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# Settlement Patterns, Chiefdom Variability, and the Development of Early States in North China

LI LIU

*School of Archaeology, La Trobe University, Melbourne, Australia*

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In the third millennium B.C., the Longshan culture in the Central Plains of northern China was the crucial matrix in which the first states evolved from the basis of earlier Neolithic societies. By adopting the theoretical concept of the chiefdom and by employing the methods of settlement archaeology, especially regional settlement hierarchy and rank-size analysis, this paper introduces a new approach to research on the Longshan culture and to inquiring about the development of the early states in China. Three models of regional settlement pattern correlating to different types of chiefdom systems are identified. These are: (1) the centripetal regional system in circumscribed regions representing the most complex chiefdom organizations, (2) the centrifugal regional system in semi-circumscribed regions indicating less integrated chiefdom organization, and (3) the decentralized regional system in noncircumscribed regions implying competing and the least complex chiefdom organizations. Both external and internal factors, including geographical condition, climatic fluctuation, Yellow River's changing course, population movement, and intergroup conflict, played important roles in the development of complex societies in the Longshan culture. As in many cultures in other parts of the world, the early states in China emerged from a system of competing chiefdoms, which was characterized by intensive intergroup conflict and frequent shifting of political centers. However, what is unusual about the Chinese case is the fact that the earliest states did not develop from the most complex of the chiefdom organizations, but from the least complex chiefdom systems then existing there. 

## CHIEFDOM THEORIES AND REGIONAL SETTLEMENT PATTERNS

The process of social development leading to the emergence of ''civilization'' has been seen as an evolutionary one (Child 1951; Engels 1972 [orig. 1884]; Flannery 1972; Fried 1960, 1967; Johnson & Earle 1987; Morgan 1963 [orig. 1877]; Service 1962; Steward 1955; White 1959; Wright 1977a,b). A basic tendency—that societies develop from early small-scale groups to later complex organizations—has been demonstrated by archaeological findings from all continents (Wenke 1980). In recent years, the effort to understand evolutionary processes underlying the development of complex societies has created a growing interest in societies that are organizationally intermediate between egalitarian and bureaucratic state societies (Feinman & Neitzel 1984:39).

In the typological classification of intermediate societies, at least a dozen descriptive subtypes have been identified since Morgan's time a century ago (Feinman & Neitzel 1984:40). Among these subtypes, the concept of ''chiefdom'' proposed by Service (1962) has occurred most frequently in the archaeological literature.

### *The Study of Chiefdoms*

Adopting White's (1959) general evolutionary approach, Service (1962) proposed a social developmental scheme with four main levels of social integration involving a progression from the band through the tribe (both egalitarian societies) to the chiefdom to the state (both hierarchical societies).



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Based primarily on Sahlins's (1958) description of Polynesian societies, Service (1962:144) suggested that redistribution was the most crucial factor among all other characteristics of chiefdoms, including great population density, social stratification, craft specialization, and large public works.

The interest in the notion of chiefdoms, as proposed by Service, has grown, and a large number of articles concerning this topic have appeared in the archaeological literature (e.g., Carneiro 1981; Drennan & Uribe 1987; Earle 1978, 1987, 1991a; Flannery 1972; Johnson & Earle 1987; Kirch 1984; Peebles & Kus 1977; Renfrew 1973; Wright 1984).

Several problems with this approach have also been remarked upon, however, such as some general weaknesses in the Service typology of social development. Cordy (1981:27–29) has summarized these deficiencies as follows. First, many traits of the various stages are not easily measured empirically. Second, lack of clarity about the differences between chiefdoms and states is especially apparent when attempting to classify bordering societies which are between stages. Third, among societies which are classified as chiefdoms, there are variations in degrees of social complexity in terms of their populations, territories, and social echelons. Fourth, there is no systems-oriented approach to classification; all the methods for classifying societies are based on the presence or absence of specific traits which do not reflect the relation between parts and the whole. Fifth, the basic tenet—that social criteria change as an entire, qualitative set—is incorrect; rather, social change occurs as spurts and lags in different dimensions of societal organization.

The most recurring criticism of Service's concept of chiefdoms has focused on the role of the chief as the focal point in a redistributive network through which subsistence goods moved, and united diverse, ecologically specialized villages. In many areas of the world, the position of the chief in food distribution was not essential to the integration of society. Indeed, for the most part, exchange normally involved status goods which were used to create alliances and mobilize support to increase the chief's powers (Earle 1977, 1978; Helms 1979; Feinman and Neitzel 1984).

These critiques have seriously challenged not only Service's original concept of chiefdom, but also, the typological approach to social evolution. Some scholars (Blanton et al. 1981; Hill 1977; Kehoe 1981; Plog & Upham 1979: 1–3; Tainter 1978; Feinman & Neitzel 1984) have opposed the approach's primary focus on the classification of specific societies into ideal organizational types using a few key attributes to infer the presence of all aspects traditionally associated with a typical paradigm. A historical-particularistic view which emphasizes the differences between developmental trajectories has become influential, and some scholars propose abandoning evolutionary theory (e.g., Hodder 1986; Shanks & Tilley 1987; Yoffee 1993). The most recent critiques of the concept of chiefdom primarily reject a model of holistic change in evolutionary stages, and emphasize a heterarchical approach to complex societies (Ehrenreich et al. 1995).

In spite of this, many anthropologists still believe that complex societies have evolved through a series of general developmental stages, and similarities may have been shared by societies cross-culturally within each stage (e.g., Rothman 1994; Spencer 1987). The chiefdom concept is still alive, but it has evolved into something quite different from Service's original formulation.

Recent redefinitions of the concept of chiefdom tend to focus on political and administrative criteria (Spencer 1987:369). For example, Carneiro (1981:45) has defined the chiefdom as ''an autonomous political unit comprising a number of villages or communities . . .'' Redistribution is no longer regarded as a central characteristic of the chiefdom.

In recent years, a shift has occurred from the analysis of formal characteristics shared

by chiefdoms to a concern with aspects such as variability between chiefdoms and the evolutionary processes by which chiefdoms were created and maintained (Earle 1991b). Discussions about chiefdom variability have focused on the following schemes: (1) the structure of chiefdoms can be distinguished as group-oriented vs individualizing (Renfrew 1974), (2) the economic basis of chiefdoms may be characterized as staple vs wealth (Brumfiel & Earle 1987; D'Altroy & Earle 1985), and (3) the level of the development of chiefdoms may be dichotomized as simple vs complex. This third scheme of analysis is particularly emphasized in this study.

### *Simple vs Complex Chiefdoms and Decision-Making Hierarchy*

Because chiefdoms varied greatly according to degree of social complexity, several archaeologists (e.g., Cordy 1985; Earle 1978:12; Johnson & Earle 1987; Milisauskas 1978:165; Steponaitis 1978:420; Wright 1984:42) have proposed dividing chiefdoms into two types: simple and complex. Civilization was more likely evolved from the more complex variants of chiefdoms. Wright (1986) has further demonstrated that civilizations in Mesopotamia, the Indus Valley, Mesoamerica, and the central Andes gradually developed from simple to more complex societies. Among the features characterizing different degrees of social complexity, analysis of the levels of decision making hierarchy, a concept developed from systems theory (e.g., Miller 1965) and information theory (Rothstein 1958), most frequently occurred in archaeological literature.

As Flannery (1972) emphasized, basic change in the development of complex societies involves, first of all, an increase in hierarchical decision-making levels and, second, specialization in relation to information processing. Flannery's formulation has been further applied to the study of cultural evolution by Wright and Johnson (Johnson 1973, 1978; Wright 1977a; Wright & Johnson 1975). According to Johnson (1973:4–12), tribes and chiefdoms have one and two administrative tiers, respectively, while a state should have at least three levels of decision-making hierarchy.

Opinions about the correlation between the number of decision-making levels and the degrees of social complexity vary among scholars. For example, Steponaitis (1978:420) has argued that simple chiefdoms have one level of decision-making authority, while complex chiefdoms have two or three tiers of political hierarchy. By contrast, Wright (1984:42) has demonstrated that simple chiefdoms have one level of control hierarchy above the level of the local community, while complex chiefdoms cycle between one and two levels of control hierarchy. Combining information about population size with analysis of political hierarchy, Earle (1991b:3) also outlined some critical features of these two types of chiefdoms:

> Simple chiefdoms have polity sizes in the low thousands, one level in political hierarchy above the local community, and a system of graduated ranking. Complex chiefdoms have polity sizes in the tens of thousands, two levels in the political hierarchy above the local community, and an emergent stratification.

Scholars have different perspectives concerning the variables of the archaeological record which manifest social complexity. The decision-making hierarchy hypotheses seems to be ambiguous with regard to the relationship between the social type and the exact number of levels of political hierarchy. However, it is generally agreed that there is a positive correlation between the number of levels of decision-making hierarchy and the levels of social complexity. State-level social organizations more than likely evolved from complex chiefdoms.

### *Regional Settlement Patterns and Social Complexity*

If we consider a chiefdom as a polity that centrally organizes a regional population

(Carneiro 1981; Earle 1987, 1991b:1), the reconstruction of regional social systems becomes crucial. Such reconstruction is best achieved by studying regional settlement patterns (Drennan & Uribe 1987:60). Several methods have been used to study these degrees of social complexity, including regional settlement hierarchy and rank-size variation.

*Regional settlement hierarchy.* Anthropologists at the University of Michigan have developed one interpretive strategy for understanding the socio-political implications of archaeological data has been developed (Cordy 1985:160). In this approach, emphasis is placed on the relationship between the decision-making hierarchy and the settlement hierarchy. Tiers of settlement hierarchy are one means of measuring the number of decision-making levels that frequently correspond to degree of social complexity. The settlement hierarchy indicated by the distinction between centers and villages is manifested in the size of the settlement and in symbolic features (Earle 1991b:3; Peebles & Kus 1977; Wright 1977b: 389, 1984:42,53).

*The rank-size rule.* Rank-size distribution in archaeology is a revised interpretation of the so-called ''Rank-Size Rule'' in economic geography (Auerbach 1913; Haggett 1971; Stewart 1958). The basic form of rank-size distribution, as observed in many different settlement systems, can be defined according to the following formula: a settlement of rank $r$ in the descending array of settlement sizes has a size equal to the size of the largest settlement in the system divided by the rank, $r$. Rank-size distribution can also be illustrated in common logarithms and the result is a straight line called the ''log-normal line.'' This Rank-Size Rule, described by George Zipf (1949), is the manifestation of a balance between two contradictory economic forces, diversification and unification (see Savage in press, for a theoretical review of this subject).

Analysis of rank-size distribution has been used in archaeological studies of regional settlement patterns (e.g., Adams & Jones 1981; Blanton 1976; Blanton et al. 1982; Crumley 1976; Falconer & Savage 1995; Hodder 1979; Hodder and Orton 1976; Johnson 1977, 1980, 1981, 1987; Kowalewski 1982; Paynter 1982, 1983; C. Pearson 1980; Randsborg 1982; Upham 1982; Weiss 1977; Wright 1986). Several basic types of deviation from rank-size linearity have been observed in archaeological data: (1) primate (or concave), in which the largest settlement in the system is larger than predicted by the rank-size rule; (2) convex, in which the largest settlement is smaller than the rule would predict; (3) primo-convex, in which the top portion of the rank-size curve appears primate, while the lower portion appears convex (Johnson 1980, 1981, 1987); and (4) double convex (Falconer & Savage 1995).

Different rank-size distributions have been seen as reflections of different systems of social integration. A number of interpretations for rank-size deviations have been proposed (for a summary in different explanations of rank-size curves, see Savage in press,). For instance, the rank-size distribution of highly integrated settlement systems is expected to approach log-normality. Accordingly, systems with a relatively low degree of integration should exhibit very convex rank-size distributions, although central place distributions are also convex. Furthermore, primate distributions may have been characteristic of systems in which economic competition is minimized and/or system boundary maintenance is the primary function of the primate center (Johnson 1981, 1987:108–109); they also may suggest the existence of high order sacred ceremonialism, macroregional elite exchange, foreign diplomacy, and war focusing on chiefly centers (Kowalewski 1982). Next, primo-convex distribution sometimes reflects the simultaneous operation of two distinct settlement systems in a single region—a centralized system superimposed on a more loosely integrated distribution (Falconer & Savage

1995). Last of all, a ''double convex'' curve suggest multiple settlement systems operating within a single region (ibid.).

In addition to a visual assessment, statistic simulation has been used to evaluate observed rank-size curves. The Kolomogorov–Smirnov one-sample goodness-of-fit test, or ''$K^-$ test,'' for example, has been used to measure the maximum deviation between observed value and expected, log-normal distribution and assess its statistical significance (Paynter 1982, 1983). A recent development in statistic method applies the $K^-$ test through Monte Carlo simulation methods in the evaluation of archaeological data. This method takes into the consideration the proportion of archaelogical sites recovered from the actual population, and addresses the sampling issue explicitly in simulations (Falconer & Savage 1995; Savage 1996a). The RankSize Program, written by Stephen Savage (1996b), estimates the probability that an observed site distribution could be drawn at random from an underlying log-normal site population.

