

# Settlement and Social Dynamics in the Upper Daling and Chifeng Regions of Northeastern China

Robert D. Drennan, Christian E. Peterson, Lü Xueming, Zhu Da, Hou Shenguang

**Abstract:** *The Neolithic and Bronze Age remains of northeastern China have traditionally been organized into a sequence of spatially extensive archaeological cultures. Scholars typically describe a particular homogeneous "lifeway" thought to characterize each culture. Because this approach provides little room for discussion of internal social dynamics, most accounts of social change depend heavily on notions of cultural and demographic replacement, external cultural influence, or long-distance interaction. Subdividing large-scale archaeological cultures into variants based on more subtle detail of artifact style does not approach internal social dynamics more closely. Comparison across multiple systematic regional-scale settlement studies can, however, throw into sharp relief aspects of the internal dynamics underlying trajectories of social change in different parts of a single "monolithic" culture area. This paper engages in just such a comparison of two recent settlement studies in northeastern China in an effort to hypothesize about internal social dynamics.*

**Key Words:** *regional-scale settlement study; comparative archaeology; social dynamics; Neolithic; Bronze Age; northeastern China*

It was in China's Central Plain that the earliest, largest, and most powerful of East Asia's ancient states emerged (Figure 1). Historical records from these societies paint a picture of neighboring regions in northeastern China as inhabited by peoples following a mobile, herding way of life, regarded as less civilized than that of the Central Plain's dynastic states. Historical and archaeological research long followed this lead, but in recent decades has increasingly recognized a variety of early societal developments involving sedentism, agriculture, and complex organization not simply derivative of social dynamics centered farther south. These Neolithic and Bronze Age societies are documented through stratigraphic excavations carried out since the 1930s. More

recently, systematic regional-scale settlement study has provided larger contexts in which the information from these excavations can be more revealing of ancient human societies. Large-scale settlement studies cover hundreds of square kilometers but still fall far short of the much vaster scale of the archaeological "cultures" into which the Neolithic and Bronze Age remains of northeastern China have been organized. Although the spatial extents of these cultures can run into the hundreds of thousands of square kilometers, each culture is customarily associated with a description of a very homogeneous "lifeway". Little room is allowed for variety in settlement patterns, subsistence and other productive activities, ritual behavior, political action, or social roles in general across

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these huge culture areas. The implicit assumption that people sharing a relatively homogeneous ceramic style will also be similar in all these other respects leads to a very static view of these cultures—one lacking in the raw material necessary for a dynamic view of social change. One is left with an account in which change seems to come only when one monolithic culture is replaced by, is influenced by, or interacts with another equally monolithic culture or when climate “improves” or “deteriorates” and culture grows or collapses. That it is difficult to deal convincingly with social dynamics from such a perspective is not a new observation (cf. Shennan 1978, 1986a, 1986b), but the archaeological literature for some parts of the world continues to be heavily focused on the delineation and description of such “cultures”.

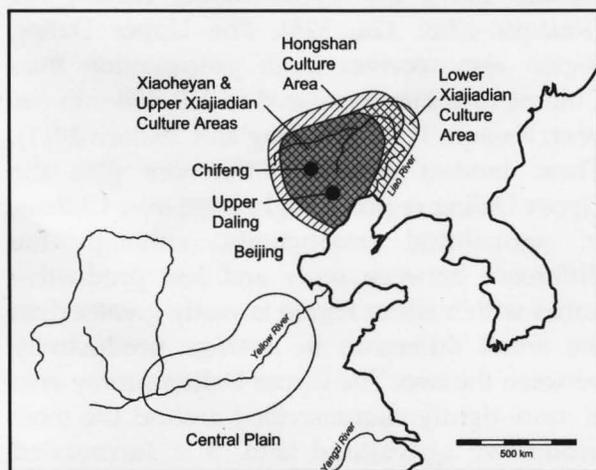


Figure 1. Northeastern China and neighboring areas.

This sense of homogeneous cultures springs from taking one or a few type sites as typical of a culture’s way of life, and grafting the interpretations of these few sites onto all the other sites where remains of the same culture are found. This static view persists even when splitters subdivide large-scale cultures into smaller variants. Regional-scale settlement studies, however, can help to reveal how settlements play different roles in a complex and highly textured regional structure. In precisely the same way, regional settlement studies can be played off against one another in order to approach the dynamic relationships between varying trajectories of change in different parts of a single very large culture

area. The people who lived in northeastern China in prehistoric and early historic times clearly interacted with their neighbors at varying distances. In this paper, though, we choose to focus on the internal social dynamics of the area, rather than on its much more studied interactions with other parts of East Asia.

Two recent systematic regional-scale settlement studies in northeastern China offer an opportunity to do just that (Figure 1). Results of full coverage survey of 1,234 km<sup>2</sup> carried out between 1999 and 2007 around the city of Chifeng 赤峰 in eastern Inner Mongolia have documented a trajectory of social change stretching from Neolithic beginnings around 6000 BCE through the Liao 辽 Dynasty in the 13th Century CE (Chifeng 2011a). This same period is dealt with by a smaller survey of 200 km<sup>2</sup> carried out in 2009 in the upper reaches of the Daling 大凌 River Valley in western Liaoning Province (Liaoning et al. 2010; Peterson et al. 2010, 2014a). The Chifeng and Upper Daling survey areas, lying 150 km apart, participated in the same sequence of archaeological cultures (Figure 2), making possible a comparison that encompasses the social dynamics of a system larger than either region on its own.

## The Two Regions

Both the Chifeng and Upper Daling survey areas are cold and dry in the winter, dry and very windy in the spring, and very hot during the summer, cooling rapidly with the onset of autumn (Kalaqin 1998; Kong et al. 1991; Teng and Shelach 2011). Rainfall is concentrated in June, July, and August; much of it arrives in the form of scattered summer thundershowers. Total precipitation varies substantially from year to year. Bedrock of several kinds from earlier geological epochs was covered during the Quaternary by loess blown from the eastern margins of the Gobi desert (Avni et al. 2010). Loess is extremely fertile; its potential for agriculture is limited only by availability of moisture. The major staple crops today are maize and millet; sunflowers are grown to produce oil, especially in the Chifeng region; wheat is also grown, particularly in the Upper

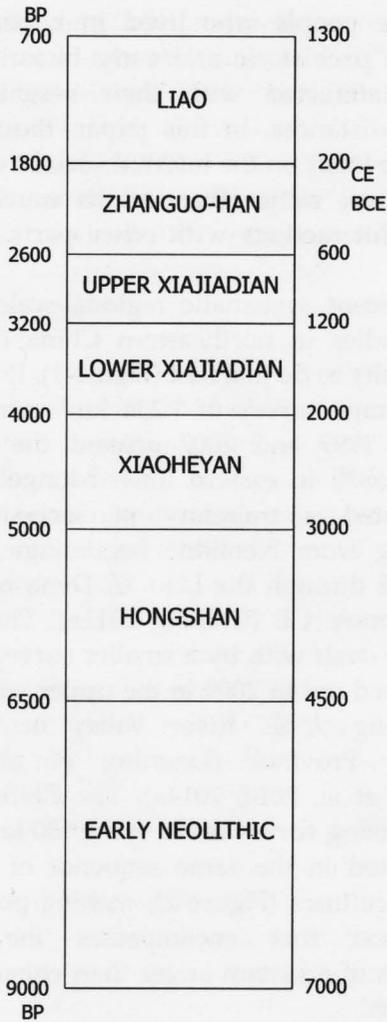


Figure 2. Chronological chart.

Daling region, but on a much smaller scale than maize or millet. Cultivation of these major staples, along with an enormous variety of vegetables and legumes, is extremely intensive on flat alluvial valley floors which are widely irrigated by pumping water from wells. The valleys are mostly those of small tributary streams, whose floodplains are usually less than 2 km wide. Crops on these valley floors are now protected from frequent flooding by dikes along the rivers. More extensive, but still substantial, cultivation (especially of maize and millet) also occurs in adjacent rolling uplands. These fields are naturally protected from flooding, but are less productive than valley floor fields and more at risk of crop failure from drought, since for the most part they cannot be irrigated. Several varieties of fruit trees are cultivated, especially to make use of sectors of uplands where soils are thinner, stonier, and retain less

water. Modern efforts at reforestation have been extensively applied to some of the highest, steepest, and least cultivable slopes. Very small herds of sheep and goats (often numbering 10 or fewer) are brought from villages on a daily basis to graze in uncultivated patches. Pigs, cattle, and chickens are raised in the villages.

The flat valley floors in the Upper Daling survey area lie at about 300 m above sea level; those of Chifeng, at about 600 m. Consequently, the Upper Daling area is warmer than Chifeng, and the growing season for crops correspondingly longer. In Chifeng, mean temperature is between  $-11^{\circ}\text{C}$  and  $-15^{\circ}\text{C}$  in January, and  $20^{\circ}\text{C}$  and  $23^{\circ}\text{C}$  in July (Kong et al. 1991). The corresponding figures for the Upper Daling survey area are  $-11^{\circ}\text{C}$  and  $24^{\circ}\text{C}$  (Kalaqin 1998:119). The Chifeng survey region averages 135–140 days without frost each year (Teng and Shelach 2011); the Upper Daling region, 141 (Kalaqin 1998: 124, 125). The Upper Daling region also receives more precipitation than Chifeng (500 mm compared to 350–450 mm per year; Kalaqin 1998: 123; Teng and Shelach 2011). These modest climatic differences give the Upper Daling region a slight edge over Chifeng in agricultural productivity, although the difference between more and less productive zones within either region is vastly greater than the small difference in average productivity between the two. The Upper Daling survey area is more tightly circumscribed around the most productive agricultural land. It is surrounded by less productive hillier terrain, much like territory that is more abundantly represented within the Chifeng survey area. This must be taken into account in interpreting the comparisons below of population densities and resource pressure.

### The Two Surveys

The Upper Daling and Chifeng surveys used what are by now relatively standard intensive pedestrian complete coverage surface survey methods, fully described in the project reports (Drennan 2011; Drennan et al. 2003b; Peterson et al. 2014a). In both surveys the collection units (not “sites”) were the fundamental units of analysis. These were clustered mathematically based on their spatial distributions and surface

sherds densities to delineate human social communities at both local and supra-local scales. This delineation relies on the distance-interaction principle—that larger numbers of people living closer together interact more intensively than smaller numbers of people living farther apart. It is this more intensive interaction in which communities are constituted. The full rationale and methods of such analysis have already been discussed at length by Peterson and Drennan (2005). Population estimates for both regions were derived from measurements of both the areal extent and density of sherds of each period in each surface scatter, allowing for the length of the period during which these sherds accumulated (Drennan et al. 2003a; Drennan and Peterson 2011; Peterson et al. 2014a). These population estimates are of course very approximate; they are given below in the form of a range between minimum and maximum estimates, providing an indication of just how approximate they should be taken to be.

### **Early Neolithic Communities (7000?–4500 BCE)**

The Neolithic in northeastern China begins with the Xiaohexi 小河西 period (7000?–6000 BCE), thus far recognized at only a few excavated sites (Neimenggu 2004; Shao 2004; Suo 2005; Suo and Guo 2004; Suo and Li 2008; Xin and Fang 2003; Xu and Zhu 2000). Remains of the ensuing Xinglongwa 兴隆洼 (6000–5250 BCE) and Zhaobaogou 赵宝沟 (5250–4500 BCE) periods are somewhat more abundant (Aohan 1991; Liaoning 1988, 1994; Li 2008; Neimenggu 1997, 2004; Shelach 2006; Xin and Fang 2003; Yang and Liu 1997; Zhao 2003; Zhongguo 1985, 1987, 1997a, 1997b, 2004). Excavated sites of all three periods (none of which are located within either survey area) include compact sedentary villages of as many as a few hundred people. Since all locales with Early Neolithic pottery in the Chifeng survey area seem to be small hamlets or even single family farmsteads, however, only a small proportion of the population probably lived in large villages like those that have been selected for excavation (Chifeng 2011a). Subsistence remains recovered from excavated sites include cultivated millet

and soybeans, domesticated pigs, and numerous species of wild flora and fauna (Fuller, Harvey, and Qin 2007:326; Shelach 2000, 2006: 321, 322; Tao et al. 2011; Zhao 2004; Zhongguo 1997a, 1997b, 2004). Social organization appears egalitarian, and there is no evidence for productive differentiation until the very end of the Zhaobaogou period (Shelach 2000, 2006).

No Early Neolithic remains at all were encountered in the Upper Daling survey. This is a clear contrast with the Chifeng region. It is true that Early Neolithic remains in the Chifeng region were very sparse, and that the Daling River survey area is only about one-sixth the size of the Chifeng survey area, but these facts alone do not account for the absence of Early Neolithic materials in Upper Daling. In Chifeng, 172 Xinglongwa sherds were encountered representing 19 spatially separate occupations, and 435 Zhaobaogou sherds representing 28 occupations. If the Upper Daling region had been utilized as intensively as the Chifeng region during Early Neolithic times, at least a few occupations of each period should have been identified. The difference in survey outcomes is thus a reliable indication that even the very sparse utilization of the Chifeng region during Early Neolithic times was more intensive than in Upper Daling. Clearly, the Early Neolithic was a period in which a very small population was spread through the vast area of northeastern China. Residence patterns were sedentary, but settlements, of course, shifted over time. The lack of remains in the Daling survey area does not indicate that no one ever lived there during the Early Neolithic, but rather that settlements there were fewer and perhaps shorter-lived than in the Chifeng region—so much so that remains are enough scarcer in the Daling Valley that they escaped detection entirely despite the somewhat more intensive coverage of the Daling survey.

