0.036		S		0										
927	0.16		S		0										
928	1.98	F	S	1	2		1								
929	2.4	M	W	1	3		1								
930	0.1404		S		0							3			
931	21.875		W	1	8	5	2	2					9		1
932	3.519	M	W	1	3		1								
933	1.156	M	S		0										

934	0.49392		S		1										
935	0.3024		S		1										
936	0.3888		S		0							1			
940	1.408		S		2										
1001	5.04	M	W	1	3	1	1								
1002	0.756		S	1	2		1								
1003	3.5	M	W	1	3	2	1								
1004	0.1575		S		0										
1005	0.0507		S		0										
1006	7.956	M	W	1	2	1	1								
1007	1.056	M	S		0										
1008	3.61415	F	S	1	3		1								
1009	1.5648	M	S	1	2									2	
1010	1.04625	F	S	1	3		1								
1011	7.71936	F	W	1	3	1	1			1					
1012	0.8364	M	S	1	2		1								
1013	1.34757	M	S	1	3		1								
1015	1.42912		S		0									94	
1016	0.41184	F	S		2										
1017	1.596	M	S	1	2	1	1								
1018	2.058	M	S	1	2	1	1								
1019	2.58048	M	W	1	2										
1020	0.834176		S	1	2	2	1								
1021	3.23575	M	W	1	3	2	1						1	149	

1022	2.4738		S	1	2	2	1								
1023	0.75392	F	S		1	1									
1024	2.856	F	S	1	2		1								
1025	1.008		S		0										
1026	0.528		S		0										
1027	0.13872	M	S		0										
1028	1.725		S		1										
1029	1.296		S	1	2		1								
1030	0.3		S		0										
1031	6.72	F	W	1	1	1					5				1
1032	1.029	M	S		2				1	1					
1034	3.84	M	W	1	2	1	1								
1102	9.072	M	W	1	4	3	2			1					
1103	7.8672	M	W	1	4	1	2								1
1105	1.5808	M	S	1	2										1
1109	7.225	M	W	1	4	1	2								1
1110	0.414	F	S		0										
1111	2.0748	M	S	1	3	2	1						3		
1112	2.6664	M	S	1	3		1								1
1113	5.698	F	W	1	4	3	2								
1114	4.648	F	W	1	3	2	1								
1115	3.47256	M	W	1	3	2	1					3			
1116	1.0374	F	S	1	2		1								
1117	5.684	M	W	1	3	3	1				1				

1120	0.46116		S		2	2					3	2			
1121	9.4325	M	W	1	5	1	1								1
1122	1.56735	M	S	1	2		1								
1123	3.9405	M	W	1	4		2								1
1124	0.378		S		0										
1125	0.252		S	1	2		1								
1126	2.1114	M	W	1	2		1								
1127	0.616125		S	1	3	1	1								1
1128	0.59925	M	S		0										
1129	2.9072	M	W	1	3		1								1
1130	2.4794	M	M	1	2		1								
1131	0.5586	M	S		2										
1132	0.354375		S		3										
1133	1.4245		S	1	2		1								
1135	2.06388	F	W	1	4	1	1								
1136	0.7293	M	S		0										
1137	1.071	F	M	1	3	2	1								
1138	0.104544		S		0						2				
1139	1.18552	F	M	1	3		1								
1140	0.2016	M	S	1	2		1								
1141	2.96856	F	S	1	4		1								
1142	0.5616	M	M		2										
1143	0.131625		S		0										
1144	0.8544		M	1	3		1								

1145	3.9208		W	1	4	3	2					1			
1146	0.19376		S		0										
1147	6.984	M	W	1	5	3	2					1			1
1148	2.2		W	1	3	3	1								
1149	2.2	M	S	1	2		1								
1150	2.7676	F	W	1	3	2	1				2	3			
1151	1.6188	M	S	1	3		1								1
1152	1.1		S	1	2		1								
1153	1.1505	F	S		3		1						23		
1154	3.5552	F	S	1	3		1								
1155	0.799	F	S	1	2		1								
1156	2.3632	F	W	1	3		1								1
1157	0.03015		S		1										
1158	1.4025	F	S	1	3		1								
1160	1.21	M	W	1	2		1								
1161	0.88065	M	S	1	2		1								
1162	3.483	M	W	1	3		1								
1163	1	M	S	1	2		1								
1164	1.071	F	S		2										
1201	3.5112	F	W	1	3	2	1				2				1
1203	8.38656	M	W	1	3	2	1					1			
1204	2.7744	M	S	1	3		1								1
1205	2.5415	F	W	1	3	2	1			1					
1206	0.9702	M	S		2	1									

1207	0.0324		S		1										
1208	7.315056	F	W		3	3									
1209	2.496		S	1	3		1								
1210	1.022	F	S	1	3		1								1
1211	3.1671		W	1	2		1								
1212	2.8875		W	1	2	2				1	83				
1213	1.0395		W	1	2		1								
1214	0.00045		S		0					2					
1215	3.92	M	W	1	6	4	1	1							
1216	0.0099	M	S		0										
1217	1.056	F	S		1										
1218	1.065408	F	W	1	2		1				1				
1219	2.115208	F	W	1	2	2	1								
1220	0.546	M	S	1	2		1				1				
1222	0.6612	M	W		0										
1223	0.004		S		2										
1224	0.2565		S		1										
1225	0.63	F	S	1	1	1					1			1	
1226	1.242		W		0										
1227	0.54264	M	S		0										
1228	1.4136	M	S	1	1	1									
1229	1.07136	M	S	1	2						1	1		2	
1230	2.184	M	S	1	2					2					
1231	0.053		S		0										

1232	0.80496	M	S		0					1					
1233	1.197	M	S	1	2		1							1	
1234	1.1077		S	1	2							1			
1235	3.6708	M	W	1	3		1								
1236	2.5789		S	1	3		1								
1237	0.4466		S		2										
1238	1.768		S	1	3	1	1				6				
1239	2.565	F	S	1	2	1	1				1				
1240	4	F	W	1	2	1	1								
1241	1.3468	F	W		2										
1242	4.83		S	1	0										
1243	0.30942	F	S		1										
1244	0.172044		S		1							1			
1245	0.255		S		0										
1246	1.79025	F	W	1	2		1								
1248	0.53222	F	S		2										
1251	2.408	M	W	1	2	2	1								
1253	0.4125		S		1										
1254	0.721875		S		1				1						
1255	1.95	F	W	1	3	2	1								
1256	0.8	M	S		0										
1257	2.6784	F	W	1	3		1			1					
1258	1.176	M	S	1	0										
1259	2.57025	M	W	1	2		1								

1260	1.47		S		0										
1261	3.168	M	S	1	2	1	1								1
1262	1.573		S	1	0					1					
1263	2.184	F	S	1	2		1								
1264	3.6556	F	S	1	2	2	1								
1265	3.036	F	W	1	2	2	1		2						
1266	2.717	F	S	1	2		1								
1267	0.07392		S		2										