The application of the rank-size model to archaeological data has provided interesting results for investigating the development of complex societies. For example, Johnson (1981) has demonstrated rank-size change in the Susiana plain in Southwestern Iran during three periods (3800, 3600, and 3400 B.C.), each of which marked change in local political organization including the development of the first state-level society in this area (3400 B.C.). These rank-size distributions showed a clear trend developing from convexity to near log-normality. Thus, these two approaches, settlement hierarchy and rank-size analysis, provide empirical methods for measuring the degree of social complexity and for assessing the nature of settlement systems.

In summation, the concept of chiefdom has become rather different from what was initially proposed by Service 30 years ago. In current studies, recognition of both social differences and similarities among chiefdoms helps archaeologists to redefine and better understand the concept. Chiefdom, therefore, has been treated as a loosely defined social category. It is ''a polity that organizes centrally a regional population in the thousands . . . [and] some degree of heritable social ranking and economic stratification is characteristically associated (Earle 1991b:1). This concept is useful for practically describing societies that share some common cultural elements and manifest similar degrees of social complexity. Certain recent studies have focused on the variability of chiefdoms among which the study of different degrees of socio-political development among chiefdoms has drawn considerable attention from archaeologists. Several empirical methods have been developed to evaluate the degrees of social complexity, including levels of decision-making hierarchy and rank-size deviations, also to be used in this study.

## WORKING HYPOTHESES

The following discussion is devoted, first of all, to examining the model of simple vs complex chiefdoms by analyzing regional settlement patterns of the Longshan culture in the Central Plains in northern China with attention to settlement hierarchy and rank-size deviations. Second, it will test the hypothesis that states were developed from more complex variants of chiefdom, based on the settlement data from the Longshan culture. In order to investigate the process of socio-political development, other theoretical premises, including the circumscription theory (Carneiro 1970, 1981) and the concept of peer–polity interaction (Renfrew 1975, 1978, 1986), will also be examined. Third, chiefdom variability in Neolithic northern China will be presented as a tentative explanation of the processes concerning the transition from chiefdoms to the early states in the Central Plains region. Finally, the theoretical implications derived from the Chinese data are to be discussed.

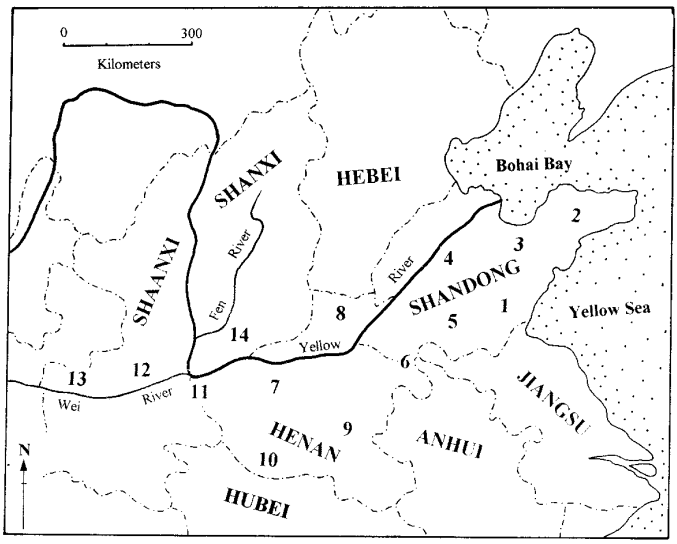


**FIG. 1.** Map of the middle and lower Yellow River valley showing distribution of the major phases of the Longshan culture. 1, Liangcheng; 2, Jiaodong; 3, Yaoguanzhuang; 4, Chengziyai; 5, Yinjiacheng; 6, Wangyoufang; 7, Wangwan; 8, Hougang; 9, Haojiatai; 10, Xiawanggang; 11, Sanliqiao; 12, Keshengzhuang; 13, Shuang'an; 14, Taosi.

## THE LONGSHAN CULTURE AND THE RESEARCH STRATEGY

The term Longshan culture or Longshan period refers to a late Neolithic culture distributed from the middle to the lower Yellow River valley. Chronologically speaking, it is generally divided into two periods: (1) the early Longshan culture, which is also referred to as the Miaodigou II culture in the western Henan, southern Shanxi, and Shaanxi regions (c. 2800–2600/2500 B.C.), and (2) the Late Longshan culture (c. 2600/2500–2000 B.C.). Geographically, based on analyses of variations of different ceramic types, the Longshan culture is further divided into several subcultures, which are named after the provinces in which they are located (e.g., the Shandong Longshan culture and the Henan Longshan culture). Furthermore, these regional Longshan cultures are classified into several phases based on the study of more detailed ceramic types. This classification often crosscuts provincial boundaries. Figure 1 illustrates the distribution of the 14 phases of the Longshan culture.[1,*] In this study, I use "Longshan culture" and "Longshan period" interchangeably, as required by the specific contextual need for clear description of data. Although the social implications of regional ceramic types are unclear, for the sake of this discussion, I will use terms such as "Henan Longshan" or "Shandong Longshan" to indicate the spatial distribution of the Longshan sites in question.

Preceding the earliest states in ancient China—Xia (c. 2100–1700 B.C.), Shang (c. 1700–1100 B.C.) and Zhou (c. 1100–256 B.C.)—the Longshan cultures manifested a process of social change from more egalitarian to stratified societies. Based on archaeological evidence, it appears that several cultural traits mark a new stage of social development. Writing systems may have occurred[2] (*Kaogu* 1993.4; E. Wang et al. 1993); copper and bronze were used for making

* See Notes section at end of paper for all footnotes.

small implements and ornaments (Yan 1981:47; An 1993); town walls were built and violence and warfare were widespread (Underhill 1989, 1994); burials indicate the presence of social hierarchies (Yan 1992:46–47; Liu 1994:184–236; Pearson 1981, 1988); ritual objects may have been exchanged among elites across regions (Liu 1994:184–236); regional cultures became more extensively distributed and interaction between them was intensified; and finally, the Neolithic cultures of this region became increasingly complex, forming the foundation for the development of civilizations (Chang 1986: 234).

The Longshan culture was situated in a crucial time and in an important region in which the early states evolved from earlier Neolithic societies. The study of regional settlement patterns of the Longshan culture, including settlement hierarchy (based on the distribution of settlement sizes), and the locational distribution of settlements, may be expected to provide important clues for understanding the processes of such socio-political evolution.

## The Spatial and Temporal Control

The rough spatial scope of this study is limited to the middle Yellow River valley, including southern Shanxi and Henan provinces, the region generally referred to as the Central Plains. This region was chosen because of two main reasons. First, it has long been regarded as the heartland of Chinese civilizations, where the earliest states, Xia and Shang, developed. Second, relatively detailed and completed survey data from this region have been published in recent years.

The main focus of this study is on the late Longshan period, dated from 2600 B.C. to 2100 B.C. in Henan (G. Cao 1994) and from 2500 B.C. to 2000 B.C. in southern Shanxi (Gao et al. 1984).[3] However, the cultures preceding and succeeding the late Longshan cultures will also be mentioned briefly in the discussion of cultural development. These include the Peiligang culture (c. 6500–5000 B.C.) in Henan, the Yangshao culture (c. 5000–2800 B.C.) in Henan and Shanxi, the Dawenkou culture (c. 4100–2600 B.C.) in Shandong, the Qujialing culture (c. 3000–2600 B.C.) in Hubei and southern Henan, the early Longshan period (Miaodigou II culture, c. 2800–2600/2500 B.C.) in Henan and Shanxi, and the Erlitou culture and Xiaqiyuan culture (c. 1900–1500 B.C.) in southern Shanxi, Henan, and southern Hebei (Table 1).

## Environment of the Region

### *Geographic Settings*

The topographic patterns of the Middle and Lower Yellow River valley can be characterized as uplands in the west, great plains in the center, and a combination of highlands and riverine plains in the east. The Yellow River, rising in the mountainous west and flowing eastward across wide extent of the country, is a dry-climate stream plagued by excessive fluctuation and flooding and carrying a heavy load of silt. In the lower course of the Yellow River, silt progressively chokes normal channels and lead directly to floods, causing the change of the river course frequently (Murphey 1972). The eastern part of the Central Plains is the Yellow River flooding region. The Yellow River switched back and forth between the north and the south of the Shandong peninsula in its course to the sea, and major changes of this kind have taken place at least since the late Pleistocene and throughout prehistoric and historic times (Wang 1993).

Based on the study of the remains of shell embankments in the Hebei and northern Jiangsu plains formed by ancient Yellow River courses, the distribution of Neolithic sites in the lower Yellow River valley and ancient texts which recorded the locations of the Yellow River, a reconstruction of the timetable for the changes of the Yellow River's course has been attempted (Wang 1993). At least two major changes of the river course occurred during the Neolithic period. For most

**TABLE 1**
**Comparison of Environmental Change and Archaeological Cultural Development in Central Plains**

| Time (BC) | Cultures devel. in Central Plains | Cultures came from outside | Climatic condition | Yellow R. course | Settlement features and social development |
|---|---|---|---|---|---|
| 8000 | | | Post-glacial optimum began | | |
| 6500 | | | | | |
| | Peiligang | | Warm | North | |
| 5000 | | | | | |
| | E. & M. Yangshao | | | | |
| 3300 | | | Very warm | | |
| 3000 | Late Yangshao | Mid. & late Dawenkou and Qujialing | | | 1st walled site |
| 2800 | Early Longshan | | Cooler and dryer | | |
| 2600 | | | | | |
| | | | | | 5 walled sites |
| | Late Longshan | | | South | |
| 2000 | | | | | |
| | Erlitou | | | | |
| | Phase I | | | | |
| | Phase II | | Warm | North | Palaces, state controlled bronze industry, elaborate burials, cultural expansion |
| | Phase III | | | | |
| | Phase IV | | | | |
| 1600 | | | | | |
| | Shang dynasty | | | | Continuous development of eary states |
| 1100 | | | | | |

of the Neolithic period the Yellow River flowed through the Hebei Plains and emptied into the Bohai Sea. Around 2600 B.C., the river course changed to the northern Jiangsu Plains and emptied into the Yellow Sea. Yet, another change took place about 2000 B.C., when the river course switched back to the Hebei Plains again (Fig. 4).

### *Climatic Change*

According to pollen analysis, the postglacial climatic optimum occurred circa 5000–1000 B.C. in China when it was warmer and moister than the present (B. Cao 1994; Sun 1987; Xu et al. 1988; Zhou et al. 1991). During this period, there were several climatic fluctuations. Northern China witnessed its the best climatic condition from 5000 to 3000 B.C. with warm temperature (in average 2–4°C higher than the present) and high precipitation. It, then, changed to a cooler and drier environment beginning around 3000–2800 B.C. (B. Cao 1994: 61–63; Man 1991: 264). Ancient texts which referred to animals and plants existing in the Xia and Shang times in northern China and the analysis of faunal remains found at Shang capital, Yinxu indicate that a warmer and wetter climate resumed before 2000 B.C. (Man 1991:266–269).

The occurrences of these climatic fluctuations and the changing course of the Yellow River often coincided with the development of archaeological cultures. For example, the warm climatic interval from 5000 to 3000 B.C. paralleled with the development of the Yangshao culture. The cold interval arriving around 3000–2800 B.C. coincided with the decline of the Yangshao culture and the development of the early Longshan culture. The Yellow River's changing course from north to south around 2600 B.C. happened when the late Longshan culture flourished. And, finally, another warm climatic interval and the Yellow River' changing course from south to north about 2000 B.C. occurred when the late Longshan culture transformed to the Erlitou culture (Table 1). The climatic fluctuations and the changes of the Yellow River's course during prehistoric times may have shaped the settlement patterns, having important impact on social development (Wang 1993; Yu 1994).