### **Hongshan Communities (4500–3000 BCE)**

Platforms, sometimes with large and impressive tombs containing elaborately carved jade artifacts, have caused many scholars to identify Hongshan 红山 societies as more “advanced”

than Early Neolithic ones (e.g. Barnes and Guo 1996; Guo 1995a, 2005, 2006; Li 2008; Liaoning 2012; Liu 2006; Nelson 1996, 1997; Su 1994; Wang 2006; Zhu 2006). These platforms are 1–2 m high, up to 25 m across, and constructed of earth and rock rubble usually faced with stone. They are often surrounded by hundreds of bottomless painted pottery cylinders up to 1 m high and 0.5 m in diameter. No structures were built atop these platforms; because of this, and because of the apparently symbolic nature of the jade offerings, the platforms are taken to be ceremonial in function. These remains, especially the tombs, certainly testify to the emergence of pervasive social inequalities of some kind, as well as to societies of sufficient demographic scale to construct and use such monuments. The skills required to carve jade and to make elaborate painted pottery suggest specialized producers. Remains from excavated sites indicate a strongly agricultural subsistence pattern (based largely on cultivated millet and pig husbandry), complemented by wild resources similar to those used in Early Neolithic times. The Hongshan period has regularly been identified as the time when complex social organization emerged in northeastern China.

In the Upper Daling survey area a Hongshan population estimated at 750–1,500 lived in 134 local communities (Figure 3). The largest of these was a substantial village estimated at 250–500 inhabitants (Figure 4). Two other local communities had more than 50–100 inhabitants. All others had fewer than this number; more than 100 of them were farmsteads of one or two families. These farmsteads housed about 12% of the Hongshan regional population; 48% of the regional population lived in villages estimated at more than 50–100 inhabitants (Figure 5). The most favored settlement location was along the margins of the flat valley floors where higher ground afforded protection from flooding and both upland and valley floor resources were readily accessible.

Hongshan local communities were spread from one end of the Upper Daling survey area to the other, but their distribution was decidedly uneven. They form four clusters, seen especially clearly in a mathematically smoothed surface representing occupation density (Figure

6). Each is a few kilometers across, and they are separated from each other by more sparsely occupied territory. Such regional-scale clusters of local communities have often been interpreted as small independent polities or districts. Elsewhere we have called them supra-local communities on the premise that they represent the same kind of centrally focused interaction that defines local communities, but at a larger scale (Peterson and Drennan 2005, 2011). The two districts at the northern and southern extremes may not be fully represented in the Upper Daling survey area, but the two in the middle are 5–8 km across with estimated populations of 150–300 and 450–900. Each has surface indications of ceremonial platforms and elaborate tombs at several centrally located settlements. One of these, at Dongshanzui 东山嘴, has been extensively excavated (Guo and Zhang 1984). These districts of a few hundred people each appear to be the supra-local communities into which the Hongshan population was organized, and which built and used the ceremonial platforms. The ceremonies for which the platforms were constructed presumably played an important role in the centrally focused interaction that drew local communities into the clusters that make these supra-local communities recognizable on the landscape.

These supra-local communities surely interacted with each other, but apparently as independent entities; that is, no one seems large enough to have dominated the others. The size disparity between the two most complete districts within the survey area seems larger than it probably really was. More intensive work subsequent to the regional survey (Peterson et al. 2014a) indicates that the district with the larger population had substantial occupation throughout Hongshan times, while the smaller one existed primarily during the later part of the period. The estimated average of 150–300 persons over the entire period for this district, then, actually represents few or none for the early part, and more than 150–300 for the later part. Thus when they both existed contemporaneously, they were of much more equal size than the population estimates superficially suggest.

The Upper Daling survey area lies in a part of western Liaoning where there is a particular

abundance of especially large Hongshan ceremonial platforms. This was known before the survey was carried out, because a number of them had been excavated, and many others had been reported on the basis of surface remains. We have loosely referred to this area of abundance of public architecture as the Hongshan “core zone” to distinguish it from a much larger surrounding area where such monuments are smaller and scarcer (Chifeng 2011a; Peterson 2006; Peterson et al. 2014a; Shelach 1996). The Chifeng region pertains to this latter region, with remains of ceremonial architecture less than one-tenth as abundant as in the Upper Daling region. Despite the disparity in ceremonial construction, however, Hongshan period demography and communities in Upper Daling and Chifeng regions are quite similar. The largest local communities in both regions had populations in the low hundreds (Figure 4). The Chifeng survey area is six times larger, so it is not surprisingly that it had five communities in this size range compared with the one in Upper Daling. The majority of local communities in both regions were farmsteads of one to two families. The population distribution in Chifeng tilts slightly more toward larger communities (Figure 5), with 59% in settlements larger than 50–100 (compared to 48% for Upper Daling). Supra-local community patterning was also similar in the two regions. Chifeng districts seem a little smaller both spatially and demographically than the largest district in Upper Daling, at 3–5 km across and ranging up to a maximum population estimate of 400. Several Chifeng districts, however, were larger than the second largest in Upper Daling. The estimated population density in the Upper Daling survey area is twice that of Chifeng (Figure 6). Given the imprecision of these estimates, however, and the fact that the Upper Daling survey area is more tightly constrained around prime agricultural land, one should not read too much into this difference.

Comparison between the Upper Daling and Chifeng regions, then, confirms that the Upper Daling region was more “developed” in terms of the abundance and scale of ceremonial architecture. This substantially greater investment in public works was not, however, the

product of more extensive sociopolitical integration. At both local and supra-local scales community patterning in both regions was very similar. Nor did this discrepancy in investment in public works result from a substantially larger, denser population was in the somewhat more productive environment of the Upper Daling region. There was no meaningful difference in regional population density between the two regions; estimated populations were surprisingly small in both. It could be that Upper Daling communities had more pronounced social inequalities, greater differences in wealth accumulation, or more intensive craft specialization, and that these were connected to the stronger expression of ceremonial architecture. These aspects of the relations between households within communities carry us beyond the scope of this article since they cannot be reconstructed with regional-scale settlement data. They require more fine-grained research at smaller scales, and just such research is underway in Upper Daling (Peterson et al. 2014a).

### The Xiaoheyuan Period (3000–2000 BCE)

Sites with Xiaoheyuan 小河沿 ceramics are extremely sparse all across northeastern China. A survey of the Lower Bang valley reports Xiaoheyuan materials at only four sites, fewer than produced sherds of either Xinglongwa or Zhaobaogou periods there during the Early Neolithic (Li 2008). Results from Chifeng are similar; the 435 Xiaoheyuan sherds recovered are only about 0.6% of the total. In the Upper Daling survey area, Xiaoheyuan sherds recovered totaled only 122 (out of 20,248 sherds). These sherds came from 44 separate collection units (Figure 3), and would produce a population estimate of 50–100 inhabitants for the entire survey area (Figure 7) distributed among 19 local communities, none of which had more than 25 inhabitants (Figure 4). With such a small population scattered over 200 km<sup>2</sup> (less than 0.5 persons/km<sup>2</sup>) it is not appropriate to imagine supra-local communities of the sort recognized in Hongshan times.

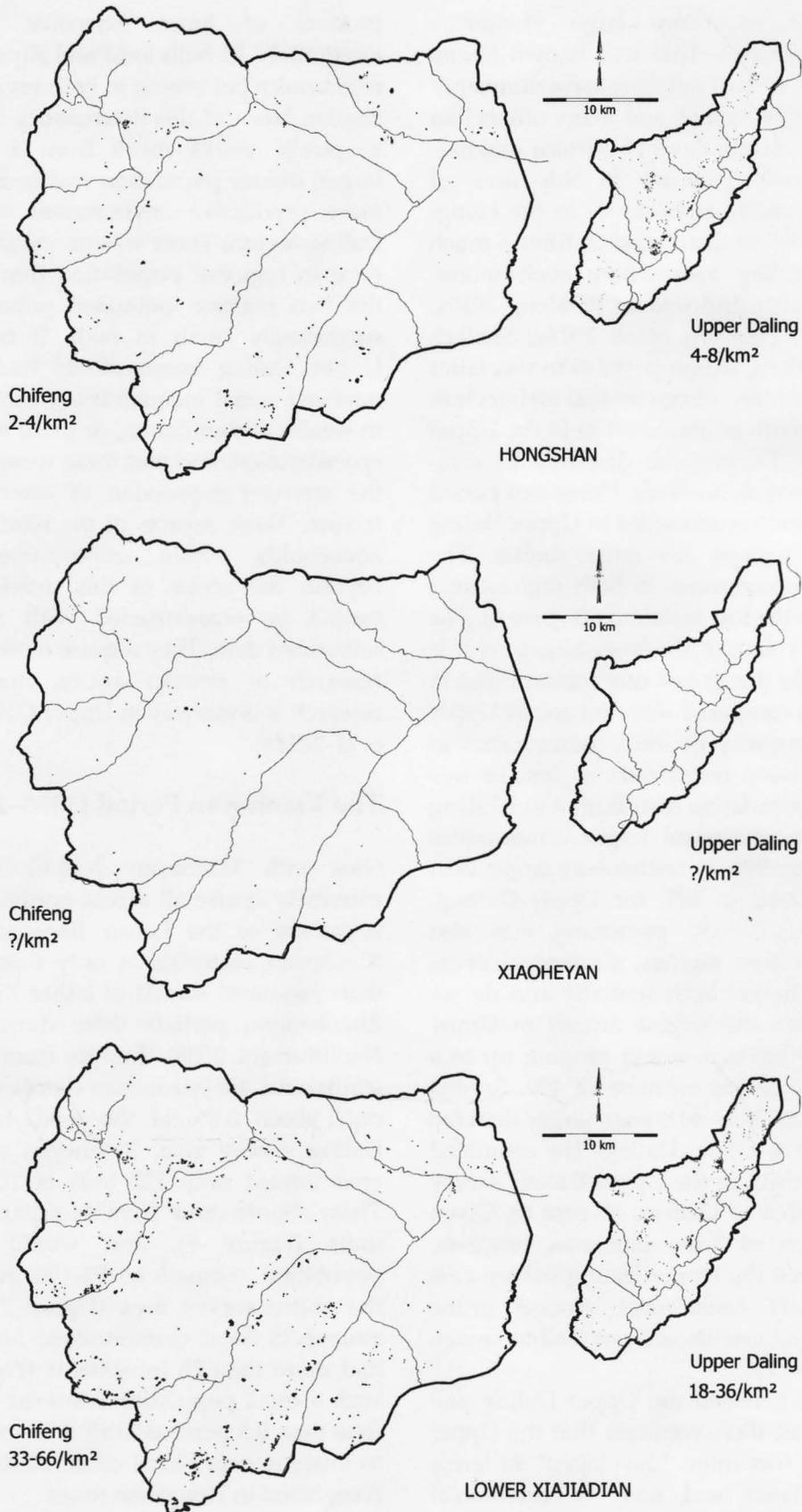
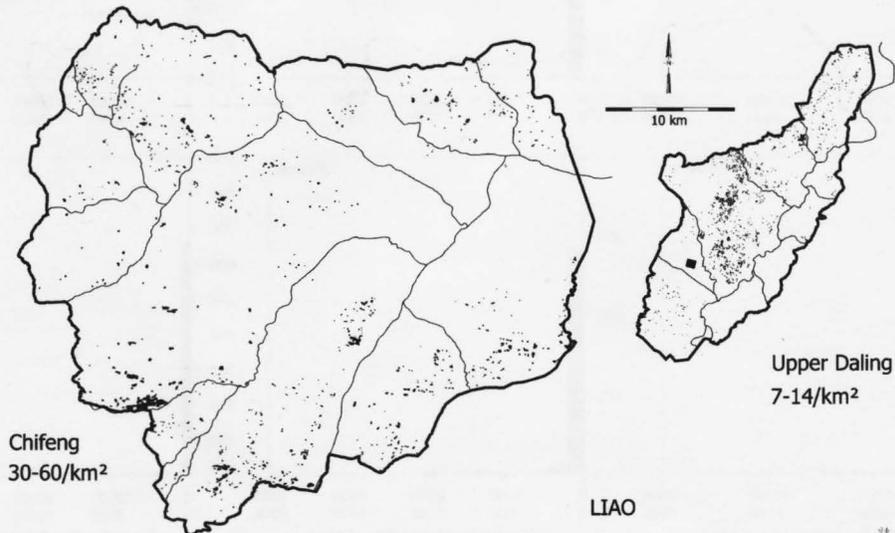
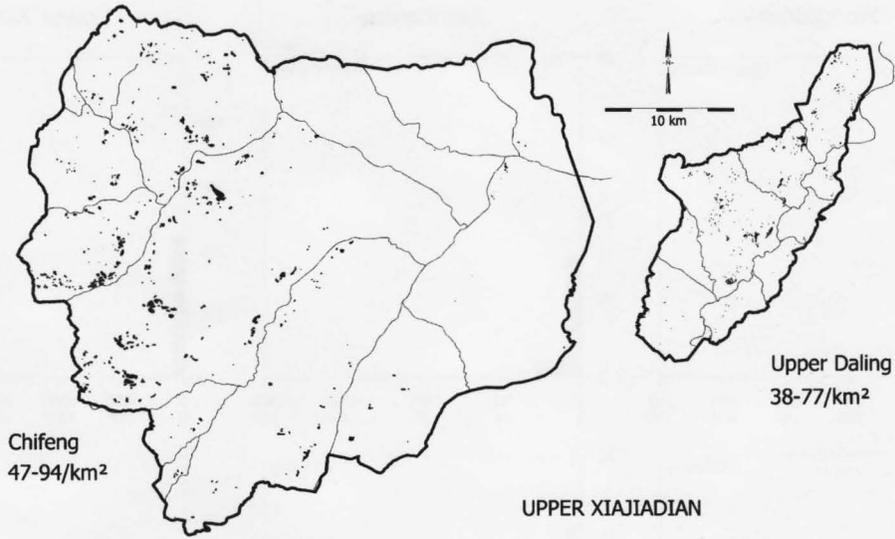


Figure 3. Settlements in the Upper Daling and Chifeng survey regions with estimated regional population densities in persons/km<sup>2</sup> (sources: Chifeng 2011a, 2011b; Peterson et al. 2014a, 2014b).