## The Data

The settlement data used in this study are derived from surveys carried out in the Yuncheng and Linfen basins in southern Shanxi, 8000 $km^2$ in area (Gao et al. 1984; *Kaogu yu Wenwu* 1986.5; *Kaoguxue Jikan* 1989; Zhang & Gao 1987), and in Henan province, 167,000 $km^2$ in area (NBCR 1991). Nearly 1100 Longshan sites have been found in these regions (Fig. 2). These sites can be divided into two categories. First, referred to as ''Longshan only'' sites in this study, includes 672 sites (632 in Henan and 40 in Shanxi) at which a single stratum of Longshan deposits have been found or the Longshan culture was the major deposit, therefore, the size of Longshan occupation at each site is known. Second category, referred to as ''multicomponent'' sites, contains 423 sites (370 in Henan and 53 in Shanxi) at which material remains belong to multiple archaeological cultures, thus, the size of Longshan occupation is unclear. These data, derived from reports of archaeological surveys,[4] suffer from several deficiencies: (1) the survey results are presented sketchily and in an unstandardized fashion, (2) measurements of the size of each cultural occupation at multicomponent sites was not attempted, and (3) many sites were roughly dated to large chronological intervals, such as the Yangshao period (covers about 2000 years) or the Longshan period (last for 1000 years). Therefore, it is impossible, in most cases, to conduct more elaborate analysis on site distribution. In order to avoid overlooking the large Longshan settlements in these multicomponent sites, site–size distributions for ''Longshan only'' and multicomponent sites are shown separately in histograms. The study of site hierarchy is mainly based on the site-size distribution of

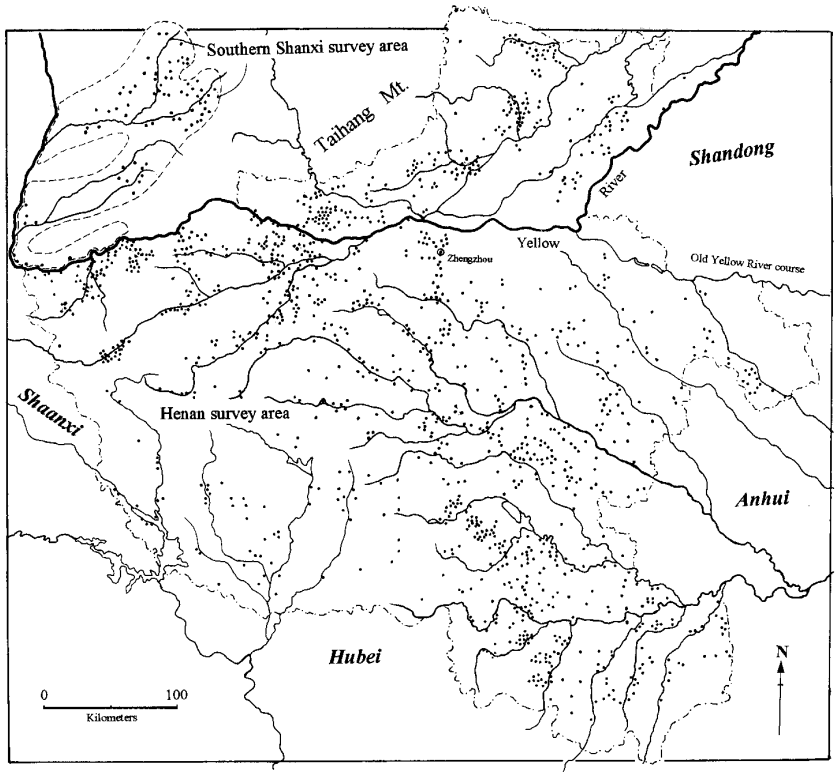


**FIG. 2.** Distribution of Longshan sites in the survey regions of southern Shanxi and Henan (redrawn from *Kaoguxue Jikan* 1989: Figs. 1–3; NBCR 1991: maps 36–37).

the Longshan only sites, but where necessary, the large multicomponent sites are also considered.

The site-size data are processed with the RankSize Program (Savage 1996b) on a PC-compatible computer. The data used for the rank-size simulations are derived from the category of ''Longshan only'' sites. As a result, the sample proportion is very small in all cases (.62–.3; Table 2).[5] According to Savage's study (1996b:8), in most situations sample proportions of .7 or less will never achieve low probabilities (a low probability means that the sample represents a noteworthy departure from the log-normal distribution). The accuracy of the simulation results was affected by the small sample proportion, indicating by high probability values ($>0.05$) in some cases.

Highly aware of these data problems, rank-size curves were used together with other variables, such as site-size hierarchy and site distribution; therefore, it still provides useful information for a synthetic analysis.

The survey data available for the study of settlement patterns were not systematically obtained, and it is inevitable that our analysis will be affected by these shortcomings. Fall coverage archaeological surveys are needed to record better data before landscapes are completely changed by modern agriculture.[6] However, the present study of settlement patterns based on traditional data is still a useful experimental operation.

A large number of sites from a broad region are encountered in this study. In order to make quantitative comparisons among the sites in different areas, a standard classi-

**TABLE 2**
**Summary of Simulation Runs for the Survey Regions in the Central Plains**

| Region | Largest site (ha) | Number of sites | Sample percent | Number of sites in population | Observed *K* value | Probability | Curve shape |
|---|---|---|---|---|---|---|---|
| Early Taosi | 300 | 30 | .62 | 47 | 0.733 | <0.001 | primate |
| Late Taosi | 300 | 28 | .50 | 56 | 0.679 | 0.0004 | convex |
| Sanliqiao | 240 | 41 | .51 | 80 | 0.829 | <0.001 | primate |
| Yi-Luo R. | 75 | 28 | .30 | 92 | 0.571 | 0.8903 | primate* |
| Qin R. | 80 | 39 | .60 | 65 | 0.205 | 1.000 | log-nor.* |
| North Henan | 48 | 97 | .48 | 201 | 0.34 | 1.000 | convex* |
| Central Henan | 50 | 187 | .56 | 332 | 0.471 | 0.7257 | convex* |

* With high probability (>0.05) caused by small sample proportion, the result is statistically log-normal.

fication of settlement size is needed. The histograms of settlement size from the Longshan only sites (Fig. 3) show that they tend to group into four groups: (1) three very large sites above 200 ha; (2) three large sites of 199–70 ha; (3) 22 medium sites, 69–20 ha; and (4) 641 small sites below 19 ha. The following analysis begins with a focus on the distribution of the sites relatively large in size, since they may represent important regional centers. However, this initial classification for regional comparison is not necessarily followed by the analysis of individual regional settlement patterns in which the settlement hierarchy in the subregions is discussed separately. The levels of hierarchy are delimited based on the specific site-size distribution in the subregions in question.

Although site size is used as a main variable for the analysis of settlement hierarchy, site function is also considered, particularly the sites with walls made of rammed earth. These walled sites, although rather small in size (1–16 ha), perhaps functioned differently than ordinary small sites without walls. They were probably the centers for their immediate area (see discussion below).

## REGIONAL SETTLEMENT PATTERNS OF THE LONGSHAN CULTURE

Two stages of analysis were applied to the study of settlement-size distribution. First, a

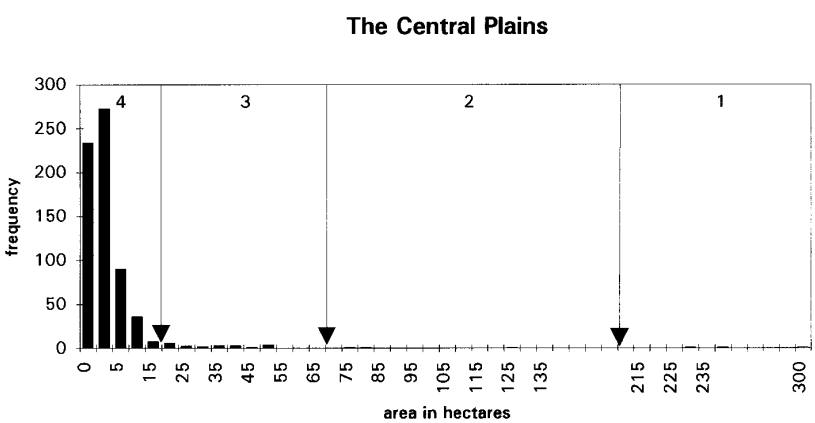


**FIG. 3.** Classification of late Longshan site size from southern Shanxi and Henan.

general comparison of site size in the entire region with attention to the relationships between settlement patterns and geographic settings. Second, discussions focused on the subregional level.

## The First Analysis—General Comparison of Site Size and Environmental Settings

### *Site Size Comparison*

By plotting the larger examples (including ''very large'', ''large,'' and ''medium'' sites) and the walled sites on the map, two general patterns of site distribution are observed. In the first pattern, the very large, large, and medium sites appear to be clustered together in four areas. In each cluster, at least two site-size ranks are involved. They are: Cluster 1 in the Taosi phase in the Linfen Basin, southern Shanxi (Fig. 1:14; Fig. 4:C1); Cluster 2 in the Sanliqiao phase, western Henan (Fig. 1:11; Fig. 4:C2); Cluster 3 in the Wangwan phase in the Yi-Luo River valley (Fig. 1:7; Fig. 4:C3); and Cluster 4 in the Hougang phase in the Qin River valley (Fig. 1:8; Fig. 4:C4). In the second pattern, all the walled sites and most ''medium'' sites have been found spread out evenly on the landscape in the northern and central Henan where the Hougang (Fig. 1:8; Fig. 4:C5) and Haojiatai phases (Fig. 1:9; Fig. 4:C6) are defined. Although most of these sites are not closely spaced, we still refer to them as the northern Henan cluster and the central Henan cluster, for the convenience of this discussion. Interestingly, the two patterns of site distribution coincide with the two types of geographic configuration in the region.

Some common geographic features in clusters 1 to 4 can be more or less characterized, adapting Carneiro's concept (1970), as environmentally circumscribed regions. These clusters are either completely (Clusters 1 and 2) or partially (Clusters 3 and 4) surrounded by natural barriers such as mountains and large rivers. Clusters 5 and 6 in northern and central Henan, on the other hand, are situated in the great alluvial plains—the lowlands of the Central Plains—with little geographic barriers. These two clusters are apparently noncircumscribed.

The relationships between the diversities of geographic configuration and the variations of settlement pattern are further discussed below. Now, we will analyze some examples of these clusters.

## The Second Analysis—Settlement Distribution of the Six Clusters in the Longshan Culture

Based on the different settlement distributions defined by regional geographic configurations described above, the six settlement clusters are divided into three types here: (1) circumscribed settlement clusters (Clusters 1 and 2), (2) semi-circumscribed settlement clusters (Clusters 3 and 4), and (3) noncircumscribed settlement clusters (Clusters 5 and 6).

### *Circumscribed Settlement Clusters*

*Cluster 1—The Taosi region.* Cluster 1, which consists of more very large sites than any other cluster, is the area where the sites of the Taosi phase are distributed. This cluster is situated in the Linfen basin, embracing the Hui River and the lower reaches of the Fen River valleys, and surrounded by the Luliang Mountains in the north, the Yellow River in the west, Emei Mountain in the south, and the Zhongtiao and Taiyue Mountains in the east (Fig. 4). Taer Mountain is situated in the center of the basin, separating the settlement system into northern and southern subclusters. This basin has abundant fresh water and fertile loess land. The analysis of pollen samples from the Taosi site suggests a warm and moist climate in the Longshan period (Kong and Du 1992). It was a desirable territory throughout ancient times. The capital of the Jin state of the Eastern Zhou period was located in Houma county in the south of the basin.

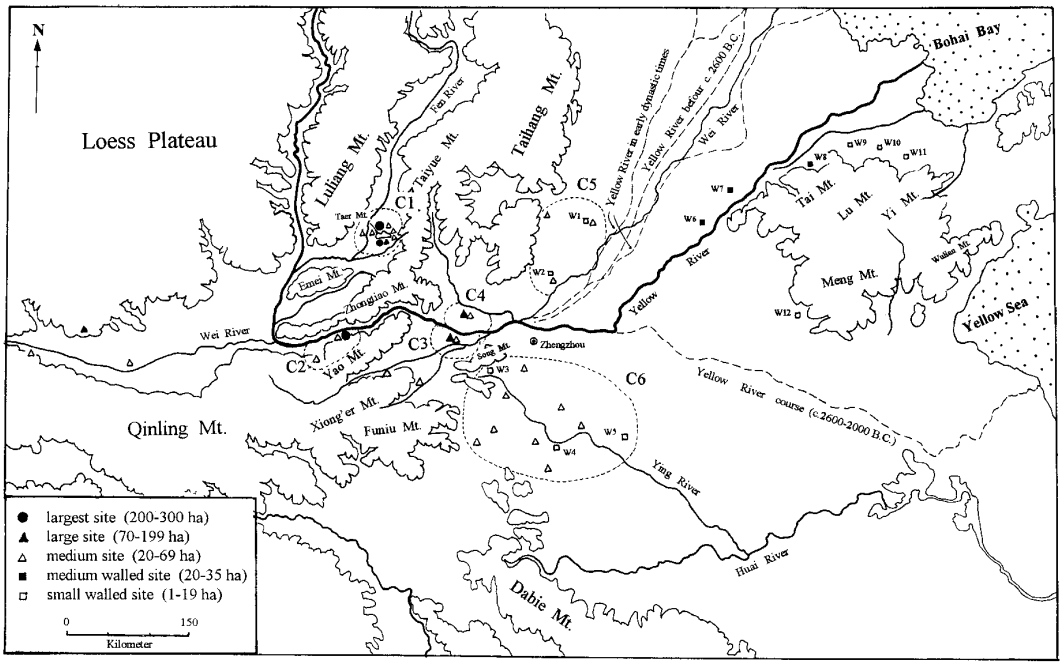


**FIG. 4.** Map of the middle and lower Yellow River valley, showing the changing courses of the Yellow river (after Q. Wang 1993: Figs. 2–4), the topography of the region, and distribution of the six clusters composed of large sites and walled towns in the Central Plains dating to the late Longshan culture. Site clusters: C1, the Taosi cluster; C2, the Sanliqiao cluster; C3, the Yi-Luo River valley cluster; C4, the Qin River valley cluster; C5, the northern Henan; and C6, the central Henan cluster. Walled sites: W1, Hougang; W2, Mengzhuang; W3, Wangchenggang; W4, Haojiatai; W5: Pingliangtai; W6, Jingyanggang; W7, Jiaochengpu; W8, Chengziyai; W9, Dinggong; W10, Tonglin-Tianwang; W11, Bianxianwang; W12, Xuegucheng. Walled sites W1-W5 within the survey region are discussed in this study, W6–W11 outside the survey region are shown here for comparison.