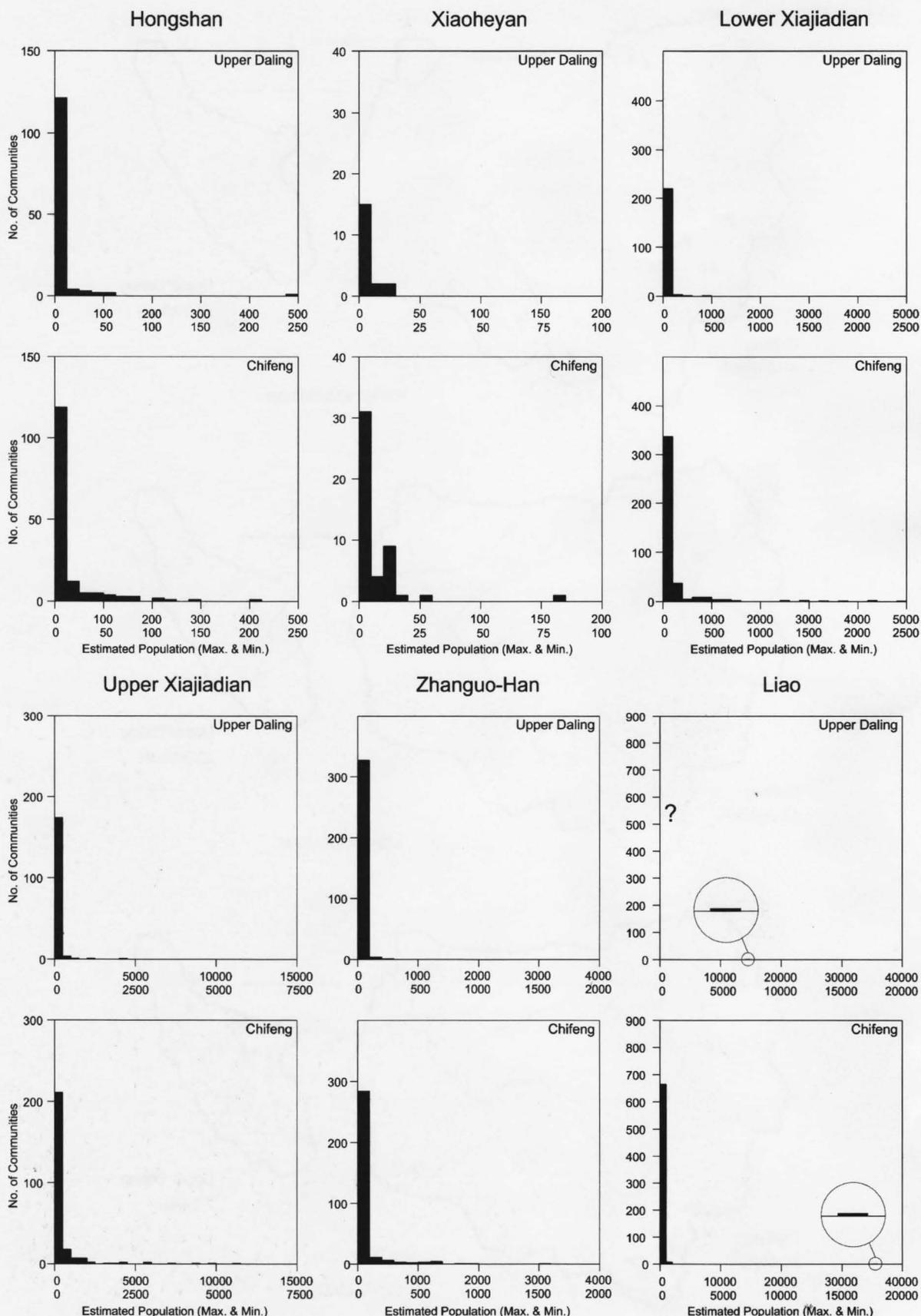


Figure 4. Numbers of local communities of different sizes in the Upper Daling and Chifeng survey regions (sources: Chifeng 2011a, 2011b; Peterson et al. 2014a, 2014b).

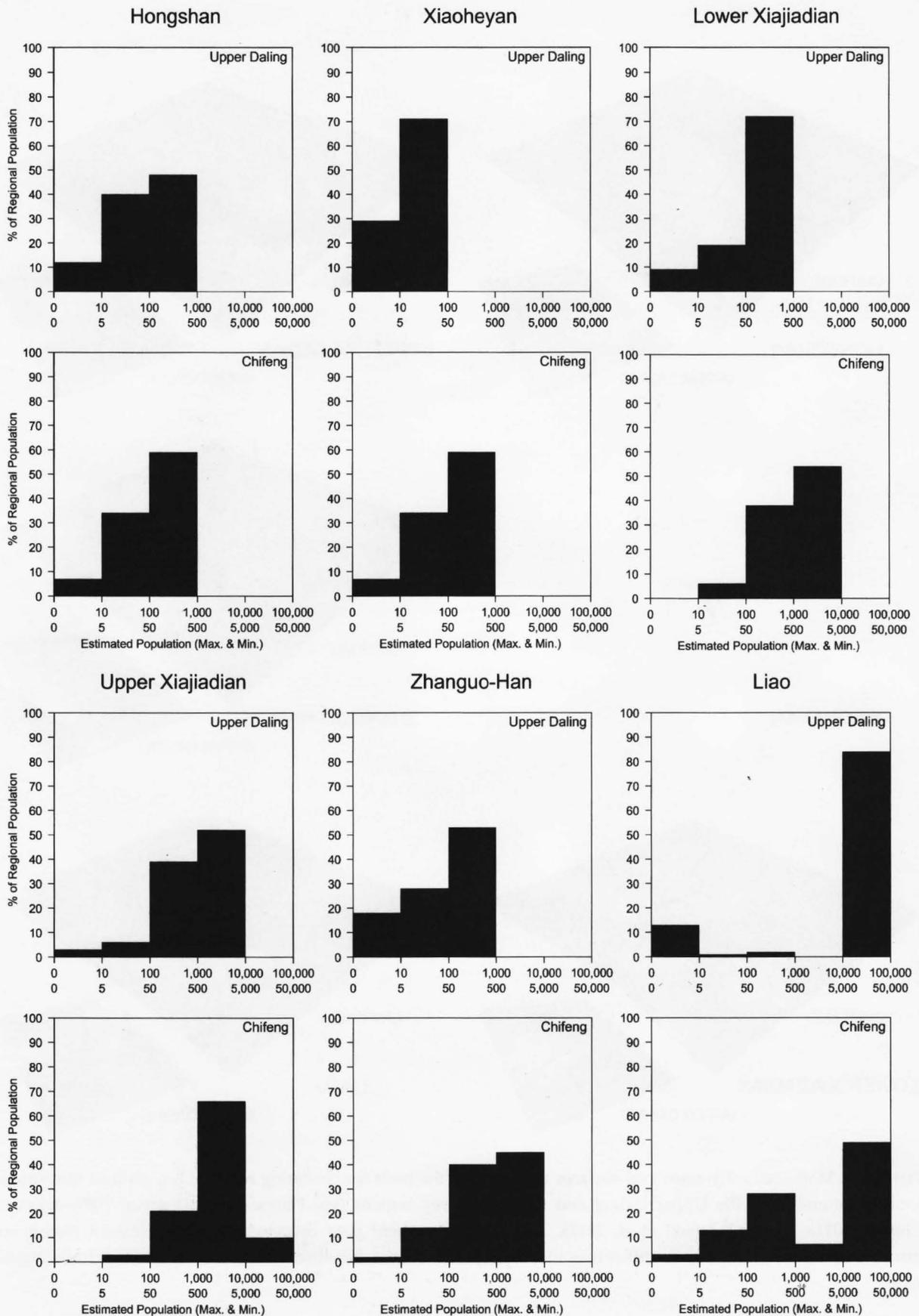


Figure 5. Proportion of regional population in local communities of different sizes in the Upper Daling and Chifeng survey regions (sources: Chifeng 2011a, 2011b; Peterson et al. 2014a, 2014b).

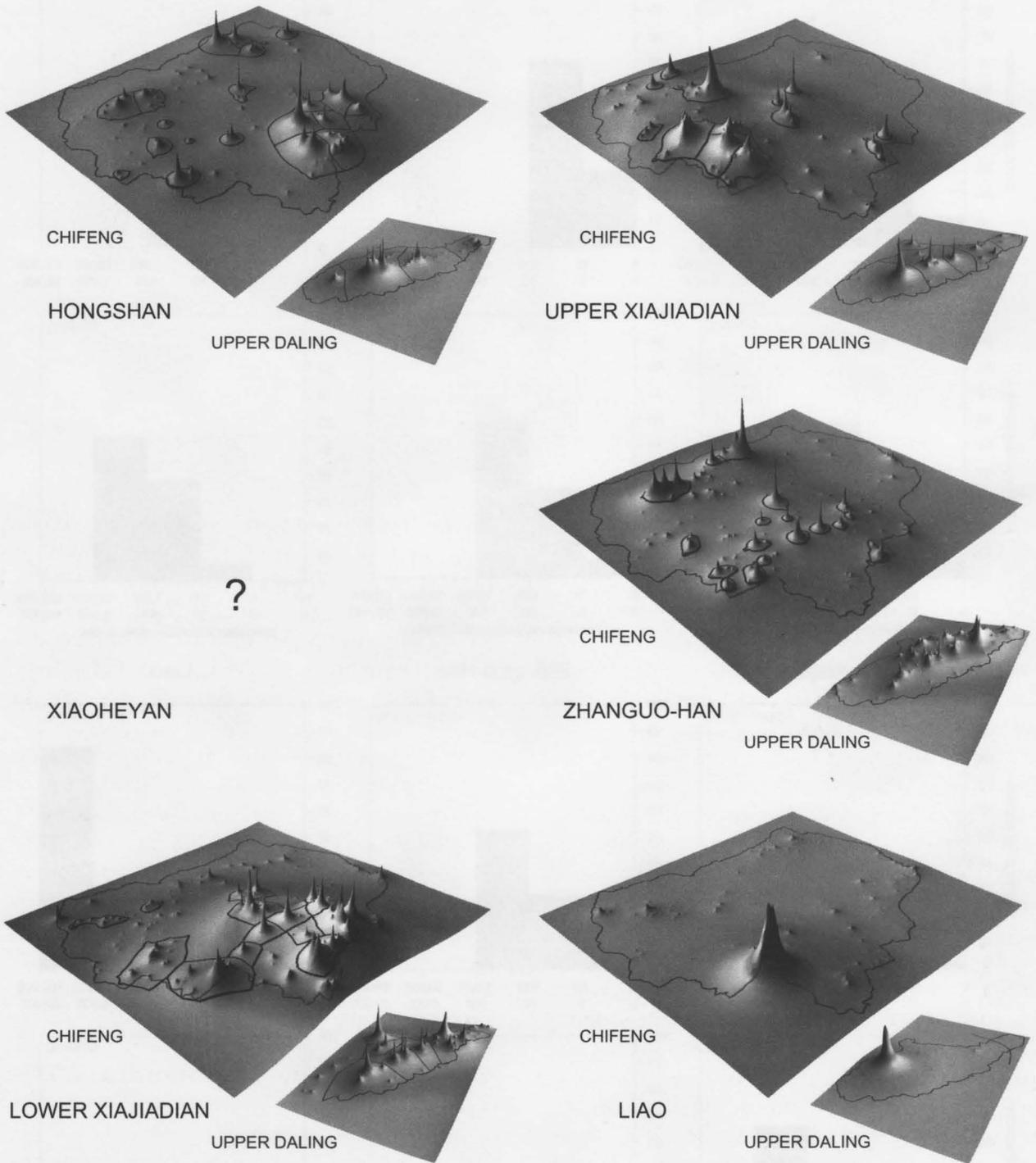


Figure 6. Mathematically-smoothed surfaces that provide the basis for clustering regional populations into supra-local communities in the Upper Daling and Chifeng survey regions (see Peterson and Drennan 2005—sources: Chifeng 2011a, 2011b; Peterson et al. 2014a, 2014b). Pottery sherd data collected for the Xiaoheyan period are insufficient for modeling due to difficulties identifying sherds from this time period and its shorter chronological span.

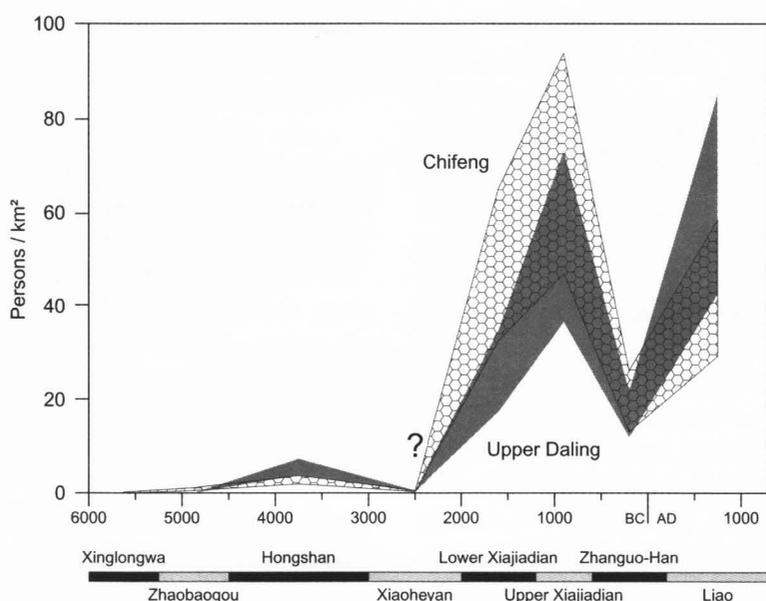


Figure 7. Regional population density by period for the Upper Daling and Chifeng regions (sources: Chifeng 2011a, 2011b; Peterson et al 2014a, 2014b).