The Taosi phase (c. 2500–2000 B.C.) is further divided into early and late sub-phases. At least 75 Taosi sites have been found in the Linfen basin, including 47 early Taosi sites (30 Longshan only) and 56 late Taosi sites (28 Longshan only) (Gao et al. 1984; *Kaogu yu Wenwu* 1986; *Kaoguxue Jikan* 1989; Zhang and Gao 1987). The hierarchical distribution among the early Taosi sites shows that the data are clearly dividable into three classes (Fig. 5) in decreasing order of size: (1) Taosi, 300 ha, in the northern subcluster, and Kaihua, 128 ha, in the southern subcluster; (2) four sites (two in the north and two in the south), ranging from 50 ha to 24 ha;[7] and (3) 23 sites smaller than 14 ha, including both Longshan only and multicomponent sites.

The site-size distribution for the late Taosi phase also demonstrates three levels of site hierarchy: (1) Taosi, 300 ha, in the north, and Fengcheng-Nanshi, 230 ha, in the south; (2) four sites (two in the north and two in the south), ranging from 50 ha to 24 ha; and (3) 22 sites smaller than 12 ha, including both Longshan only and multicomponent sites (Fig. 6).

As the largest Neolithic site ever found in north China, Taosi has been excavated extensively for more than ten years. Excavations of its cemetery (3 ha in size) have yielded clear evidence indicating the exis-

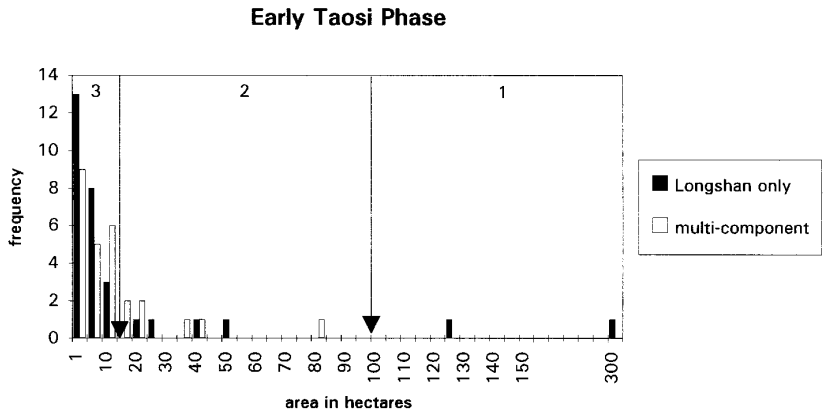


**FIG. 5.** Three levels of settlement hierarchy of the early Taosi phase, Longshan culture.

tence of a highly stratified social organization (Gao et al. 1983; *Kaogu* 1983a). It is possible that Taosi had already reached its maximum size during its early phase as most elaborate tombs and large architectural remains found at the site are dated to the early Taosi phase (*Kaogu* 1983a, 1986:777). No evidence has been reported to indicate a significant reduction in size at Taosi during its late occupation. The settlement, therefore, may have remained about the same in scale in the late phase.

The three very large sites/major centers (Taosi, Kaihua, and Fengcheng-Nanshi) are located near Taer Mountain. The straight-line distances between Taosi and the other two sites are about 20 km, but the actual distance is much greater. The major centers are closely surrounded by minor centers and a large number of third class size sites/villages (Fig. 7).

The distribution of site hierarchy, as described above, suggests that, in the early phase, Taosi (300 ha) was the dominant center of not only the northern subcluster, but also of the entire Linfen basin. Since southern subcluster in which the largest site, Kaihua (126 ha), was less than half of the size of Taosi. There are three levels of settlement hierarchy. Rank-size distribution expresses

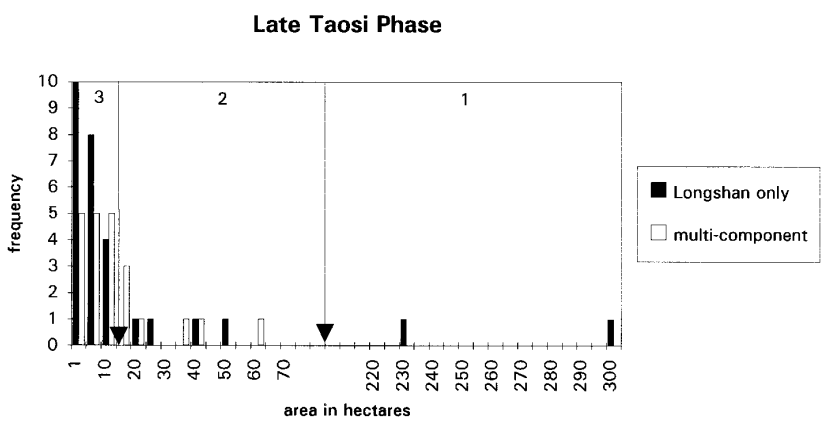


**FIG. 6.** Three levels of settlement hierarchy of the late Taosi phase, Longshan culture.

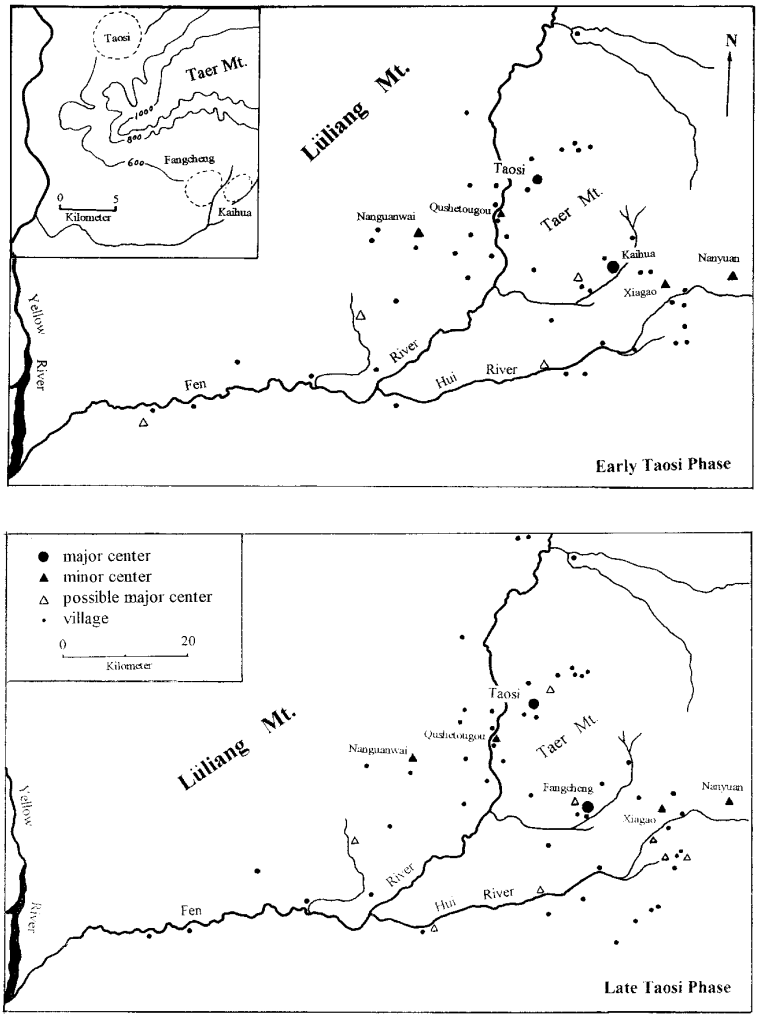


**FIG. 7.** Distribution of sites in the early and late Taosi phases, Longshan culture (redrawn from *Kaogu yu Wenwu* 1986.5: Fig. 1; *Kaoguxue Jikan* 1989: Fig. 3; Zhang & Gao 1987: Fig. 1).

a strong primate curve (Fig. 8), suggesting a highly integrated regional social system.

In the late Taosi phase, however, the basin seems to be dominated by two competitive centers located on the two sides of Taer Mountain—Taosi in the north and Fangcheng-Nanshi, a newly established large settlement with comparable size (230 ha), in the south (Fig. 7). While the settlement hierarchy still shows three tiers (Fig. 6), the upper portion of the rank-size curve shifts to a convex distribution (Fig. 8), indicating a decentralized social system.

Many of these Taosi sites also have occupation of the Yangshao culture (c.5000–3000 B.C.), Miaodigou II culture (c.3000–2500 B.C.), or Erlitou culture (c.1900–1500 B.C.), suggesting a long history of cultural development. Figure 9 illustrates a comparison of the largest site size and site number from early Yangshao to Erlitou (c. 5000–1500 B.C.), based on the results of archaeological

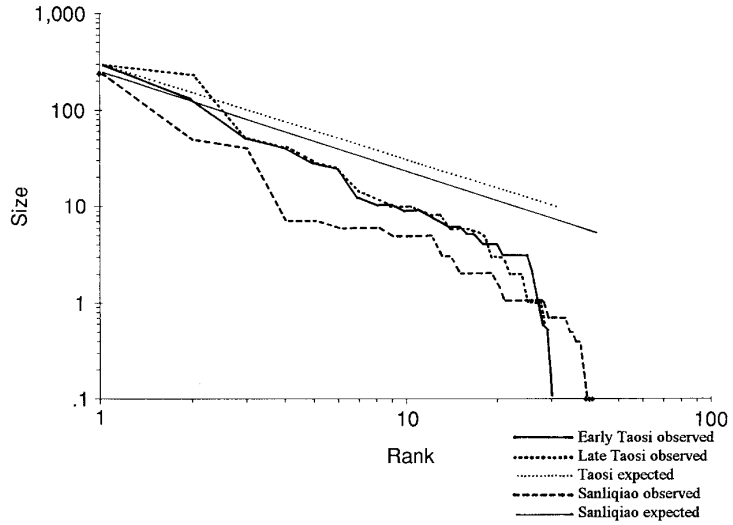


**FIG. 8.** The rank-site distributions of the Taosi phase and Sanliqiao phase, Longshan culture. Primate curve in the early Taosi phase, convex curve in the late Taosi phase, and primate curve in the Sanliqiao cluster.

surveys conducted in southern Shanxi, including the Linfen and Yungcheng basins (*Kaoguxue Jikan* 1989).[8] There is a sharp increase in site numbers from the late Yangshao (42 sites) to the early Longshan (102 sites). However, when the settlements began to nucleate and the largest site size reached its maximum degree in the early Taosi phase, site numbers dramatically decreased (65 sites). In the late Taosi phase, site numbers rose slightly (84 sites).

*Cluster 2—The Sanliqiao region.* The Sanliqiao region is a hilly land in western Henan (2000 to 500 m in altitude), including Sanmenxia city and Shanxian and Lingbao counties (HBCS 1987). It is clearly a circum-

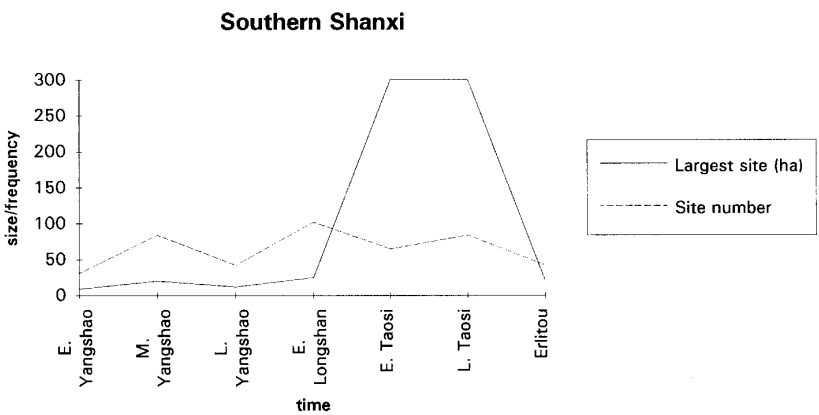


**FIG. 9.** Comparison of the largest site size and site number from the Yangshao to Erlitou cultures (c. 5000–1500 B.C.), southern Shanxi.

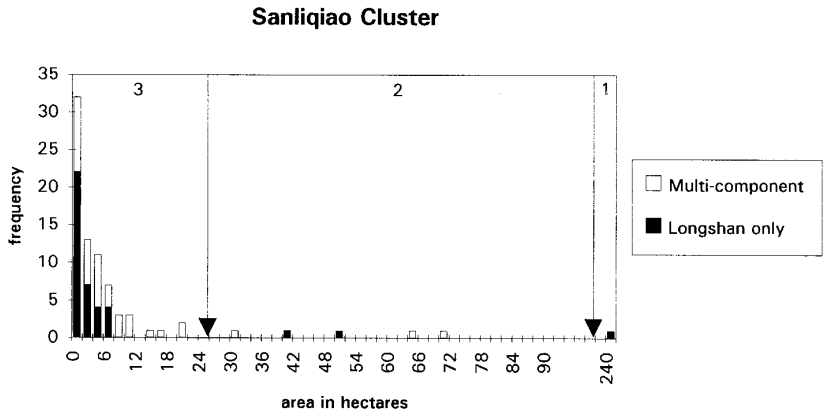


**FIG. 10.** Three levels of Longshan settlement hierarchy of the Sanliqiao cluster.

scribed region surrounded by natural barriers—the Yellow River in the north, the Yao Mountains in the east and south, and the Qinling Mountains in the west (Fig. 4). A strategic pass, Hanguguan, regarded as the most important juncture in ancient times because it connected the Central Plains in the east with the Guanzhong Plains of Shaanxi of the west, is located here (Fig. 11).

Some 84 Longshan sites, belonging to the Sanliqiao phase, are distributed in narrow riverine areas along several tributaries of the Yellow River. Half of these Longshan occupations have been found at multicomponent sites, mostly overlapping with the Yangshao cultural deposits (NBCR 1991:maps 166–169, account 342–360). Site-size distribution of the Longshan only sites manifests three levels of settlement hierarchy, including one major center (240 ha), two secondary centers (40, 50 ha), and a number of third-rank sites smaller than 6 ha. The distribution of the multicomponent Longshan sites seem to fit into the range of the second (referred to as possible minor centers below) and third ranks (Fig. 10).

The major center, Xiaojiaokou (240 ha), a minor center, Sanliqiao (40 ha), and another possible minor center, Renmazhai (30 ha), are located along the Qinglongjian River valley. These three centers along with a number of villages, rather closely spaced, seem to form a subcluster with a three-tier settlement hierarchy in the northeast of the region. Moreover, one second-rank center, Zhuyang (50 ha), and two possible minor centers, Sansheng (70 ha) and Shigata (64 ha), with many smaller villages, are distributed in the central and western parts of the region. These three second-rank centers formed three subclusters, each demonstrating a two-tier settlement hierarchy (Fig. 11). The straight-line distances between the nearest neighboring centers are 36, 31, and 30 km. Similar to the Taosi cluster, the actual distances between the centers are greater due to the mountainous topography. Apparently, this region included at least four subregional groups separated by rivers and hills. The group centered on Xiaojiaokou was the most integrated. Xiaojiaokou, therefore, may have been the most influential, if not dominant, center of the region. The rank-size graph clearly shows a primate curve (Fig. 8).

This region became densely populated as early as the Yangshao period. Some 95 Yangshao sites, ranging from 80 to less than 1 ha in size, have been identified (Fig. 26) (NBCR 1991: maps 166–169, account 342–360). Given the fact that the Yangshao culture lasted for more than 2000 years and the Longshan culture nearly 1000 years, it is likely that not all Yangshao sites or Longshan sites were contemporaneous. It is con-

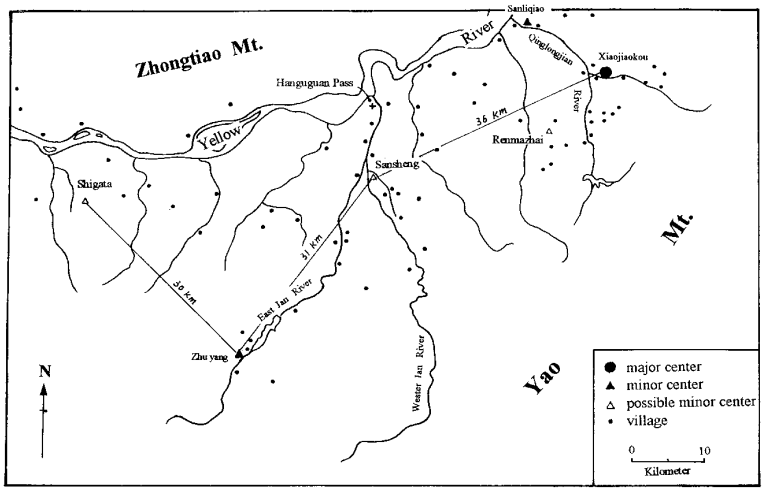


**FIG. 11.** Distribution of Longshan sites in the Sanliqiao cluster (redrawn from NBCR 1991: maps 166–169).

ceivable that the sites were more densely distributed in Longshan than in Yangshao at any given time, because the Yangshao period was twice as long as the Longshan period. Also, the Longshan culture witnessed new social integration as the largest settlement, Xiaojiaokou, developed.

### *Semicircumscribed Clusters*

*Cluster 3—The Yi-Luo River valley region.* This region, including Luoyang city, Yanshi, Mengjin, and Xin'an, is an alluvial plain (about 120 meters or more in altitude) in the lower Yi and Luo River valley (HBCS 1987). A large number of sites have been found in a lowland area delimited by the Yellow River in the north, the Yao Mountains in the west, the Xionger Mountains in the southwest, and Song Mountain in the east. However, it is not completely circumscribed region. There is virtually no natural barrier in the southeast connecting to the Huang-Hui Plains in central Henan (Fig. 4).

Some 92 Longshan sites, belonging to the Wangwan phase, have been found in this region (NBCR 1991: maps 68–69, 92–101, account 34–35, 101–122). Among them only 28 sites are Longshan only, while the rest are multicomponent. Site-size distribution of the Longshan only sites clearly indicates a three-tier settlement hierarchy, with a major center, Poluoyao (75 ha); a minor center, Dayanghe (35 ha); and 20 villages (ranging from 9 to <1 ha) (Fig. 12). The two centers are closely spaced, about 6 km apart. Nine possible minor centers, ranging from 45 to 20 ha were also identified here (Fig. 13). It is possible that the Poluoyao site was the dominant center of most of the region. The rank-size distribution also presents a primate curve in general, but the upper portion of the curve is clearly close to the log-normal line (Fig. 14).

The population of the Yangshao culture in this region was already very dense. Some 84 Yangshao sites, ranging from 75 to <1 ha in size, have been found (Fig. 26; NBCR 1991: maps 68–69, 92–101; account 34–35, 101–122). The Yi-Luo River valley has long been regarded as the heartland of Chinese civilizations. Nine dynasties established capitals in Luoyang, not far from the Poluoyao site. The earliest urban capital city—the Erlitou site—was also located here (Fig. 30).

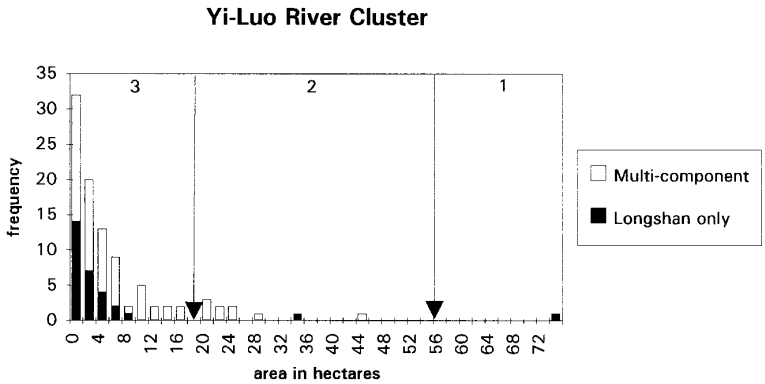


**FIG. 12.** Three levels of Longshan settlement hierarchy of the Yi-Luo River valley cluster.

*Cluster 4—The Qin River valley region.* Some 66 Longshan sites (38 Longshan only and 28 multicomponent) have been found on the lower Qin River valley, embracing Jiyuan, Mengxian, Qinyang, Wenxian, and Boai counties (NBCR 1991: maps 114–118, account 122–123, 169–188, 201–202). The western part of this region is hilly lands (above 200 m in altitude), extending from the Taihang Mountains, while the eastern part of the region are alluvial plains (100 m or lower in altitude) (HBCS 1987). Most sites are clustered on the plain region between the Yellow and Qin Rivers, which is a relatively circumscribed region, delimited by Wangwu Mountain in the west, the Yellow river in the south, and the Qin River in the north and east (Fig. 4). However, the Qin River is not a very large river, and cultural interaction between the south and the north sides of the Qin River was probably greater than that of the Yellow River. Indeed, since archaeological remains found in this region are closely related to the Hougang phase in the north of the Qin River (Fig. 1:8) with some influence from the Wangwan phase (Fig. 1:7) in the southern side of the Yellow River (Liu and Zhang 1985).

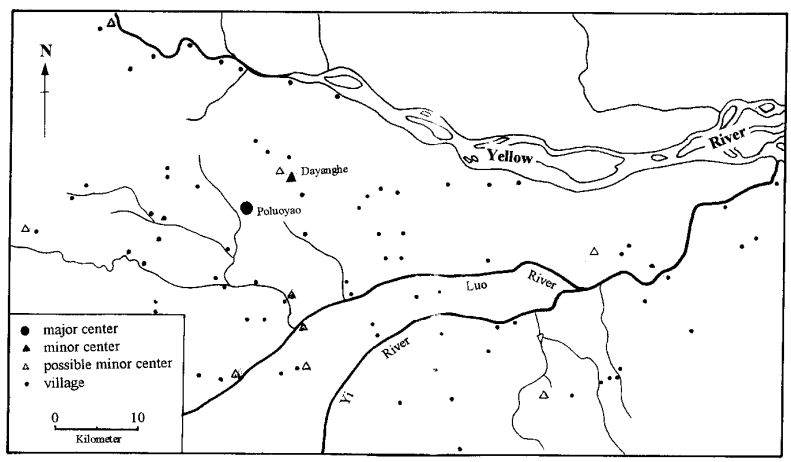


**FIG. 13.** Distribution of Longshan sites in the Yi-Luo River valley cluster (redrawn from NBCR 1991: maps 92–101).

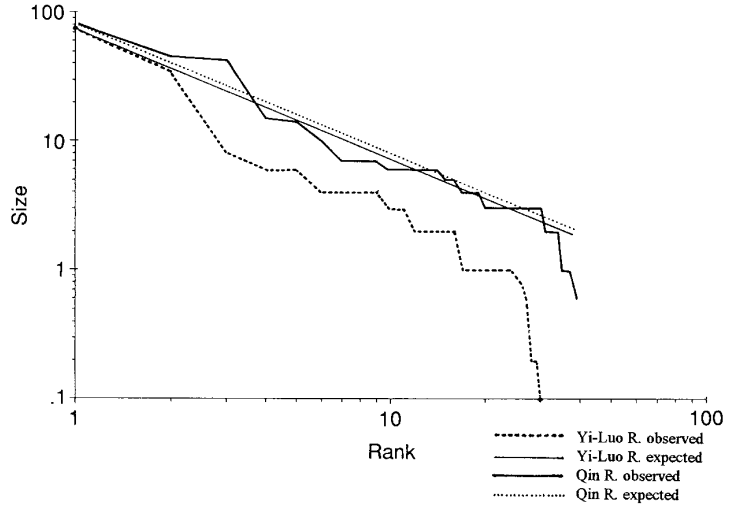


**FIG. 14.** Primate rank-size distribution with log-normality on the upper part of the curve in the Yi-Luo River valley cluster, and Log-normal curve in the Qin River valley cluster, Longshan culture.

Three levels of site hierarchy can be observed from the histogram (Fig. 15), including (1) a major center, Miaojie (80 ha); (2) two minor centers—Miaodian (42 ha), 8 km from the major center, and Yijing (45 ha), 28 km from the major center; and (3) a number of villages smaller than 15 ha (Fig. 16). It appears that Miaojie was probably the primary center, which dominated at least two minor centers and a large number of villages in the valley. Rank-size analysis suggests a nearly log-normal distribution (Fig. 14).

This region had already been populated during the Yangshan period, to which 43 sites, ranging from 15 to <1 ha in size, have been dated (Fig. 26) (NBCR 1991: maps 114–118, account 122–123, 169–188, 201–202). The population had probably grown during the Longshan period, judging from both site size and site number.