Interpreted at face value, then, survey results for both the Upper Daling and Chifeng regions indicate a Xiaoheyuan population decline of catastrophic proportions. Indeed, it has been suggested that deteriorating climate caused a near complete abandonment of northeastern China (e.g. Li 2008; Liu and Feng 2012). This, however, seems unlikely. While such devastating demographic declines are not impossible, they are extremely unusual; evidence suggesting such a thing should be carefully examined. Any climatic shift of sufficient magnitude to have the demographic consequences imagined would certainly have left clear and consistent traces in the multiple lines of paleoclimatic evidence available. Liu and Feng (2012) date the climatic event they focus on at 2000 BCE, which is much too late, and the paleoclimatic data for around 3000 BCE in northeastern China are particularly unclear. They provide confusing and conflicting indications of the direction and magnitude of any change in temperature or precipitation (Teng and Shelach 2011). This in itself is evidence that there was no climatic shift sufficient to have the dramatic demographic impact attributed to it. Moreover, the elegant pedestal vessels that comprises the most characteristic Xiaoheyuan ceramics, and the elaborate multiple burials in which they were placed as offerings (Liaoning and Chifeng 1998; Neimenggu 2010), are inconsistent with the image

of a tiny, remnant population attempting to eke out a living in the face of inhospitable environmental change.

Elsewhere we have argued that there may not have been much population decline during the third millennium BCE after all, and that at least some utilitarian domestic ceramics that date to this period are likely to be classified as Hongshan, or possibly Lower Xiajiadian (Chifeng 2011a; Peterson et al. 2014a). Thermoluminescence dating of sherds from the Dongshanzui Hongshan ceremonial site has recently provided support for this interpretation (Peterson et al. 2014a). For the moment, then, simplistic accounts of climate-induced catastrophe can be rejected, but we cannot confidently compare Xiaoheyuan period organization for the Chifeng and Upper Daling regions.

### Lower Xiajiadian Communities (2000–1200 BCE)

The Lower Xiajiadian 夏家店 period (including its eastern variant labeled Gaotaishan) represents the beginning of the Bronze Age in northeastern China. Bronze artifacts are not very abundant, but knives and arrowheads are found in graves, along with other offerings: ceramic vessels with polychrome decoration are sometimes numerous, and there are adornments of jade, shell, and other materials (Guo

1995b; Neimenggu 1984; Zhongguo 1996). Offerings of this sort are often found in elaborate graves built of stone slabs. Burial remains thus include characteristics archaeologists often take to indicate the presence of wealthy elites more strongly set off from commoner populations than had been the case earlier (Flad 2001; Shelach 1999: 110–115, 2001). Circular mud brick houses can be as small as 4 m in diameter; others are made of stone, sometimes with double walls, and are known to have diameters up to 25 m. Such residential structures add to the impression that some families were economically much better off than others (Shelach 1999: 96–101). Artifacts of several materials, including bronze, ceramic, and jade, include luxury goods of very high quality, suggesting a level of skill likely to be attained only by specialist producers. Subsistence centered on millet cultivation combined with animal husbandry (Guo 1995b:160; Li and Gao 1985). Excavated midden deposits yield sheep, goat, and cattle remains, but pig bones are the most abundant faunal remains from residential contexts (Chifeng 2011a; Wang 2004: 256). Warfare and conflict are indicated by sometimes quite massive fortifications consisting of walls, ditches, watchtowers, and gated entries (Cao and Sun 2009; Liaoning 2001; Neimenggu 2007; Shelach, Raphael, and Jaffe 2011; Xu 1986).

Substantial population growth certainly characterizes both the Upper Daling and Chifeng survey areas in Lower Xiajiadian times (Figure 3). The estimated Lower Xiajiadian population of the Upper Daling region was five times the Hongshan population; in Chifeng, Lower Xiajiadian population represents growth by a factor of 20 over Hongshan times (Figure 7). If some sherds classified as Hongshan actually date to the second millennium BCE, then the population estimated for Hongshan times would be somewhat less, and these growth factors would be even more impressive. If some sherds classified as Lower Xiajiadian actually date to the second millennium BCE, population growth from Hongshan to Lower Xiajiadian times would still be impressive. If population had almost disappeared from northeastern China during the third millennium BCE, then the Lower Xiajiadian demographic rebound would be stunning. Allowing for all possible inter-

pretations, Lower Xiajiadian demographic expansion falls into somewhere between “impressive” and “stunning”.

Only the three largest of the Upper Daling region’s 226 local communities had populations above 300–600; none reached 1,000 (Figure 4). Six more local communities exceeded the 100–200-person range. Fully 210 local communities had fewer than 50–100 inhabitants; the vast majority were not really even communities, but only farmsteads of one or two families. Even though farmsteads account for most of the settlements, only about 9% of the population lived this way (Figure 5). Local communities over 50–100 represent about 72% of the Lower Xiajiadian regional population. The largest local communities, however, saw much greater increases in Chifeng (by a factor of 12, in contrast to a factor of 4 for the Upper Daling region). The Chifeng population was thus much more oriented toward larger settlements, with over 50% living in local communities larger than any in the Upper Daling survey area (Figure 5).

Spatially small Lower Xiajiadian districts continue the Hongshan pattern in both Chifeng and Upper Daling (Figure 6). The populations of these supra-local communities grew in both regions, but their demographic growth in Chifeng was much more dramatic. Even with major regional population growth, the total number of supra-local communities changed very little in either survey area, increasing slightly in Upper Daling (from 4 to 6), and actually decreasing in Chifeng (from 20 to 16) where regional population growth was most intense. Consequently, the populations of supra-local communities were substantially larger in Lower Xiajiadian times than they were before, especially in Chifeng, where the modal population for Lower Xiajiadian districts (1,500–3,000) was triple that of the Upper Daling region. Several Chifeng districts now had populations as large as 6,000 or 7,000 inhabitants. The separation of districts by zones of lower density settlement and the fact that no one is very much larger than others suggest that the districts in both regions were independent political entities. Many Lower Xiajiadian sites are known from all across the culture area; none is much larger or more complex than those in

either survey area. Political integration thus seems tighter, but resolutely fragmented and small in scale, comprising small polities whose territories were not much bigger than those of Hongshan supra-local communities.

In sum, Lower Xiajiadian was, as has long been recognized in at least a general way, a time of major demographic expansion, social change, and political consolidation. These trends are unmistakable in both the Upper Daling and Chifeng survey regions, although they are manifest much more strongly in all respects in Chifeng. This is a reversal from Hongshan times, during which the hallmarks of social complexity were much more conspicuous in the Upper Daling region. Whatever connection there may (or may not) have been between the somewhat more abundant resources of the Upper Daling region and its participation in the Hongshan core zone development, resource abundance cannot account for the Lower Xiajiadian pattern of especially vigorous development in the region of sparser resources. A contrary set of models focusing on scarcity, risk, and conflict could be more applicable to this pattern (e.g. Anderson, Stahle, and Cleaveland 1995; Billman 1997; Boserup 1965; Carneiro 1981, 1998; Cohen 1977; Elliott 2005; Field 2004; Hommon 1986; Kirch 1991; Lepofsky et al. 2005; Monks 1997; Sebastian 1991; Spencer 1993, 1994). It is not possible to make a meaningful estimate of carrying capacity for either region in Lower Xiajiadian times because knowledge of subsistence technology is incomplete, and of climate change, vague. At the much higher population levels of Lower Xiajiadian times, however, pressure on subsistence resources, while not conclusively demonstrable, is a possibility to be taken seriously.

Resource scarcity, if present, would provide a ready rationale for the high level of conflict suggested by abundant and elaborate fortifications at Lower Xiajiadian settlements in the Chifeng region. On this foundation, a scenario could be constructed in which small Lower Xiajiadian polities competed militarily with each other for access to key resources. This could drive demographic growth as polities with larger populations would have a competitive advantage in the form of larger labor forces for constructing fortifications and the

ability to field larger fighting forces. And impressive demographic growth is exactly what we have already observed in the archaeological settlement data for Lower Xiajiadian times. Such conditions would enhance elites' opportunities for resource control, wealth accumulation, and consolidation of political power, as often observed in the literature on early complex societies (e.g. Arnold 1996; Carneiro 1981, 1998; Drennan 1987; Earle 1991; Gilman 2001; Webster 1990). Larger regional populations would, in turn, heighten resource pressure and create a developmental spiral ending in small, tightly-packed regional polities locked in a competitive stalemate.

This description fits the Chifeng settlement evidence especially well. While not inaccurate for the Upper Daling region, the process clearly was more attenuated there. One settlement provides clear indication of the kind of impressive fortifications for which Lower Xiajiadian sites are well known. The top of a tall ridge with steeply sloping sides is surrounded by a substantial stone wall and ditch enclosing an area of nearly 1 ha. Surface sherd densities are extremely high, resulting in a population estimate of 400–800 for this local community, which is the central place of one of the five districts. This is, however, the only fortified Lower Xiajiadian settlement, making fortifications a much less conspicuous part of the evidence from this period in the Upper Daling region. This could be taken to indicate that conflict was less intense in the Upper Daling region than in Chifeng. This would make sense in terms of the scenario outlined above, since resource competition would have been less intense in the Upper Daling region. Regional population density was much lower in Upper Daling (Figure 3) although its carrying capacity was higher, both because of slightly higher temperature and precipitation and because the survey area contains a higher proportion of the most productive agricultural land, as noted above. Less resource pressure would lead to less intense competition, less population growth, and less opportunity for elite advancement and political centralization, providing less impulse to development in Upper Daling during Lower Xiajiadian times.

Comparison of the pace of development, then,

between the Upper Daling and Chifeng regions supports a model relying on scarcity, competition, and conflict as the driving forces behind Lower Xiajiadian demographic growth, increasing socioeconomic inequalities, and political centralization. How such a dynamic could have emerged from Hongshan societies cannot even be speculated about until the organizational patterns of the third millennium BCE can be more confidently constructed. It also remains to be explained why pressure on resources in Chifeng in Lower Xiajiadian times was not relieved by a demographic shift toward less stressed regions like Upper Daling that were, after all, part of the same broad, open environmental zone and culture area. That is, Chifeng in this scenario sounds like a political pressure cooker, but it is not entirely clear what circumstances kept its lid on to maintain the pressure. In any event, playing off against each other settlement analyses from different regions within the same culture area has once again made possible a dynamic account of the forces of social change, and progress toward an empirical evaluation of explanatory models.

### Upper Xiajiadian Communities (1200–600 BCE)

The Upper Xiajiadian period (including its Linghe 凌河 or Shi'ertaiyingzi 十二台营子 variants) was largely contemporaneous with the historically known Western Zhou 周 in the Central Plain. Bronze comes into much more widespread use for making elaborate ritual vessels, weapons and armor, chariot fittings, ornaments, and a wide range of practical tools and utensils. Bronze objects in recognizable styles of the Central Plain are found across northeastern China. Burials sometimes have quite large numbers of bronze objects of all these kinds, as well as a long list of other kinds of goods: ceramic vessels; sacrificed animals; ornamental items made of gold, shell, and stone; stone axes, hoes, and reaping knives; bone needles; and other tools. Stone slab graves, sometimes containing wood or stone coffins and covered with small mounds of earth, are abundant on the landscape. Mortuary remains have been interpreted to indicate more substantial inequalities of wealth than ever

before (Shelach 1999:163–177, 2001). Houses were built of stone or mud brick and seldom reach as much as 10 m in diameter (Liaoning 1983; Liu and Xu 1981; Zhongguo 1974, 1975). The argument for specialized producers based on the quality of workmanship seen in bronze, stone, and other objects, is even stronger than it was for Lower Xiajiadian. Fortifications, on the other hand, so abundant in the Chifeng region in Lower Xiajiadian times, are no longer at all common. This is a curious contrast to the prominence of weaponry and other military gear among Upper Xiajiadian burial offerings. It suggests a reduction in actual conflict or at least a substantial change in its nature if fortifications were no longer required. The military burial offerings have been attributed to the role played in the projection of identity and power by a warrior ethos and connections to northern steppe regions (Shelach 2009). The Upper Xiajiadian culture is often taken in the archaeological literature to represent the replacement of Lower Xiajiadian agricultural subsistence by the pastoral nomadic people that figure so prominently in early Chinese history (e.g. Bunker 1990; Linduff 1997; Qiao 1992; Shelach 1999, 2009; Tian 1995). Settlement study in the Chifeng and Upper Daling regions, however, shows fully sedentary residence patterns with subsistence focused on cultivated millet and domesticated pigs, supplemented by sheep, goats, and cattle (Chifeng 2011a; see also Wang 2004: 257).

Population in the Upper Daling survey area reached a level approximately double that of Lower Xiajiadian times; Chifeng's population grew as well, but not so rapidly, allowing the population-density gap between the two regions to narrow (Figures 3 and 7). Three local communities in the Upper Daling region exceeded 500–1,000 inhabitants; one reached 2,000–4,000 (Figure 4). Although farmsteads of one or two families were, as usual, the most common kind of settlement, they account for an even smaller proportion of the population (3%) than in Lower Xiajiadian times (Figure 5). Over half the population lived in larger settlements than had previously existed in the Daling survey area—three local communities could loosely be called “towns” (Figure 6). Chifeng had nearly a dozen such settlements. More than

half the populations of both regions lived in towns (Figure 5). These towns are distinguished by patches of very high surface artifact densities, which indicate particularly compact, nucleated occupation, often associated with more extensive zones of less compact settlement. These large, sprawling unfortified Upper Xiajiadian towns documented by both the Chifeng and Upper Daling surveys would not likely have emerged without a reduction in the endemic conflict of Lower Xiajiadian times.