### *Noncircumscribed Clusters*

*Cluster 5—The Northern Henan region.* Northern Henan, including five districts, Ji-

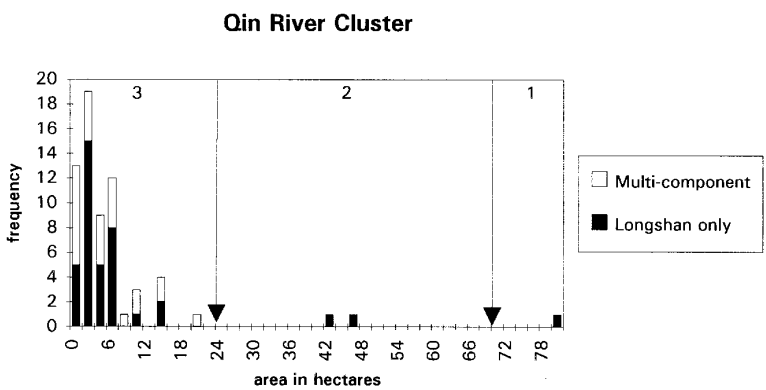


**FIG. 15.** Three levels of Longshan settlement hierarchy of the Qin River valley cluster.

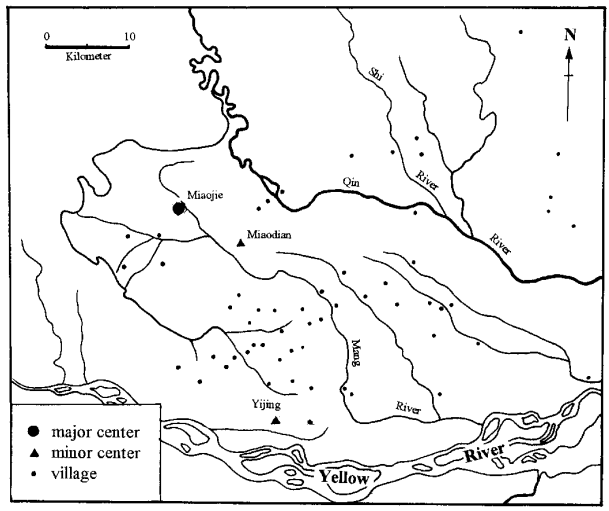


**FIG. 16.** Distribution of Longshan sites in the Qin River valley cluster (redrawn from NBCR 1991: maps 114–123).

aozuo, Anyang, Hebi, and Puyang, is a lowland region of the Central Plains in conjunction with the Taihang Mountains in the west. This region, formed by the Yellow River, the Wei River, and their tributaries, has a low altitude (100–50 m, high in the west and low in the east), rich soil, and abundant water resources (HBCS 1987).

The ceramic type of this region belongs to the Hougang phase (Fig. 1:8). Most Longshan sites are distributed along river courses, such as the Huan River, Qi River, upper Wei River, and Jinti River. Some 201 Longshan sites have been found (97 Longshan only and 104 multicomponent), including three medium sites (Lubao of 48 ha in Xinxiang; Balizhuang of 35 ha in Anyang; Mengzhuang of 25 ha in Huixian; and Daliutan of 20 ha in Linxian); two walled sites (one at Hougang in Anyang of 10 ha and another one of 16 ha built at a medium-sized site, Mengzhuang in Huixian) (*Kaoguxue Jikan* 1983; NBCR 1991: Account 160–168, 212–312; *Zhongguo Wenwu Bao* 1995b). Most sites are very small, and the site size distribution shows a three-tier settlement hierarchy for the entire northern Henan region (Fig. 17): (1) two first-rank centers (48, 35 ha), (2) nine second-rank centers (25–10 ha), and (3) nearly 190 villages (8–<1 ha). These sites tend to be clustered into at least five groups, in which large sites appear to be surrounded by small sites (Fig. 18). (NBCR 1991: maps 112, 113, 124–155).

The following discussions will focus on the two subclusters with walled sites, Hougang in the Huan River valley and Mengzhuang in upper Wei River valley, as relatively detailed data from excavations in these two areas are available.

### *The Hougang Subcluster*

This group of sites is distributed along the Huan River valley in Anyang and Tangyin. One medium site at Balizhuang (35 ha), one walled site at Hougang (10 ha; *Kaogu Xuebao* 1985), and 36 small sites (the Longshan only sites are no larger than 3 ha) have been found (Fig. 18) (*Kaoguxue Jikan* 1983; NBCR 1991: maps 140–143, 146–147; account 268–275, 288).

Balizhuang is located on a terrace area, 3 meters above the surrounding ground. The Longshan deposits found there can be divided into two phases with the later phase

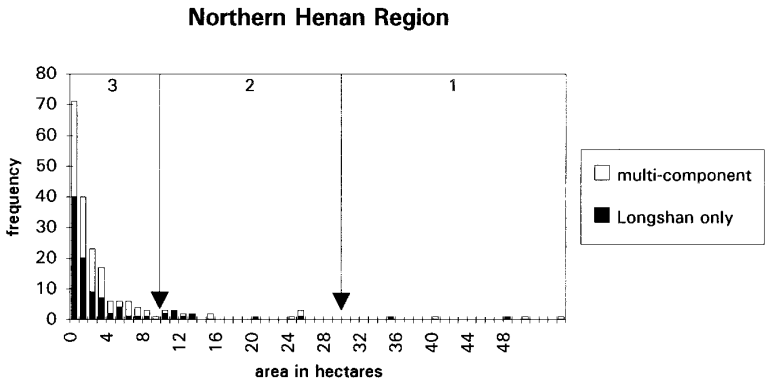


**FIG. 17.** Three levels of Longshan settlement hierarchy in the northern Henan cluster.

dated to 2585 ± 145 B.C. ((ZK-756); *Henan Wenbo Tongxun* 1980). The Hougang site, about 6 km to the west of Balizhuang, is also on a mount-shaped terrace near the Huan River. Longshan culture deposits there were dated to c. 2700–2100 B.C. (*Kaogu Xuebao* 1985a: 82). A section of rammed-earth wall, 70 m long and 2–4 m wide and probably the remains of a town wall, was discovered in the 1930s (Yin 1955: 54, 55) and dates to

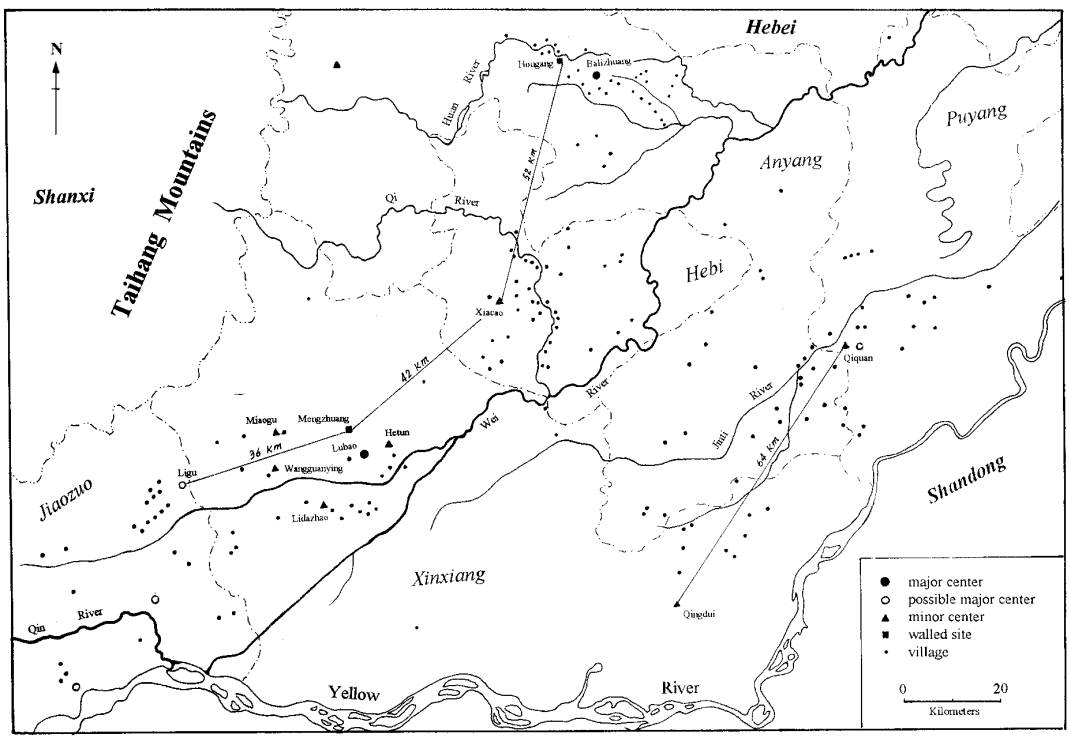


**FIG. 18.** Distribution of Longshan sites in the northern Henan cluster (redrawn from NBCR 1991: maps 112, 113; 124–155).

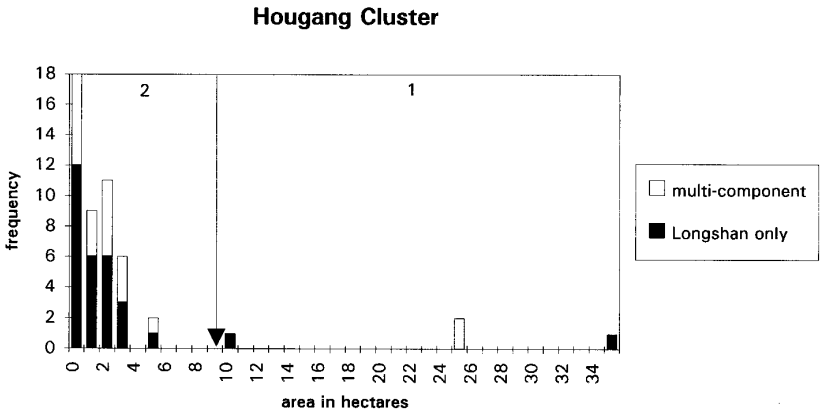


**FIG. 19.** Two levels of Longshan settlement hierarchy in the Hougang subcluster.

around 2500–2300 B.C. (Qu 1989; Sui 1988:47). It is possible that both of the sites were regional centers which dominated the area during different times. Balizhuang may have been the early center of the region, which was, then, replaced by the walled site Hougang. If this was the case, we would expect only two levels of site hierarchy at a time in this subcluster (Fig. 19).

### *The Mengzhuang Subcluster*

This subcluster is a group of sites distributed along the upper Wei River valley in Huixian and Xinxiang (Fig. 18). It includes two major centers—Lubao (48 ha) in Xinxiang and Mengzhuang (25 ha) in Huixian; four minor centers—Hetun, Lidazhao, Miaogu, and Wangguanying (ranging from 11 to 13 ha); and 21 villages (smaller than 8 ha) (NBCR 1991: maps 130–133, account 236–242).

A square-shaped walled town, 16 ha in size and dated to the middle and late Longshan period, has been recently found at the Mengzhuang site. The remaining walls of rammed earth are about 400 m long on each side, 0.2–1.2 m in height, 8.5 m in width at the base, and 5.5 m in width at the top. A moat 5.7 m deep and 30 m wide was found surrounding the town walls which appear to be repaired several times after the initial construction. The later parts of the walls date to the Xia and Shang periods (Yuan 1992; *Zhongguo Wenwu Bao* 1995b). About 8 km southeast of Mengzhuang is another center, Lubao, which has not been excavated. A situation similar to the Hougang subcluster, Mengzhuang and Lubao were probably two centers subsequently developed during the Longshan period. Only one major center dominated the region at a given time. As a result, three levels of site hierarchy can be observed in this subcluster (Fig. 20).

### *Other Subclusters*

At least four other subclusters in the northern Henan region were investigated and studied.

*The Xiacao subcluster.* A group of some 40 Longshan sites are distributed along the Qi River valley in Hebi district (Fig. 18) These rather small sites are consist of Xiacao (11 ha) in Qixian county which may have been the only center; all others (7 to <1 ha) were probably villages (Fig. 17).

*The Qiquan subcluster.* A similar situation is revealed in the eastern part of the region (Fig. 18). A group of Longshan sites are distributed along the Jinti River valley, includ-

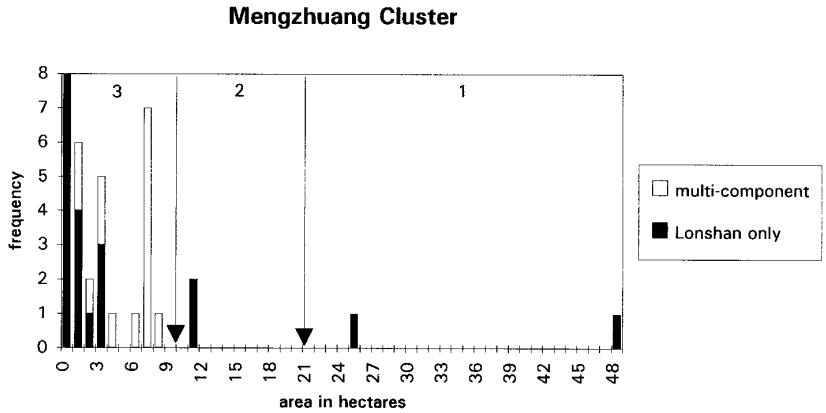


**FIG. 20.** Three levels of Longshan settlement hierarchy in the Mengzhuang subcluster.

ing a center, the Qiquan site (11 ha) in Wuyang, and nearly 30 villages (ranging from 8 to <1 ha). (Fig. 17).

*The Qingdui subcluster.* Some 14 sites are closely spaced along the Huangzhuang River valley in the southeastern part of this region, including a center at Qingdui (13 ha) in Fengqiu county and 13 villages smaller than 4 ha (Figs. 17 and 18). There may have been more than 14 sites in this area, since this is part of the Yellow River flooding region, ancient sites tend to be buried by thick silt and are thus difficult to find.

*The Ligu subcluster.* Nearly 20 Longshan sites appear to be clustered along the uppermost Wei River valley in Jiaozuo district (Fig. 18). Among them, a multicomponent site, Ligu (24 ha), is the largest; other Longshan only sites are smaller than 5 ha. Since the actual size of the Longshan deposits at the Ligu site is unknown, it is tentative to define it as the center of this subcluster.

Each of these four subclusters demonstrates two levels of site hierarchy (Fig. 17).

### *Relationships between Subclusters and Cultural Development in Northern Henan*

The six subclusters described above are located in two sections. Four of them are situated on the west and two on the east, with a few sites scattered in the central area. This central area was where the old Yellow River courses flowed during early Neolithic and during the Dynastic period (Fig. 4). There may have been more site clusters in this region, which were either destroyed by the frequently changed Yellow River course or covered by deep silt.

The distances between the subregional centers in the western part of the region appear to be similar—52 km between Hougang and Xiacao, 42 km between Xiacao and Mengzhuang, and 36 km between Mengzhuang and Ligu. The average distance is 43 km. The distance between the two centers (Qiquan and Qingdui) in the eastern part of the region is about 64 km. Given the fact that these two clusters are situated near the Yellow River flooding region, there may have been another cluster of Longshan sites in the area where the present Yellow River runs.

The rank-size distribution of this region expresses a convex curve (Fig. 21), indicating a decentralized settlement system. The town walls found at Hougang and Mengzhuang clearly suggest that the relationships between the centers were competitive in nature. The centers in some clusters shifted locations (e.g., Hougang and Balizhuang in the Hougang cluster), suggesting a frequent re-

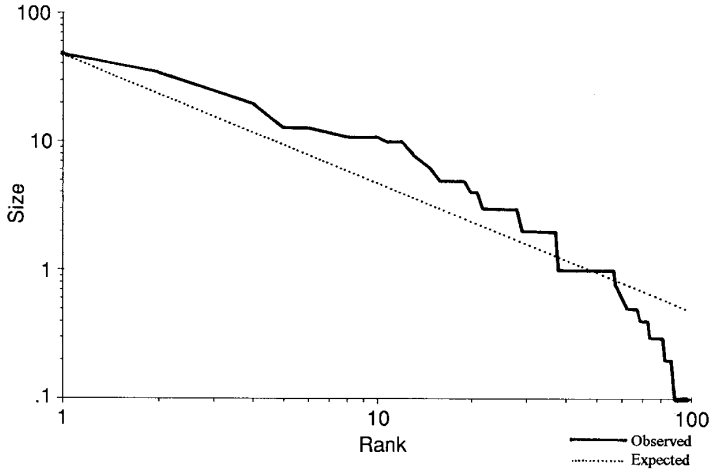


**FIG. 21.** Convex curve of rank-size distribution in the northern Henan cluster, Longshan culture.

placement of political centers due to intergroup conflict.

It is evident that the Longshan culture in northern Henan witnessed a rapid population growth. Only about 62 Yangshao sites, ranging from 15 to <1 ha, have been found here (Fig. 26) (NBCR 1991: maps 112, 113, 124–155, account 160–168, 212–312), compared to 201 Longshan site (48–<1 ha) identified in the same area.

*Cluster 6—The Central Henan region.* This region, referred to as the Huang-Huai Plains to the south of the Yellow River and east of the Song and Funiu Mountains, is also a lowland region of the Central Plains (100–30 m in altitude)(HBCS 1987). The northeastern portion of the region, where an old course of the Yellow River still exists (Fig. 2), is one of the areas formerly flooded by the Yellow River. The silt deposits dating from the historical period can be as thick as 10 m or more in some areas. This has changed the topographic configuration dramatically by raising the ground level, burying ancient architectural remains, and flattening hills (Shi 1981:63–77), thus affecting our knowledge of the distribution of prehistoric sites. According to archaeological surveys, most sites are found on higher mounds along rivers, implying that sites located on lower levels may have not been found. It is obvious that fewer sites are marked in this area than in other parts of the region (Fig. 2).

This region includes six districts: Zhengzhou, Kaifeng, Zhoukou, Luohe, Xuchang, Pingdingshan, and Zhumadian. The ceramic type here is defined as the Haojiatai phase (Fig. 1:9). Several rivers, mainly the Ying River and its tributaries, flow from northwest to southeast and then join the Huai River. Some 330 Longshan sites have been identified, and the histogram of the site-size distribution suggests a three-level settlement hierarchy:(1) eight medium centers (20–50 ha);(2) nine small centers (17–10 ha); and (3) about 313 small sites, 9–>1 ha in size, among which three are walled sites (6.5–1 ha) (Fig. 22). All the medium centers and walled sites are spread out over the landscape, probably representing subregional centers. Some small centers, which are clustered with the medium centers, perhaps functioned as subsidiary centers in the subregions. Others, which are located some distance away from the medium centers, may have formed the primary centers for their immediate areas (Fig. 23). The rank-size distribution shows a strong convex curve (Fig. 24).

The locational pattern of the centers is af-

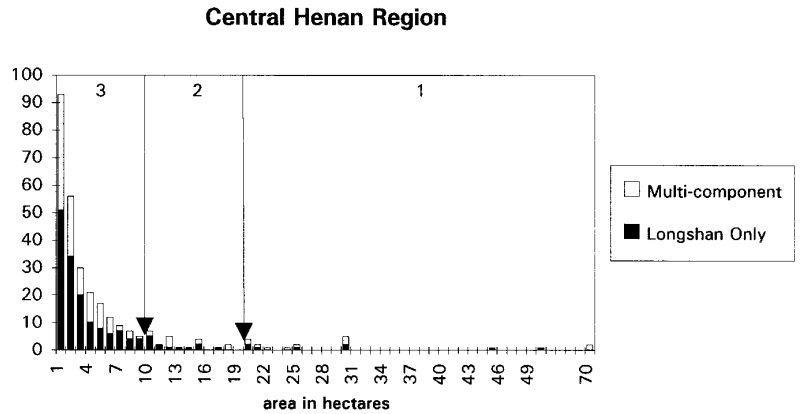


**FIG. 22.** Three levels of Longshan settlement hierarchy in the central Henan cluster.

fected by the distribution of the nearby rivers. For instance, the four medium centers (Wuhumiao, Wadian, Houzhuang, and Hetang) in the western portion of the region are spaced nearly equidistantally from one another (42, 37, 37.5 km) coinciding with a regular parallel pattern of the four rivers distributed there. By contrast, an irregular loca-

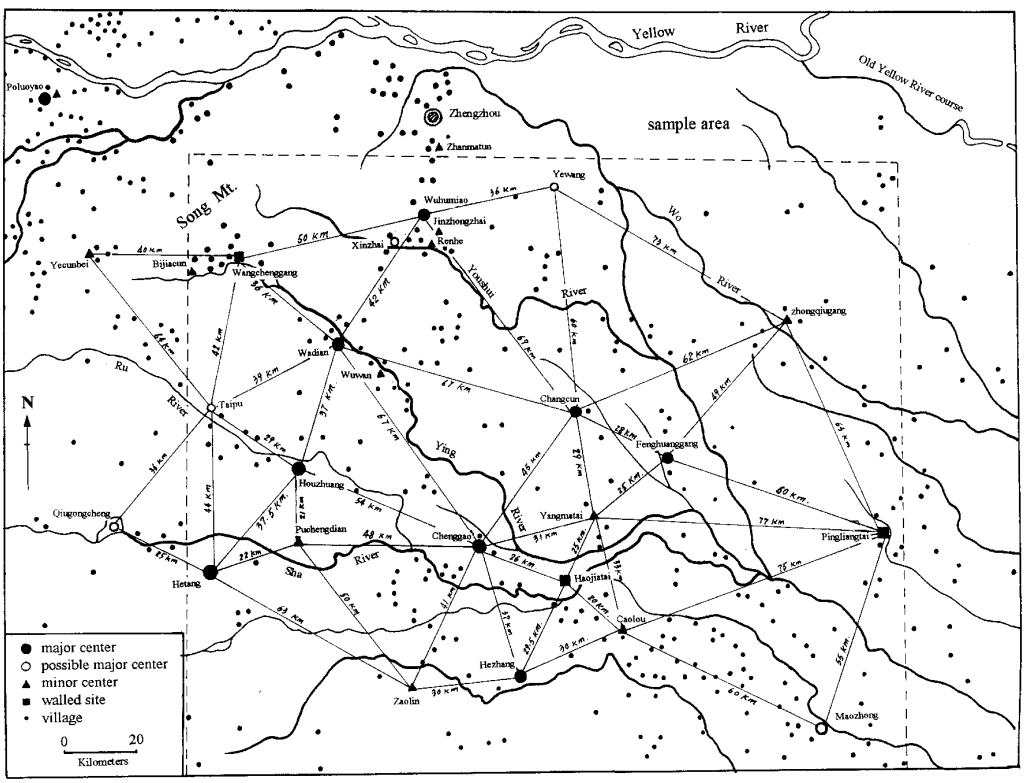


**FIG. 23.** Distribution of Longshan sites in the central Henan cluster (redrawn from NBCR 1991: maps 60–91, 184–187).

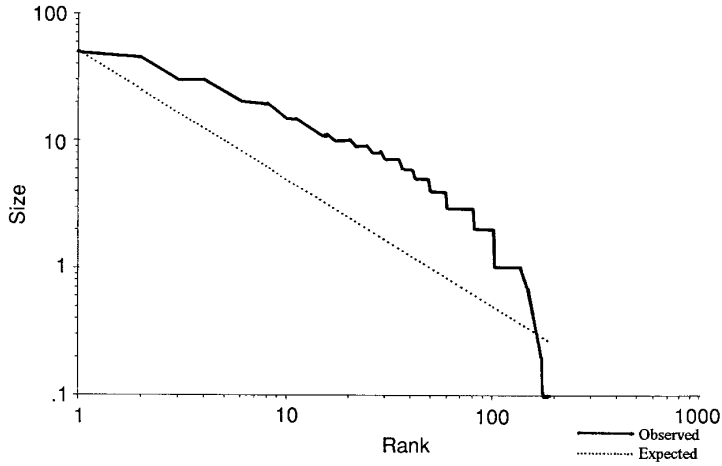


**FIG. 24.** Convex curve of rank-size distribution in the central Henan cluster, Longshan culture.

tional pattern of the centers occurs in the southern part of the region, where the rivers show an arbitrary distribution (Fig. 23).

Below, I will mainly discuss those subclusters centered on the walled sites in relation to their neighboring subclusters.

### *Wangchenggang and the Neighboring Clusters*

The Wangchenggang site on a terraced area is located in the alluvial region southeast of the Song Mountain in the upper Ying River valley (Fig. 23). A walled town, a little more than 1 ha in size and consisting of two connected enclosures along an east–west axis, was found there. While the western enclosure contains an area of about 8500 $m^2$, the eastern enclosure, most of which was destroyed by a flood, may have originally been of a size similar to the western one (Dong 1984, 1988; *Wenwu* 1983c; HPCRI& ADHMC 1992).

The cultural remains cover a long span from the Peiligang culture of the early Neolithic to the Eastern Zhou period (c. 6000–400 B.C.). The town walls were built in Phase II of the Longshan culture (c. 2280–2455 B.C.; Cao 1994:145), and was probably destroyed by a flood in Phase III of the Longshan culture (Dong 1984, 1988). The town walls enclosed a residential area, indicated by remains of several rammed-earth foundations and finds of 101 ash pits which contained large numbers of implements and pottery. Human sacrifices including children and adults of at least 17 complete and a few dismembered skeletons were found in 13 sacrificial pits under the structural foundations. Perhaps, they were dug in connection with foundation-laying ceremonies (HPCRI & ADHMC 1992:28–63),[9] suggesting the existence of violence against humans.

Twelve other Longshan sites, closely clustered to Wangchenggang, including one small center, Bijiacun (10 ha), and 11 villages smaller than 4.5 ha, have been found (Fig. 23). It is notable that Wangchenggang is rather small in size, and its town walls were destroyed not long after its initial construction. The Bijiacun site, therefore, may have functioned as an alternative center in this settlement cluster. The site distribution of this cluster shows a two-level site hierarchy (Fig. 22).

Some 51 km east of Wangchenggang is a medium center, the Wuhumiao site (35 ha) in Mixian near the Youshui River (Fig. 23). More than a dozen sites closely spaced around Wuhumiao and including a multi-

component medium site, Xinzhai (70 ha), which dates to a short transitional period from late Longshan to early Erlitou (*Kaogu* 1981). In addition, two secondary centers, Renhe (11 ha) and Jinzhongzhai (10 ha) in Xinzheng county, and a number of villages smaller than 7 ha have been found. Wuhumiao and Xinzhai may have been major centers that dominated the area during different times, and the site size distribution suggests a three-tier settlement hierarchy (Fig. 22).