As we have seen in earlier periods, several separate supra-local communities a few kilometers across are evident in the mathematically-smoothed surface of Upper Xiajiadian occupation for Upper Daling (Figure 6). Some of these districts may extend beyond the limits of the survey area to the north and west, but three of them seem fully delineated within its boundaries. Each of the three has at its center one of the towns mentioned above (visible as the three tallest peaks in the smoothed surface). Modal and maximal district populations are about twice what they had been in Lower Xiajiadian times (now 1,000–2,000 and 2,500–5,000, respectively). Much the same is seen in Chifeng. Spatially small independent districts persisted and modal district populations roughly doubled in both regions.

In sum, then, the developmental roles of Chifeng and Upper Daling had shifted again. In Hongshan times the Upper Daling region fit the role of developmental core zone, at least in the sense of having more abundant and more elaborate public architecture, although populations and community structures were seen to be quite similar to those of Chifeng. Demographic growth and supra-local community consolidation in Lower Xiajiadian times were much more vigorous in Chifeng, leaving Upper Daling behind in these developmental respects. In the transition from Lower Xiajiadian to Upper Xiajiadian, changes in community patterns were stronger in the Upper Daling region, enabling it to narrow the developmental gap in this respect with Chifeng, although Chifeng's population density remained somewhat higher, and its towns and districts had more inhabitants.

The social dynamics of Upper Xiajiadian times seem quite different from those of Lower

Xiajiadian. The dominant feature of settlement change in Chifeng and Upper Daling is an expansion and intensification of town dwelling. The nature of evidence for conflict also changed substantially. The frequency of bronze weapons and armor among Upper Xiajiadian burial offerings shows that conflict was important in the language of prestige, but the radical decline in fortified settlements suggests considerable alleviation of the hostilities between districts that were such a conspicuous feature of the Lower Xiajiadian landscape, especially in Chifeng. If those hostilities had been generated by pressure on resources, as suggested above, one wonders what became of this pressure. Improving climatic conditions for agricultural production could have relieved resource pressure, but the decreasing precipitation in Upper Xiajiadian times (Teng and Shelach 2011) would only have intensified whatever pressure had existed. Pressure was also not relieved by declining regional populations, since population grew in both Chifeng and Upper Daling. The more rapid growth in the Upper Daling region, however, could reflect an evening out of population distribution broadly across the entire Upper Xiajiadian culture area so that it better matched resource distribution. Running somewhat counter to this notion, however, is dramatic Upper Xiajiadian population decline documented in a recently surveyed region at Zhangwu 彰武 in northern Liaoning 辽宁 (Williams 2014).

Scarcity of subsistence resources can also be coped with through changes in technology and economic organization that increase production. There were domesticated horses in northeastern China for the first time during the Upper Xiajiadian period. The use of horses and cattle for traction, if substantiated, would have increased agricultural productivity. The same could be said of improved agricultural tools; although at present bronze axes provide the only concrete evidence of such a thing. Arrowheads and fishhooks were now made of both bone and bronze, and these could have made hunting more productive. Irrigation from small-scale canal systems or shallow wells could make a major difference in crop yields in both Chifeng and Upper Daling, although the application of this technology in Upper Xiajiadian

dian times has not been shown. A possible irrigation canal at the site of Wuhuanchi 勿欢池 dates to late in Lower Xiajiadian times (Xin 1997).

Bronze artifacts recognizably imported from the Central Plain and northwestern China testifies to an intensification of long distance exchange. Molds for bronze casting, crucibles, and slag document considerable increase in local bronze production as well, organized in a more highly specialized way than before. This could be part of a broader restructuring of the economy, with more specialized production generally, and more highly developed webs of interdependence. Upper Xiajiadian ceramics for daily use seem slightly harder, and better made than earlier ones, perhaps indicating more specialized manufacture. Ground stone axes and reaping knives, as well as various kinds of bone tools, were more carefully shaped and more highly polished. Spindle whorls of ceramic and other materials were more numerous than in previous periods.

This is also (as noted above) the period most often suspected to witness the emergence of the mobile specialized herders that have played such a large role in Chinese historical analysis. Direct evidence of this economic adaptation has been difficult to find, and it is clear that the notion of a climate-induced “collapse of the agriculture-based Lower Xiajiadian Culture” and the “rise of pastoral nomadism” (Liu and Feng 2012: 1189; see also Wagner et al. 2013), which persists in print, is a gross oversimplification (Chifeng 2011a: 129). There were clearly large numbers of sedentary farmers and substantial permanent towns in Upper Xiajiadian times. Not surprisingly, archaeological research has been concentrated around the largest sites, which of course, occur in the most agriculturally productive regions. This leaves open the possibility that evidence of mobile herding might be found in the more marginal zones where this specialization would be most likely to occur. This entire set of observations would be consistent with the emergence of a more spatially extensive, diverse and integrated economic system. A greater diversity of more highly specialized subsistence practices could be more sensitive to regionally varying environments, thus enhancing overall

subsistence productivity. Specialized herding could well have been part of this picture, alongside varied ways of combining agriculture with animal husbandry. Settlement pattern research in the Zhangwu region, where environmental conditions seem propitious for the development of specialized herding, however, does not show evidence of it at this time (Williams 2014). The specialized production of non-subsistence craft goods can also increase overall productivity, and contribute to the enhanced well-being of larger populations.

In this scenario, Upper Xiajiadian economic development could be seen as a pathway out of the political balkanization and resource pressure of Lower Xiajiadian times, and the newly founded larger towns of the Upper Daling and Chifeng regions are just the kinds of settlements where one would expect such an economy to be centered. This line of thinking, sparked by regional settlement study and by playing off against each other two survey regions within the same culture area, has led us even farther away from a static description of the homogeneous way of life of a monolithic culture. The resulting account, it must be emphasized, is highly tentative. It appears to be consistent with the archaeological evidence known at present, and at least a few bits of that evidence point suggestively toward the model we have sketched out. Efforts to define and classify subvariants of the Upper Xiajiadian culture attract current attention, but other approaches can provide much fuller and more direct indications of increased subsistence productivity, specialized subsistence and craft production, and increases in the scale of economic interdependence. Research designed to answer the question of whether these trends truly characterize Upper Xiajiadian times could provide archaeological confirmation of the tentative model we have proposed. Such research could, of course, also require modification of the model, or even its complete rejection. Even this last possibility would represent a substantial advance in empirical knowledge of Upper Xiajiadian organization. It is in the hope of stimulating such research that we risk offering the model here.

## Zhanguo-Han Communities (600 BCE–200 CE)

With the Zhanguo 战国– Han 汉 period, of course, we move into a time with much more detailed historical documentation for northeastern China. The state of Yan 燕 is the major political entity of the northeast during much of Zhanguo times, with its capital in what is now Beijing, over 300 km from the Upper Daling and Chifeng regions. The Yan state was eventually conquered and incorporated into the larger Qin 秦 and then finally Han states with even more distant capitals. Both Chifeng and Upper Daling thus take on a very different political character and role as small parts of the distant hinterland of polities representing a projection of power and a scale of political integration on a truly vast scale compared to earlier patterns of organization in northeastern China. Horse-drawn transport made it possible for these powerful political entities to extract hitherto unprecedented quantities of both subsistence and craft goods from the distant territories they controlled, and larger quantities of goods from distant places were imported into the northeast as well. Tools of iron represented a considerable technological improvement over bronze, and would have made agricultural and other kinds of labor much more productive. If the model suggested above for Upper Xiajiadian times is correct, then these long-known aspects of Zhanguo-Han economy can be seen as building upon and intensifying pre-existing trends. In contrast to earlier periods, archaeological settlement study's contribution to previous knowledge is not to provide a broader and more comprehensive view of relationships between settlements, but rather to focus in on the impact of truly large scale political integration and commerce on a hinterland region.

The Zhanguo-Han period was one of dramatic population decline all across both the Chifeng and Upper Daling regions (Figures 3 and 7). The largest Upper Daling local community is estimated at 200–400 inhabitants, about one-tenth the size of the largest Upper Xiajiadian town (Figure 4). Larger local communities (up to over 1,000 inhabitants) persisted in Chifeng, but here too they were much smaller than the Upper Xiajiadian towns.

The proportion of the Upper Daling population living in farmsteads of only one or two families increased to 18% of the regional population (Figure 5). The disappearance of all the larger settlements, and the dramatic increase in the proportion of the population living in farmsteads, represent a sharp ruralization of the earlier largely town-dwelling Upper Xiajiadian population. Settlement is much more broadly scattered throughout the Upper Daling survey area; the tendency toward clustering is weaker than in earlier periods and supra-local communities are not easily delineated. The same demographic trends are seen in Chifeng; regional population decline was even more severe, but ruralization of the population was less pronounced. Regional population densities were now quite similar in the two regions (Figure 3).

The existence of historical records for Zhanguo times provides knowledge of the large scale political environment in which both Chifeng and Upper Daling regions participated, and makes it clear that social and economic development was centered elsewhere. Zhanguo documents, however, provide little specific information about hinterlands so distant from important political capitals. Probably the most important known Zhanguo place near the Upper Daling region was the archaeological site of Huajingou 化金沟, just outside the southern boundary of the survey area, where the existing remains of rammed earth walls enclose an area 300 m × 180 m. Fuller historical detail becomes available in the Han period. As many as three Han counties are specifically named in and around the Upper Daling survey area. The walled county seat of Bailangcheng 白狼城 lies only 5 km to the southwest; Shichengxian 石城县 probably corresponds to the archaeological site of Huangjiadian 黄家店 12 km farther southwest; and Guangduxian 广都县 was at an undetermined location to the north of the survey area. Thus it seems that no settlement even as important as a county seat is included in the Upper Daling archaeological survey.

This picture is entirely consistent with the archaeological remains recorded. Huajingou and the Han period county seats would have had populations of 5,000 people or perhaps substantially more. The largest Zhanguo-Han local community in the survey area, at 200–400

people, falls far short of this level, and clearly would have been subordinate to one of the higher-order walled towns outside the survey area. Lacking the anchor provided by a large central place, the smoothed surface for Zhanguo-Han Upper Daling in Figure 6 gives undue importance to this modest village, but even so, there is no sign that this village exerts any strong centripetal forces on the regional population. The ruralization seen in the Upper Daling region is clearly not an adequate generalization about Zhanguo-Han settlement and demographic trends. It is an accurate characterization of the trends that might be observed in many places—places that, like this survey area, were rural peripheries of low-level administrative centers that were themselves in very peripheral positions within the large political entities of Zhanguo-Han times. Although the trend toward ruralization was weaker in the Chifeng region, and there were larger Zhanguo-Han settlements than in Upper Daling, centralizing tendencies are virtually imperceptible there as well. Located to the north of a large Zhanguo town that probably became the head of a later Han prefecture, the Chifeng region was also peripheral to an administrative district on the distant borders of the empire (Chifeng 2011a:134). In contrast to earlier times, Zhanguo-Han political integration had attained a scale far beyond the reach of archaeological settlement analyses, which must thus be interpreted in terms of this larger context.

### Liao Communities (200–1300 CE)

The period referred to here as Liao includes the Liao Dynasty proper (907–1125 CE), as well as politically more turbulent periods before and after it. Since the Liao Dynasty was a phenomenon of northeastern China, Upper Daling and Chifeng were, for part of this period, once again close to a major center of political power. The Liao domain represented a projection of political power much greater than that of the Yan state, although the still earlier Han Empire had forged much larger-scale political integration. The Liao central capital of Zhongjing 中京, however, was located quite nearby, between the Upper Daling and Chifeng survey

regions, only about 75 km from either one. Both Upper Daling and Chifeng settlement analyses thus concern parts of an imperial heartland not far from a major capital, not the distant periphery of an empire.

In the Upper Daling survey area population again grew sharply (Figures 3 and 7). The remains of the historically known Liao mid-level administrative center of Lizhou 利州, with walls enclosing an area 500 m × 600 m, lie under the location of the modern city of Kazuo 喀左; a tall Liao Dynasty pagoda and temple have been preserved there. Lizhou dominated the Upper Daling survey area demographically in a way that no earlier community had. Its population is estimated between 7,000 and 14,000 inhabitants, and only 16% of the population of the survey area did not live there (Figures 4 and 5). Those who did not live in Lizhou were broadly dispersed across the landscape, mostly in innumerable small hamlets and farmsteads, although four small but highly compact villages can also be discerned. The largest of these four local communities has an estimated 150–300 inhabitants; the smallest only 25–50.

Historical documentation about administrative centers outside the Upper Daling survey area relates to the extent of the Lizhou supra-local community or district known to be a county (Fusuxian 阜俗县) in the Liao administrative structure. Longshanxian 龙山县, a walled county seat 30 km south of Lizhou, was subordinate to a different mid-level administrative center known as Tanzhou 潭州. A third walled town, Fushuxian 富庶县, 28 km north of Lizhou, headed a county subordinate directly to the Liao capital at Zhongjing. If Lizhou's district reached halfway to the neighboring county seats, then it would be about 30 km across, and its northern extreme would fall within the boundaries of the archaeological survey. As it turns out, within the survey area, settlement density, decreasing northward from Lizhou, reaches a minimum at about the expected distance, and shows signs of increasing again toward Fushuxian still farther north. This is the basis of the line tentatively demarcating the limit of the Lizhou district in Figure 6. For the first time ever, then, a political center in the Upper Daling region held sway over a territory extending well beyond the limits of the

archaeological survey area. The Liao county of Fusuxian thus represented an integrated political entity far larger than the earlier polities of Lower and Upper Xiajiadian times.

Although not quite as dramatic, Chifeng's population also rebounded strongly from a Zhangguo-Han low (Figures 3 and 7). These results, although similar for the two survey areas, should not be taken as a statement of general demographic trends in northeastern China at this time. Population may well have grown generally across northeastern China, but the principal factor behind the sharp changes in the two survey areas is surely that each now contained a large, important administrative center. Songshanzhou 松山州, in the Chifeng region, was at a lower administrative level than Lizhou, although its population was twice as large. Chifeng appears less urbanized than Upper Daling with less than half the survey area's population residing in Songshanzhou, but this may be little more than a reflection of the larger size of the Chifeng survey area. The broad dispersal of farmsteads and small hamlets in both regions may result from intensive cultivation to provision Songshanzhou and Lizhou, as well as to meet the demands of imperial taxation. It would be practical for farmers investing substantially increased labor in cultivation to live on or near the fields that they farmed, a circumstance known to produce such a pattern in other contexts (Chisholm 1970; Drennan 1988; Peterson and Drennan 2005; Stone 1993).

The settlement evidence is fully consistent with a further intensification of the large-scale, highly diverse and specialized economic interdependence whose roots we suggested above go back to Upper Xiajiadian times in northeastern China. Such large-scale economic integration must surely have been fundamental to state power at the same time that large-scale political integration stimulated economic expansion and intensification. The cultural origins of the Liao ruling class in mobile herding peoples of the north is emphasized in historical sources and scholarship (e.g. Bennett and Standen 2011; Tuotuo 1974; Twitchett and Tietze 1994; Wittfogel and Feng 1949). The settlement evidence makes it clear that the Chifeng and Upper Daling regions, just to the north and south of

the Liao capital at Zhongjing, had substantial fully sedentary populations of people living in towns, cultivating large quantities of grain, and tending various species of animals. These people almost certainly did not all practice the same subsistence strategies, but varied the mix of plant and animal species considerably in pursuing locally successful adaptations. One of the many resulting combinations, as appropriate to local environments, would likely have strongly emphasized herd animals in a pattern of mobile residence. The actual economic importance of this particular strategy is not reliably indicated by the symbolic projection of the cultural identity of the Liao ruling class (no more than George Bush's cowboy boots reflect the economics of the Texas cattle industry). Subsistence and settlement systems must be assessed by directly relevant archaeological evidence of subsistence and settlement, not by the themes represented in small portable art objects. Unfortunately such evidence is at present extremely scarce, not only for Liao times, but also for Zhangguo-Han and Upper Xiajiadian times for which the issue arises as well.

## Conclusion

In sum, the trajectories of the Upper Daling and Chifeng regions show the broad trend toward larger and more internally differentiated human communities often seen in the development of complex societies. Local village communities grow into towns that serve as the central places of supra-local groupings of farmsteads, hamlets and villages. In global comparative perspective, the trajectories of these two regions stand out for the persistently small spatial scale of their supra-local communities or districts. Even as the populations of these districts increased dramatically, they remained only a few kilometers across, more than 6,000 years after the establishment of sedentary agricultural life in northeastern China. Social, political and economic organization, nonetheless, changed substantially through this period. In the earliest supra-local communities social integration and political leadership revolved around ritual and ceremonial activities. Population growth and conflict, possibly resulting from resource pres-

sure, subsequently created a very different political dynamic. We suggest that this stage of political balkanization and competitive stalemate may have ended with technological advance and economic development in a context of continued demographic growth. If correct, this suggestion means local roots for a developmental trend greatly accelerated by subsequent further technological advance and political domination originating far outside either of the two survey areas.

Far from being homogeneous monolithic entities, the archaeological cultures of north-eastern China were internally dynamic. People shifted around the landscape as their use of resources and patterns of interaction with each other changed; local communities waxed and waned; supra-local communities emerged, developed and declined. Patterns of settlement not only changed through time, but also varied from place to place within a single archaeological culture. The pace of change in Upper Daling and Chifeng was uneven, with developmental surges first in one region and then the other, as the responses to widely operating forces varied under local conditions.

Examining the trajectories of Upper Daling and Chifeng regions from the perspective of regional settlement systems has revealed some of the internal social forces at work, and let us hypothesize about others not yet fully documented by archaeological research. These are some of the same raw materials for social change often discussed by those who study the development of early complex societies in other parts of the world. The sequence of change in northeastern China has much to offer to this comparative research, once we understand better the social dynamics in play. We hope that the broad, and often speculative, account of social change through eight millennia offered above will contribute to the furtherance of the kinds of archaeological research that will most advance our understandings of these dynamics.

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## References

- Anderson, David G., David W. Stahle, and Malcolm K. Cleaveland (1995). "Paleoclimate and the potential food reserves of Mississippian societies: A case study from the Savannah River Valley." *American Antiquity* 60: 258–286.
- Aohan Bowuguan 敖汉博物馆 (1991). "Aohanqi Nantaidi Zhaobaogou wen hua yi zhi diao cha 敖汉旗南台地赵宝沟文化遗址调查 (Surface survey at the Zhaobaogou Culture site of Nantaidi, Aohan Banner)." *Neimenggu wen wu kao gu* 内蒙古文物考古 1991. 5: 2–10.
- Arnold, Jeanne E. (1996). "Organizational transformations: Power and labor among complex hunter-gatherers and other intermediate societies." In Jeanne E. Arnold (editor), *Emergent Complexity: The Evolution of Intermediate Societies*, pp. 59–73. Ann Arbor: International Monographs in Prehistory.
- Avni, Yoav, Zhang Jiafu, Gideon Shelach, and Zhou Liping (2010). "Upper Pleistocene-Holocene geomorphic changes dictating sedimentation rates and historical land use in the valley system of Chifeng Region, Inner Mongolia, Northern China." *Earth Surface Processes and Landforms* 35: 1251–1268.
- Barnes, Gina L., and Guo Dashun (1996). "The ritual landscape of 'Boar Mountain' Basin: The Niuheliang site complex of North-eastern China." *World Archaeology* 28(2): 209–219.
- Bennett, Gwen P., and Naomi Standen (2011). "Historical and archaeological views of the Liao (10th to 12th centuries) borderlands in Northeast China." In David Mullin (editor), *Places in Between: The Archaeology of Social, Cultural, and Geographical Borders and Borderlands*, pp. 80–98. Oxford: Oxbow Books.
- Billman, Brian R. (1997). "Population pressure and the origins of warfare in the Moche Valley, Peru." In Richard R. Paine (editor), *Integrating Archaeological Demography: Multidisciplinary Approaches to Prehistoric Population*, pp. 285–310. Carbondale: Center for Archaeological Investigations, Southern Illinois University.
- Boserup, Ester (1965). *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure*. New York: Aldine de Gruyter.
- Bunker, Emma C. (1990). "Ancient Ordos bronzes." In

- Jessica Rawson, and Emma C. Bunker (eds.), *Ancient Chinese and Ordos Bronzes*, pp. 291–307. Hong Kong: The Royal Asiatic Ceramic Society.
- Cao Jian-en 曹建恩, and Sun Jinsong 孙金松 (2009). "Chifengshi Erdaoingzi Xiajiadian xia ceng wen hua ju luo yi zhi kao gu huo zhong da fa xian 赤峰市二道井子夏家店下层文化聚落遗址考古获重大发现 (Major archaeological discovery of a Lower Xiajiadian settlement at Erdaoingzi, Chifeng City)." *Zhongguo wen wu bao* 中国文物报 Dec. 25, 2009: 5.
- Carneiro, Robert L. (1981). "The chiefdom: Precursor of the state." In Grant D. Jones, and Robert R. Kautz (eds.), *The Transition to Statehood in the New World*, pp. 37–79. Cambridge: Cambridge University Press.
- Carneiro, Robert L. (1998). "What happened at the flashpoint? Conjectures on chiefdom formation at the very moment of conception." In Elsa M. Redmond (editor), *Chiefdoms and Chieftaincy in the Americas*, pp. 18–42. Gainesville: University Press of Florida.
- Chifeng International Collaborative Archeological Research Project (2011a). *Regional Settlement Patterns in the Chifeng Region*. Pittsburgh: University of Pittsburgh Center for Comparative Archaeology.
- Chifeng International Collaborative Archeological Research Project (2011b). *Chifeng Settlement Dataset / Chifeng Juluo Shuju Ji 赤峰聚落数据集*. Comparative Archaeology Database, University of Pittsburgh. URL: <<http://www.cadb.pitt.edu>>.
- Chisholm, Michael (1970). *Rural Settlement and Land Use*. Chicago: Aldine.
- Cohen, Mark N. (1977). *The Food Crisis in Prehistory*. New Haven: Yale University Press.
- Drennan, Robert D. (1987). "Regional demography in chiefdoms. In Robert D. Drennan, and Carlos A. Uribe (editors), *Chiefdoms in the Americas*, pp. 307–324. Lanham, MD: University Press of America.
- Drennan, Robert D. (1988). "Household location and compact versus dispersed settlement in Prehispanic Mesoamerica." In Richard R. Wilk, and Wendy Ashmore (eds.), *Household and Community in the Mesoamerican Past: Case Studies in the Maya Area and Oaxaca*, pp. 273–293. Albuquerque: University of New Mexico Press.
- Drennan, Robert D. (2011). "Field survey methods." In Chifeng International Collaborative Archeological Research Project (editor), *Regional Settlement Patterns in the Chifeng Region*, pp. 54–56. Pittsburgh: University of Pittsburgh Center for Comparative Archaeology.
- Drennan, Robert D., and Christian E. Peterson (2011). "Methods for regional demographic analysis." In Chifeng International Collaborative Archeological Research Project (editor), *Regional Settlement Patterns in the Chifeng Region*, pp. 57–79. Pittsburgh: University of Pittsburgh Center for Comparative Archaeology.
- Drennan, Robert D., Christian E. Peterson, Gregory G. Indrisano, Teng Mingyu 滕铭予, Gideon Shelach, Zhu Yanping 朱延平, Kathryn M. Linduff, and Guo Zhizhong 郭治中 (2003a). "Qu yu xing ren kou gui mo chong jian zhi chang shi 区域性人口规模重建之尝试 (Approaches to regional demographic reconstruction)." In Chifeng International Collaborative Archeological Research Project (editor), *Neimenggu dong bu (Chifeng) qu yu kao gu diao cha jie duan xing bao gao* 内蒙古东部 (赤峰) 区域考古调查阶段性报告 (Regional Archeology in Eastern Inner Mongolia: A Methodological Exploration), pp. 62–72, 152–165, 196–202. Beijing: Kexue Chubanshe.
- Drennan, Robert D., Teng Mingyu 滕铭予, Christian E. Peterson, Gideon Shelach, Gregory G. Indrisano, Zhu Yanping 朱延平, Kathryn M. Linduff, Guo Zhizhong 郭治中, and Manuel A. Román-Lacayo (2003b). "Juluo Kaogu Yanjiu de Shijian 聚落考古研究的实践 (Methods for Archeological Settlement Study). In Chifeng International Collaborative Archeological Research Project (editor), *Neimenggu dong bu (Chifeng) qu yu kao gu diao cha jie duan xing bao gao* 内蒙古东部 (赤峰) 区域考古调查阶段性报告 (Regional Archeology in Eastern Inner Mongolia: A Methodological Exploration), pp. 39–61, 122–151, 181–195. Beijing: Kexue Chubanshe.
- Earle, Timothy K. (1991). "The evolution of chiefdoms." In Timothy Earle (editor), *Chiefdoms: Power, Economy, and Ideology*, pp. 1–15. Cambridge: Cambridge University Press.
- Elliott, Michelle (2005). "Evaluating evidence for warfare and environmental stress in settlement pattern data from the Malpas Valley, Zacatecas, Mexico." *Journal of Anthropological Archaeology* 24: 297–315.
- Field, Julie S. (2004). "Environmental and climatic considerations: A hypothesis for conflict and the emergence of social complexity in Fijian prehistory." *Journal of Anthropological Archaeology* 23: 79–99.
- Flad, Rowan K. (2001). "Ritual or structure? Analysis of burial elaboration at Dadianzi, Inner Mongolia." *Journal of East Asian Archaeology* 3: 23–52.
- Fuller, Dorian Q., Emma Harvey, and Qin Ling (2007). "Presumed domestication? Evidence for wild rice cultivation and domestication in the fifth millennium BC of the Lower Yangtze Region." *Antiquity* 81: 316–331.
- Gilman, Antonio (2001). "Assessing political development in copper and Bronze Age southeast Spain." In

- Jonathan Haas (editor), *From Leaders to Rulers*, pp. 59–81. New York: Kluwer Academic / Plenum Publishers.
- Guo Dashun 郭大顺 (1995a). "Hongshan and related cultures." In Sarah M. Nelson (editor), *The Archaeology of Northeast China: Beyond the Great Wall*, pp. 21–64. London: Routledge.
- Guo Dashun (1995b). "Lower Xiajiadian Culture." In Sarah M. Nelson (editor), *The Archaeology of Northeast China: Beyond the Great Wall*, pp. 147–181. London: Routledge.
- Guo Dashun (2005). *Hongshan wen hua 红山文化 (The Hongshan Culture)*. Beijing: Wenwu Chubanshe.
- Guo Dashun (2006). "Hongshan wen hua yu Zhongguo wen ming qi yuan de dao lu yu te dian 红山文化与中国文明起源的道路与特点 (The Hongshan Culture and the trajectories and characteristics of the origins of Chinese civilization)." In Chifeng Xueyuan Hongshan Wenhua Guoji Yanjiu Zhongxin 赤峰学院红山文化国际研究中心 (editor), *Hongshan wen hua yan jiu — 2004 nian Hongshan wen hua guo ji xue shu yan tao hui lun wen ji 红山文化研究——2004年红山文化国际学术研讨会论文集 (Studies of the Hongshan Culture: a collection of papers from the 2004 International Conference on the Hongshan Culture)*, pp. 45–54. Beijing: Wenwu Chubanshe.
- Guo Dashun 郭大顺, and Zhang Keju 张克举 (1984). "Liaoningsheng Kazuo Xian Dongshanzui Hongshan wen hua jian zhu qun zhi fa jue jian bao 辽宁省喀左县东山嘴红山文化建筑群址发掘简报 (Report of excavations at the Hongshan Culture architectural complex of Dongshanzui, Kazuo County, Liaoning Province)." *Wen wu 文物* 1984. 11: 1–11.
- Hommon, Robert J. (1986). "Social evolution in ancient Hawai'i." In Patrick V. Kirch (editor), *Island Societies: Archaeological Approaches to Evolution and Transformation*, pp. 55–68. Cambridge: Cambridge University Press.
- Kalaqin Zuoyi Menggu Zu Zizhixian Zhi Bianzuan Weiyuanhui 喀喇沁左翼蒙古族自治县志编纂委员会 (1998). *Kalaqin zuo yi Menggu zu zi zhi xian zhi 喀喇沁左翼蒙古族自治县志 (Kalaqin Left Wing Mongolian Autonomous County)*. Shenyang: Liaoning Renmin Chubanshe.
- Kirch, Patrick V. (1991). "Chiefship and competitive involution: The Marquesas Islands of eastern Polynesia." In Timothy Earle (editor), *Chiefdoms: Power, Economy, and Ideology*, pp. 119–145. Cambridge: Cambridge University Press.
- Kong Zhaochen 孔昭宸, Du Naiqiu 杜乃秋, Liu Guanmin 刘观民, and Yang Hu 杨虎 (1991). "Neimenggu Zizhiqu Chifeng shi ju jin 8000–2400 nian jian huan jing kao gu xue de chu bu yan jiu 内蒙古自治区赤峰市距今 8000–2400 年间环境考古学的初步研究 (Preliminary study on environmental archaeology before 8000–2400 years in Chifeng, Inner Mongolia Autonomous Region)." In *Huan jing kao gu yan jiu 环境考古研究 (Research on environmental archaeology)*, pp. 112–119. Beijing: Kexue Chubanshe.
- Lepofsky, Dana, Ken Lertzman, Douglas Hallett, and Rolf Mathewes (2005). "Climate change and culture change on the southern Gulf Coast of British Columbia 2400–1200 cal. B.P.: An hypothesis." *American Antiquity* 70: 267–293.
- Li Gongdu 李恭笃, and Gao Meixuan 高美璇 (1985). "Xiajiadian xia ceng wen hua ruo gan wen ti yan jiu 夏家店下层文化若干问题研究 (Several issues concerning the Lower Xiajiadian period)." *Liaoning da xue xue bao* 1985. 5: 154–161.
- Li Xinwei (2008). *Development of Social Complexity in the Liaoxi Area, Northeast China*. BAR International Series 1821. Oxford: Archaeopress.
- Liaoning Sheng Bowuguan Wenwu Gongzuodui 辽宁省博物馆文物工作队 (1983). "Liaoning Jianpingxian Kalaqin Hedong yi zhi shi jue jian bao 辽宁建平县喀喇沁河东遗址试掘简报 (Preliminary report of test excavations at the Hedong site, Kalaqin River, Jianping County, Liaoning)." *Kao gu 考古* 1983. 11: 973–981, 1003.
- Liaoning Sheng Wenwu Kaogu Yanjiusuo 辽宁省文物考古研究所 (1988). "Fuxin Chahai xin shi qi shi dai yi zhi shi jue jian bao 阜新查海新石器时代遗址试掘简报 (Test excavations at the Neolithic period site of Chahai, in Fuxin)." *Liaohai wen wu xue kan 辽海文物学刊* 1988. 1: 11–16.
- Liaoning Sheng Wenwu Kaogu Yanjiusuo (1994). "Liaoning Fuxin xian Chahai yi zhi 1987–1990 nian san ci fa jue 辽宁阜新县查海遗址 1987–1990 年三次发掘 (Three seasons of excavation [1987–1990] at the Chahai site, Fuxin County, Liaoning Province)." *Wen wu 文物* 1994. 11: 4–9.
- Liaoning Sheng Wenwu Kaogu Yanjiusuo (2001). "Liaoning Beipiaoshi Kangjiatun cheng zhi fa jue jian bao 辽宁北票市康家屯城址发掘简报 (Preliminary report on the excavations at the Kangjiatun fortified site, Beipiao City, Liaoning)." *Kao gu 考古* 2001. 8: 31–44.
- Liaoning Sheng Wenwu Kaogu Yanjiusuo (2012). *Niuheliang: Hongshan wen hua yi zhi fa jue bao gao, 1983–2003 nian du 牛河梁: 红山文化遗址发掘报告, 1983–2003 年度 (Niuheliang: Excavation report on a Hongshan Culture site [1983–2003])*. Beijing: Wenwu

- Chubanshe.
- Liaoning Sheng Wenwu Kaogu Yanjiusuo and Chifeng Bowuguan 辽宁省文物考古研究所, 赤峰博物馆 (1998). *Danangou: Hou Hongshan wen hua mu di fa jue bao gao* 大南沟——后红山文化墓地发掘报告 (Danangou: Report of excavations at the post-Hongshan period cemetery). Beijing: Kexue Chubanshe.
- Liaoning Sheng Wenwu Kaogu Yanjiusuo, Pizibao Daxue Renleixue Xi, and Xiaweiyi Daxue 辽宁省文物考古研究所, 美国匹兹堡大学人类学系, 美国夏威夷大学 (2010). "Liaoning Dalinghe shang you liu yu kao gu diao cha jian bao 辽宁大凌河上游流域考古调查简报 (Report on archaeological survey in the Upper Daling River Valley, Liaoning)." *Kao gu* 考古 2010. 5: 24–35.
- Linduff, Katheryn M. (1997). "Archaeological overview." In Emma C. Bunker, Trudy Kawami, Katheryn M. Linduff, and Wu En (eds.), *Ancient Bronzes of the Eastern Eurasian Steppes: The Arthur M. Sackler Collection*, pp. 18–98. New York: Abrams, Sackler/Freer Gallery, Smithsonian Institution.
- Liu Fenggui and Feng Zhaodong (2012). "A dramatic climatic transition at ~4000 cal. yr BP and its cultural responses in Chinese cultural domains." *The Holocene* 22: 1181–1197.
- Liu Guoxiang 刘国祥 (2006). "Hongshan wen hua yu Xiliaohe liu yu wen ming qi yuan tan suo 红山文化与西辽河流域文明起源探索 (Hongshan Culture and the exploration of the origins of civilization in the western Liao River Valley)." In Chifeng Xueyuan Hongshan Wenhua Guoji Yanjiu Zhongxin 赤峰学院红山文化国际研究中心 (ed.), *Hongshan wen hua yan jiu: 2004 nian Hongshan wen hua guo ji xue shu yan tao hui lun wen ji* 红山文化研究——2004年红山文化国际学术研讨会论文集 (Studies of the Hongshan Culture: A collection of papers from the 2004 International Conference on the Hongshan Culture), pp. 62–104. Beijing: Wenwu Chubanshe.
- Liu Guanmin 刘观民, and Xu Guangji 徐光冀 (1981). "Neimenggu dong bu di qu qing tong shi dai de liang zhong wen hua 内蒙古东部地区青铜时代的两种文化 (Two Bronze Age cultures in the eastern part of Inner Mongolia)." *Neimenggu wen wu kao gu* 内蒙古文物考古 1981. 1: 5–14.
- Monks, Sarah J. (1997). "Conflict and competition in Spanish prehistory: The role of warfare in societal development from the late fourth to third millennium BC." *Journal of Mediterranean Archaeology* 10: 3–32.
- Neimenggu Wenwu Gongzuodui 内蒙古文物工作队 (1984). "Aohan Qi Fanzhangzi gu mu qun fa jue jian bao 敖汉旗范仗子古墓群发掘简报 (Preliminary excavation report of the Fanzhangzi tomb cluster, Aohan Banner)." *Neimenggu wen wu kao gu* 内蒙古文物考古 1984. 3: 22–25.
- Neimenggu Zizhiqu Wenwu Kaogu Yanjiusuo 内蒙古自治区文物考古研究所 (1997). "Keshiketengqi Nantaizi yi zhi 克什克腾旗南台子遗址 (The Nantaizi site in Keshiketeng Banner)." In Wei Jian 魏坚 (editor), *Neimenggu wen wu kao gu wen ji* 内蒙古文物考古文集 (*Anthology of Archaeology in Inner Mongolia*), Vol. 2, pp. 53–78. Beijing: Zhongguo Dabaiké Quanshu Chubanshe.
- Neimenggu Zizhiqu Wenwu Kaogu Yanjiusuo (2004). *Baiyinchanghan: Xin shi qi shi dai yi zhi fa jue bao gao* 白音长汗: 新石器时代遗址发掘报告 (*Baiyinchanghan: Report of excavations at the Neolithic period site*). Beijing: Kexue Chubanshe.
- Neimenggu Zizhiqu Wenwu Kaogu Yanjiusuo (2007). "Neimenggu Chifeng shi Sanzuodian Xiajiadian xia ceng wen hua shi cheng yi zhi 内蒙古赤峰市三座店夏家店下层文化石城遗址 (Sanzuodian: A site with stone fortifications from the Lower Xiajiadian period, in Chifeng, Inner Mongolia)." *Kao gu* 考古 2007. 7: 17–27.
- Neimenggu Zizhiqu Wenwu Kaogu Yanjiusuo (2010). "Neimenggu Chifeng shi Hala Haigou xin shi qi shi dai mu di fa jue jian bao 内蒙古赤峰市哈拉海沟新石器时代墓地发掘简报 (Preliminary report of excavations at the Hala Haigou cemetery, Chifeng City, Inner Mongolia)." *Kao gu* 考古 2010. 2: 19–35.
- Nelson, Sarah M. (1996). "Ideology and the formation of an early state in Northeast China." In H. J. M. Claessen, and J. G. Oosten (eds.), *Ideology and the Formation of Ancient States*, pp. 153–169. Leiden: Brill.
- Nelson, Sarah M. (1997). "Hongshan: An early complex society in Northeast China." In Peter Bellwood, and Dianne Tinoston (eds.), *Indo-Pacific Prehistory: The Changnan Papers, Volume 3*, pp. 57–62. *Bulletin of the Indo-Pacific Prehistory Association*, No. 16. Canberra: Australian National University.
- Peterson, Christian E. (2006). "Crafting" *Hongshan Communities? Household Archaeology in the Chifeng Region of Eastern Inner Mongolia, PRC*. Ph.D. Dissertation, Department of Anthropology, University of Pittsburgh.
- Peterson, Christian E., and Robert D. Drennan (2005). "Communities, settlements, sites, and surveys: Regional-scale analysis of prehistoric human interaction." *American Antiquity* 70: 5–30.
- Peterson, Christian E., and Robert D. Drennan (2011). "Methods for delineating community patterns." In Chifeng International Collaborative Archeological

- Research Project (editor), *Regional Settlement Patterns in the Chifeng Region*, pp. 80–87. Pittsburgh: University of Pittsburgh Center for Comparative Archaeology.
- Peterson, Christian E., Lü Xueming 吕学明, Robert D. Drennan, and Zhu Da 朱达 (2010). "Hongshan chiefly communities in Neolithic northeastern China." *Proceedings of the National Academy of Sciences* 107: 5756–5761.
- Peterson, Christian E., Lü Xueming, Robert D. Drennan, and Zhu Da (2014a). *Hongshan Regional Organization in the Upper Daling Valley / Dalinghe shang you liu yu Hongshan shi qi de qu yu xing she hui zu zhi* 大凌河上游流域红山时期的区域性社会组织. Pittsburgh: University of Pittsburgh Center for Comparative Archaeology and Shenyang: Liaoning Sheng Wenwu Kaogu Yanjiusuo.
- Peterson, E. Christian, Lu Xueming, Robert D. Drennan, and Zhu Da (2014b). *Upper Daling Region Settlement Dataset* 大凌河上游流域聚落数据集 Dalinghe shang you liu yu ju luo shu ju ji. Comparative Archaeology Database, University of Pittsburgh. URL: <<http://www.cadb.pitt.edu>>.
- Qiao Xiaoqin 乔晓勤 (1992). "Guan yu bei fang you mu wen hua qi yuan de tan tao 关于北方游牧文化起源的探讨 (On the origin of Northern Nomadic Culture)." *Neimenggu wen wu kao gu* 内蒙古文物考古 1992. 1, 2: 21–25.
- Sebastian, Lynne (1991). "Sociopolitical complexity and the Chaco System." In Patricia L. Crown, and W. James Judge (eds.), *Chaco and Hohokam: Prehistoric Regional Systems in the American Southwest*, pp. 109–134. Santa Fe, New Mexico: School of American Research Press.
- Shao Guotian 邵国田 (2004). "Caomaoshan ji si yi zhi qun 草帽山祭祀遗址群 (The Caomao Shanjisi site cluster)." In Shao Guotian 邵国田 (editor), *Aohan wen wu jing hua* 敖汉文物精华 (*Aohan antiquities*), pp. 27–29. Haila'er: Neimenggu Wenhua Chubanshe.
- Shelach, Gideon (1996). *The Emergence of Complex Society in Northeast China from the Fourth to the First Millennia BC: A Perspective from the Chifeng Area in Inner Mongolia*, Ph.D. Dissertation, Department of Anthropology, University of Pittsburgh.
- Shelach, Gideon (1999). *Leadership Strategies, Economic Activity, and Interregional Interaction: Social Complexity in Northeast China*. New York: Kluwer Academic / Plenum Publishers.
- Shelach, Gideon (2000). "The earliest Neolithic cultures in Northeast China: Recent discoveries and new perspectives on the beginnings of agriculture." *Journal of World Prehistory* 14: 363–413.
- Shelach, Gideon (2001). "Apples and oranges? Cross-cultural comparison of burial data from Northeast China." *Journal of East Asian Archaeology* 3: 53–90.
- Shelach, Gideon (2006). "Economic adaptation, community structure, and sharing strategies of households at early sedentary communities in Northeast China." *Journal of Anthropological Archaeology* 25: 318–345.
- Shelach, Gideon (2009). *Prehistoric Societies on the Northern Frontier of China: Archaeological Perspectives on Identity Formation and Economic Change during the First Millennium BCE*. London: Equinox.
- Shelach, Gideon, Kate Rafael, and Yitzhak Jaffe (2011). "Sanzuodian: The structure, function, and social significance of the earliest stone fortified sites in China." *Antiquity* 85: 11–26.
- Shennan, Stephen (1978). "Archaeological 'cultures': An empirical investigation." In Ian Hodder (editor), *The Spatial Organisation of Culture*, pp. 113–139. Pittsburgh: University of Pittsburgh Press.
- Shennan, Stephen (1986a). "Central Europe in the third millennium B.C.: An evolutionary trajectory for the beginning of the European Bronze Age." *Journal of Anthropological Archaeology* 5: 115–146.
- Shennan, Stephen (1986b). "Interaction and change in third millennium B.C. Western and Central Europe." In Colin Renfrew, and John F. Cherry (eds.), *Peer Polity Interaction and Socio-Political Change*, pp. 137–148. Cambridge: Cambridge University Press.
- Spencer, Charles S. (1993). "Human agency, biased transmission, and the cultural evolution of chiefly authority." *Journal of Anthropological Archaeology* 12: 41–74.
- Spencer, Charles S. (1994). "Factional ascendance, dimensions of leadership, and the development of centralized authority." In Elizabeth M. Brumfiel and John W. Fox (eds.), *Factional Competition and Political Development in the New World*, pp. 31–43. Cambridge: Cambridge University Press.
- Stone, Glenn Davis (1993). "Agrarian settlement and the spatial disposition of labor." In Augustin Holl, and Thomas E. Levy (eds.), *Spatial Boundaries and Social Dynamics: Case Studies from Food-Producing Societies*, pp. 25–38. Ann Arbor: International Monographs in Prehistory.
- Su Bingqi 苏秉琦 (1994). *Hua ren, long de ren, Zhongguo ren—kao gu xun gen ji* 华人, 龙的人, 中国人——考古寻根记 (Searching for the origins of the Chinese people through archaeology). Shenyang: Liaoning Daxue Chubanshe.
- Suo Xiufen 索秀芬 (2005). "Xiaohexi wen hua chu lun 小河西文化初论 (Preliminary discussion of the Xiao-

- hexi Culture)." *Kao gu yu wen wu* 考古与文物 147: 23–26.
- Suo Xiufen 索秀芬, and Guo Zhizhong 郭治中 (2004). "Baiyinchanghan yi zhi Xiaohexi wen hua yi cun 白音长汗遗址小河西文化遗存 (Remains of the Xiaohexi Culture at Baiyinchanghan)." *Bian jiang kao gu yan jiu* 边疆考古研究 3: 301–310.
- Suo Xiufen 索秀芬, and Li Shaobing 李少兵 (2008). "Xiaohexi wen hua ju luo xing tai 小河西文化聚落形态 (Xiaohexi Culture settlement patterns)." *Neimenggu wen wu kao gu* 内蒙古文物考古 2008. 1: 55–60.
- Tao Dawei, Wu Yan, Guo Zhizhong, David V. Hill, and Wang Changsui (2011). "Starch grain analysis for ground stone tools from Neolithic Baiyinchanghan site: Implications for their function in Northeast China." *Journal of Archaeological Science* 38: 3577–3583.
- Teng Mingyu, and Gideon Shelach (2011). "The natural environment and its modern exploitation." In Chifeng International Collaborative Archeological Research Project (editor), *Regional Settlement Patterns in the Chifeng Region*, pp. 36–43. Pittsburgh: University of Pittsburgh Center for Comparative Archaeology.
- Tian Guangjin 田广金 (1995). "Shi xi Zhongguo bei fang xu mu ye qi yuan wen ti 试析中国北方畜牧业起源问题 (Preliminary analysis of the origin of pastoralism in northern China)." In Su He 苏赫 (editor), *Zhongguo bei fang gu dai wen hua guo ji xue shu yan tao hui lun wen ji* 中国北方古代文化国际学术研讨会论文集 (*Proceedings of the International Symposium on Ancient Northern Chinese Culture*), pp. 110–112. Beijing: Zhongguo Wenshi Chubanshe.
- Tuotuo 脱脱 (1974). *Liao shi* 辽史 (History of the Liao Dynasty). Beijing: Zhonghua Shuju.
- Twitchett, Denis, and Klaus-Peter Tietze (1994). "The Liao." In Herbert Franke and Denis Twitchett (eds.), *The Cambridge History of China, Vol. 6: Alien Regime and Border States, 907–1368*, pp. 43–153. Cambridge: Cambridge University Press.
- Wagner, Mayke, Pavel Tarasov, Dominic Hosner, Andreas Fleck, Richard Ehrich, Xiaocheng Chen, and Christian Leipe (2013). "Mapping of the spatial and temporal distribution of archaeological sites of northern China during the Neolithic and Bronze Age." *Quaternary International* 290–291: 344–357.
- Wang Lixin 王立新 (2004). "Liaoxiqu Xia zhi Zhanguo shi qi wen hua ge ju yu jing ji xing tai de yan jin 辽西区夏至战国时期文化格局与经济形态的演进 (The evolution of cultural and economic patterns in the Western Liaoning area from the Xia through the Warring States period)." *Kao gu xue bao* 考古学报 2004. 3: 243–269.
- Wang Wei 王巍 (2006). "Hongshan wen hua yu Zhonghua wen ming qi yuan yan jiu 红山文化与中华文明起源研究 (The Hongshan Culture and the study of the origins of Chinese civilization)." In Chifeng Xueyuan Hongshan Wenhua Guoji Yanjiu Zhongxin 赤峰学院红山文化国际研究中心 (editor), *Hongshan wen hua yan jiu—2004 nian Hongshan wen hua guo ji xue shu yan tao hui lun wen ji* 红山文化研究—2004年红山文化国际学术研讨会论文集 (*Studies of the Hongshan Culture: A collection of papers from the 2004 International Conference on the Hongshan Culture*), pp. 55–61. Beijing: Wenwu Chubanshe.
- Webster, Gary S. (1990). "Labor control and emergent stratification in prehistoric Europe." *Current Anthropology* 31: 337–366.
- Williams, James T. (2014). *Staple Economies and Social Integration in Northeast China: Regional Organization in Zhangwu, Liaoning, China*. Ph.D. Dissertation, Department of Anthropology, University of Pittsburgh.
- Wittfogel, Karl A., and Feng Chia-Sheng (1949). *History of Chinese Society: Liao (907–1125)*. Transactions of the American Philosophical Society, Vol. 36.
- Xin Yan 辛岩 (1997). "Fuxin Wuhuanchi yi zhi fa jue jian bao 阜新勿欢池遗址发掘简报 (Short report of excavations at Wuhuanchi in Fuxin)." *Liaohai wen wu xue kan* 辽海文物学刊 1997. 2: 20–29.
- Xin Yan 辛岩, and Fang Dianchun 方殿春 (2003). "Chahai yi zhi 1992–1994 nian fa jue bao gao 查海遗址 1992–1994 年发掘报告 (Report of excavations at Chahai, 1992–1994)." In Liaoning Sheng Wenwu Kaogu Yanjiusuo 辽宁省文物考古研究所 (editor), *Liaoning kao gu wen ji* 辽宁考古文集 (*Anthology of Liaoning archaeology*), pp. 12–43. Shenyang: Liaoning Minzu Chubanshe.
- Xu Guangji 徐光冀 (1986). "Chifeng Yingjinhe, Yinhe de shi cheng yi zhi 赤峰英金河、阴河的石城遗址 (Fortified sites of the Yingjin and Yin River basins)." In Zhongguo Kaoguxue Yanjiu Bianweihui 中国考古学研究编委会 (editor), *Zhongguo kao gu xue yan jiu* 中国考古学研究 (*Chinese archaeology*), pp. 82–93. Beijing: Wenwu Chubanshe.
- Xu Guangji 徐光冀, and Zhu Yanping 朱延平 (2000). "Liaoxiqu gu wen hua (xin shi qi zhi qing tong shi dai) zong lun 辽西区古文化 (新石器至青铜时代) 总论 (Remarks about ancient cultures [Neolithic through Bronze Age] in the Western Liao region)." In Su Bingqi xian sheng ji nian ji 苏秉琦先生纪念集 (*A collection to commemorate Mr. Su Bingqi*), pp. 86–96. Beijing: Kexue Chubanshe.
- Yang Hu 杨虎, and Liu Guoxiang 刘国祥 (1997). "Xinglongwa wen hua ju shi zang su ji xiang guan

- wenti tan tao 兴隆洼文化居室葬俗及相关问题探讨 (Inquiry into the graves within houses of the Xinglongwa Culture and related questions)." *Kao gu* 考古 1997. 1: 27-36.
- Zhao Binfu 赵宾福 (2003). *Dongbei shi qi shi dai kao gu* 东北石器时代考古 (Stone Age archaeology of Northeast China). Changchun: Jilin Daxue Chubanshe.
- Zhao Zhijun 赵志军 (2004). "Cong Xinglonggou yi zhi fu xuan jie guo tan Zhongguo bei fang han zuo nong ye qi yuan wen ti 从兴隆沟遗址浮选结果谈中国北方旱作农业起源问题 (Addressing the origins of dryland agriculture in North China based on the results of flotation from the Xinglonggou site)." *Dong ya gu wu* 东亚古物 2004. 12: 188-199.
- Zhongguo Shehui Kexue yuan Kaogu Yanjiusuo 中国社会科学院考古研究所 (1996). *Dadianzi—Xiajiadian xia ceng wen hua yi zhi yu mu di fa jue bao gao* 大甸子—夏家店下层文化遗址与墓地发掘报告 (*Dadianzi: Excavation of a settlement and cemetery of the Lower Xiajiadian period*). Beijing: Wenwu Chubanshe.
- Zhongguo Shehui Kexue yuan Kaogu Yanjiusuo (1997a). *Aohan Zhaobaogou: xin shi qi shi dai ju luo* 敖汉赵宝沟: 新石器时代聚落 (Zhaobaogou: A Neolithic settlement). Beijing: Zhongguo Dabaike Quanshu Chubanshe.
- Zhongguo Shehui Kexue yuan Kaogu Yanjiusuo Neimenggu Diyi Gongzuodui 中国社会科学院考古研究所内蒙古第一工作队 (2004). "Neimenggu Chifeng shi Xinglonggou ju luo yi zhi 2002-2003 nian de fa jue 内蒙古赤峰市兴隆沟聚落遗址 2002-2003 年的发掘 (The 2002-2003 Excavations at the Xinglonggou settlement site in Chifeng, Inner Mongolia)." *Kao gu* 考古 2004. 7: 3-8.
- Zhongguo Shehui Kexue yuan Kaogu Yanjiusuo Neimenggu Gongzuodui 中国社会科学院考古研究所内蒙古工作队 (1974). "Chifeng Yaowangmiao, Xiajiadian yi zhi shi jue bao gao 赤峰药王庙、夏家店遗址试掘报告 (Report of test excavations at the Yaowangmiao and Xiajiadian sites in Chifeng)." *Kao gu xue bao* 考古学报 1974. 1: 111-144.
- Zhongguo Shehui Kexue yuan Kaogu Yanjiusuo Neimenggu Gongzuodui (1975). "Ningcheng Nanshan'gen yi zhi fa jue bao gao 宁城南山根遗址发掘报告 (Report of excavations at the Nanshan'gen site, Ningcheng)." *Kao gu xue bao* 考古学报 1975. 1: 117-140.
- Zhongguo Shehui Kexue yuan Kaogu Yanjiusuo Neimenggu Gongzuodui (1985). "Neimenggu Aohanqi Xinglongwa yi zhi fa jue jian bao 内蒙古敖汉旗兴隆洼遗址发掘简报 (Preliminary report of excavations at the Xinglongwa site, Aohan Banner, Inner Mongolia)." *Kao gu* 考古 1985. 10: 865-874.
- Zhongguo Shehui Kexue yuan Kaogu Yanjiusuo Neimenggu Gongzuodui (1987). "Neimenggu Aohanqi Xiaoshan yi zhi 内蒙古敖汉旗小山遗址 (The Xiaoshan site, Aohan Banner, Inner Mongolia)." *Kao gu* 考古 1987. 6: 481-506.
- Zhongguo Shehui Kexue yuan Kaogu Yanjiusuo Neimenggu Gongzuodui (1997b). "Neimenggu Aohanqi Xinglongwa ju luo yi zhi 1992 nian fa jue jian bao 内蒙古敖汉旗兴隆洼聚落遗址 1992 年发掘简报 (Preliminary report of the 1992 excavations at the Xinglongwa site, Aohan Banner, Inner Mongolia)." *Kao gu* 考古 1997. 1: 1-26.
- Zhu Naicheng 朱乃诚 (2006). "Liaoxi di qu wen ming qi yuan yan jiu de li cheng 辽西地区文明起源研究的历程 (The course of research into the origins of civilization in the Liaoxi region)." In Chifeng Xueyuan Hongshan Wenhua Guoji Yanjiu Zhongxin 赤峰学院红山文化国际研究中心 (editor), *Hongshan wen hua yan jiu—2004 nian Hongshan wen hua guo ji xue shu yan tao hui lun wen ji* 红山文化研究——2004 年红山文化国际学术研讨会论文集 (Studies of Hongshan Culture: A Collection of Papers from the 2004 International Conference on Hongshan Culture), pp. 17-44. Beijing: Wenwu Chubanshe.