Wadian in Yuxian (50 ha; *Kaogu* 1991:106), 36 km southeast of Wangchenggang and 42 km southwest of Wuhumiao, is another center of a Longshan site group. Wadian and one secondary center, Wuwan (15 ha), with about 15 villages (smaller than 4 ha) along the Ying River valley (Fig. 23), form a three-tier settlement hierarchy.

These three centers, Wangchenggang, Wuhumiao, and Wadian, were found in a triangle-shaped distribution. Each cluster seems to have a well-defined boundary in which few sites occur in the periphery areas. The distances between the centers are rather similar (51, 42, 36 km) with 42.6 km on average.

### *Haojiatai and the Neighboring Clusters*

Another walled site, 6.5 ha in size, was found at Haojiatai in Yancheng (Fig. 23; HPCRI 1991:178; *Huaxia Kaogu* 1992). The town wall was built during Haojiatai Phase II (2656 ± 121 B.C. (DY-K0187); G. Cao 1994:145) and is covered by cultural remains of Phase III (2640 ± 145 B.C. (WB88-32); ibid.). This suggests that the town wall probably ceased to function not long after the initial construction. Evidence of violence indicated by dismembered and incomplete human skeletons in burials has been found in Phases IV and V at the site, dated to the late Longshan period, suggesting that intergroup conflict may have continued after the town wall ceased to function.

Several medium and small centers appeared in the surrounding area, including Hezhang (45 ha), Chenggao (20 ha), Yangmagang (17.5 ha), and Caolou (10 ha). The smaller centers do not seem to be subsidiary to the larger ones and all these centers are spread out along different river courses. The distances between nearest neighboring centers range from 20 to 37 kilometers with an average of 29 km (Fig. 23). Such an average distance between centers are rather short compared to other regions (e.g., 43 km in the western part of the northern Henan, 42.6 km in the Wangchenggang area). One possible explanation is that during the Longshan period, as communities became more involved in intergroup warfare, competition for power became intensive, and regional centers may have frequently shifted their affiliations among different polities. Therefore, these centers in the area near Haojiatai may have not been contemporary, but rather have come to dominate their immediate areas at different times. This is supported by the Haojiatai town wall which appeared to be in function for a fairly short period. Haojiatai may have been one political center that emerged in the beginning of the late Longshan period, but which then weakened or was replaced because of other polities in the region.

The site-size distribution in this area suggests the existence of a two-tier settlement hierarchy (Figs. 22, 23).

### *Pingliangtai and the Neighboring Clusters*

The Pingliangtai walled site, excavated from 1979 to 1980 (*Wenwu* 1983c), is located on an elevated flat mound in Huaiyang county, Zhoukou district. The Pingliangtai site covers an area of 5 ha, in which five phases ranging from the late Dawendou period to the Erlitou culture are identified. Phases II to IV belong to the Longshan culture. The town enclosure is square, measuring about 185 m on a side and covering over 3.4 ha in area. What remains of the rammed-earth wall is a little over 3 m tall, 13 m wide at the base, and 8–10 m wide at the top. The

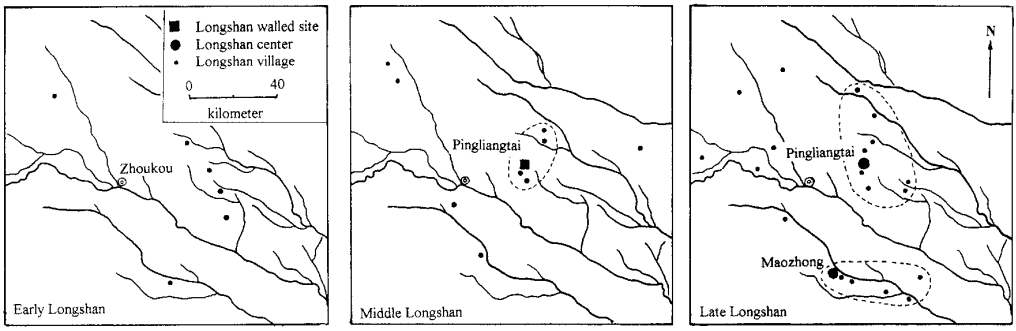


**FIG. 25.** Development of site distribution from the early Longshan to the late Longshan period in the Zhoukou region (redrawn from *Kaoguxue Jikan* 1984: Fig. 1).

town wall, dated to Phase III (2550 ± 140 B.C. (WB83-53); G. Cao 1994:145), was used for a short period during the early part of the late Longshan culture.

Two gates were found at the center of both the north and south walls, and the south gate was flanked by two structures, probably guardhouses, built of clay blocks or sun-dried bricks which were contemporary with the town wall. A section of an underground drainage channel made of ceramic pipes was found 0.3 m below the road surface in the South Gate. Other features at the site include residential houses, infant burials, pottery kilns, and ash pits. Verdigris-like dust, possibly the remains of copper metallurgy, was found in one of the pits.

The Zhoukou District, in which Pingliangtai is located, is a part of the Yellow River flooding region, where many ancient sites may be deeply buried by silt. Nevertheless, a clear trend of site development can still be seen in this region as the number of sites increases steadily throughout the Longshan period. According to a survey report that provides rather detailed dates for ancient sites in the Zhoukou region (*Kaoguxue Jikan* 1984), early Longshan sites (c.2800–2600 B.C.) are distributed sparsely, and only six were found. By contrast, nine mid-Longshan sites (c.2600–2300 B.C.) and 22 late Longshan sites (c.2300–2100 B.C.) were found in the same region (Fig. 25). Beginning in the middle Longshan period, there is also a tendency for a number of sites, ranging from 0.5 to 6 ha, to be concentrated in a small area centered around the Pingliangtai walled site. In the late Longshan period when the Pingliangtai town wall may have ceased to function, more small sites emerged in this area. The sites near Pingliangtai were closely spaced and formed a cluster in the region, and it is possible that the Pingliangtai site was still a center in its immediate area during the late Longshan period.

Meanwhile, about 50 km south of Pingliangtai, a possible medium center at Maozhong in Xiangcheng county (a 21-ha, multicomponent site including Longshan and Shang remains) appeared in the late Longshan period. The Maozhong site, clustered with a number of smaller sites (no larger than 7 ha, including both Longshan only and multicomponent sites) may have been a newly developed political center competing with Pingliangtai. The site-size distribution in each subcluster seems to suggest a two-level settlement hierarchy (Fig. 22).

### *Xishan in Zhengzhou Cluster*

Notably, the Longshan walled sites uncovered were not the earliest examples of this kind in the Henan region. A rammed-earth town wall, dated to the late Yangshao culture, was found at Xishan (20 ha) near

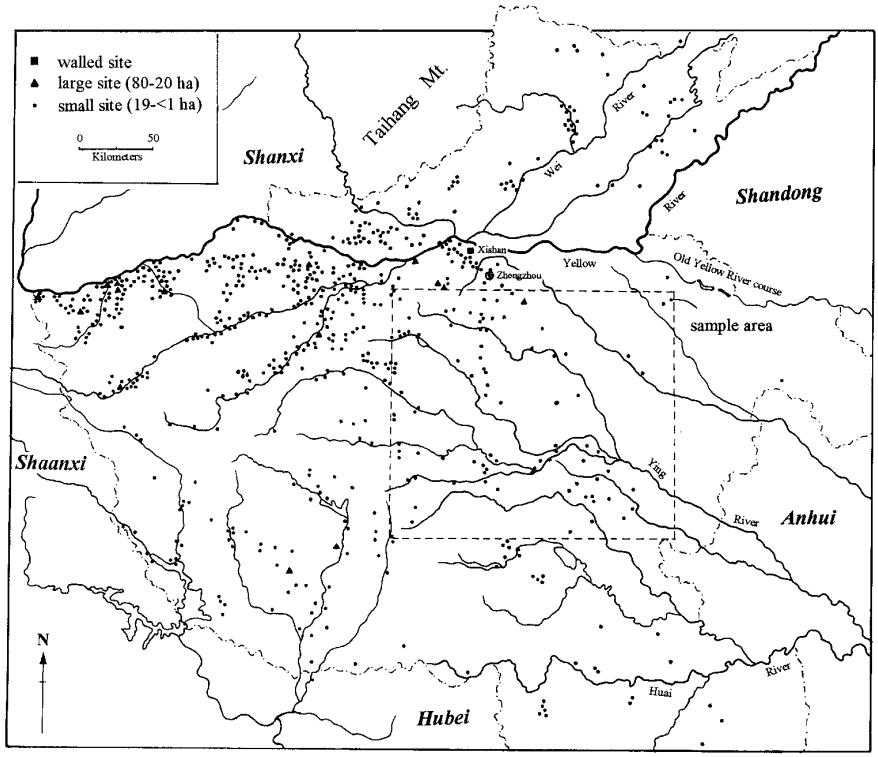


**FIG. 26.** Distribution of Yangshao sites in Henan (redrawn from NBCR 1991: maps 32, 33).

Zhengzhou (Zhang and Yang 1995; personal communication with Mr. Zhang Yushi at the Xishan site, 1995) (Fig. 26). The remaining walls, 11 m wide at the base and 5–6 m wide at the top, are located on a terraced area by a river. Only the northern and western parts of the enclosure are preserved, and the original walled town seems to be an irregular round shape. The remaining western wall is 60 m in length. The northern wall is comprised of three connected strait-line sections forming an arc, including a western section (60 m long), a central section (120 m long), and an eastern section (50 m long). Within an area of 4700 $m^2$, excavations have yielded about 120 houses, 1600 ash pits, 300 burials, and a large amount of artifacts and faunal and floral remains. Some artifacts stylistically non-native to the Central Plains are relatable to the Dawenkou culture in Shandong and Qujialing culture in Hubei. While the Xishan site dates to the entire Yangshao culture, the rammed-earth enclosure was constructed at the beginning of the late Yangshao period and ceased to function before the end of late Yangshao (c.3300–2800 B.C.). The enclosure was contemporary with the non-native cultural elements, suggesting that cultural interaction, perhaps including intergroup conflict, played an important role in the construction of the town wall. These phenomena imply the existence of a social change during a period just before the early Longshan culture.

This region, including Zhengzhou, Xingyang, and Gongyi, is a zone where the western hilly region (800–300 m in altitude) and the eastern Huang-Huai Plains (<150 m in altitude) meet (HBCS 1987). The Xishan site is located at the very end of the hilly region. In the surrounding areas of Xishan, Yangshao sites appear to be densely distributed

(Fig. 26). Some 43 Yangshao sites (rang 40–<1 ha) have been found, among which at least three sites are larger than 20 ha. During the Longshan period, a similar number of sites (41) still tended to cluster together in this area; however, site sizes became smaller than the previous period (rang 11–<1 ha).

The Zhengzhou cluster, rather different from others in Henan in terms of the development of settlement patterns, will be analyzed separately in the following discussion.

### *Cultural Development and Interaction in Central Henan*

Central Henan has a long history of Neolithic cultural development which can be traced back to the early Neolithic period, the Peiligang culture (c. 6500–5000 B.C.). By analyzing the number of sites in different archaeological periods in the same area, the development of population through the Neolithic times can be observed. If we draw a square-shaped sample area of 20 × 17 km on the map, enclosing the three Longshan walled sites and medium centers in central Henan, site-number distributions in three Neolithic periods show interesting patterns. In this sample area, there are 54 Peiligang sites (all smaller than 6 ha except for one site of 15 ha) (Fig. 27), 87 Yangshao sites (20 to <1 ha in size) (Fig. 26), and about 260 Longshan sites (50–<1 ha in size) (Fig. 23).

Apparently, central Henan was a major region where the early Neolithic culture flourished for 1500 years. Population remained rather steady during the following 2200 years of the Yangshao culture, judging from a moderate increase of sites in number during a longer time interval. The number of sites tripled in 800 years of the Longshan period, indicating a considerable population increase. Based on the site-distribution pattern found in the Zhoukou region, as mentioned above, the late Longshan culture experienced the most rapid population growth.

In addition to the rapid growth in number of sites, the late Yangshao and early Longshan cultures in the central Henan region witnessed another important cultural change. A number of sites in central Henan have yielded cultural remains which are related to the Dawenkou culture in Shandong and the Qujialing culture in Hubei (Fig. 28). During the late Yangshao period, the cultural influence of the Dawenkou and Qujialing cultures, moving from the southeast to northwest, evidently made marked social impact on the socio-political structure in the northern part of the central Henan in intergroup conflict and in the construction of the town wall at Xishan. In the early Longshan period, Dawenkou and Qujialing cultural elements, although further moved to the southern Shanxi region, occurred mostly in the southeast of the central Henan region, before finally diminishing in the late Longshan period (Du 1992; Zhang 1994; Zhao 1994). The three walled sites in central Henan, dating to the beginning of the late Longshan culture, were probably also the consequences of intergroup conflict.

## ENVIRONMENTAL PRECONDITIONS AND DEVELOPMENT OF SOCIAL COMPLEXITY

The archaeological record cannot be fully understood without securely aligning it chronologically with changes in climate and environment. The development of social complexity in some cases (e.g., Mesopotamia) may have been led by a series of large scale changes, including population migration and settlement patterns, which were triggered by environmental fluctuation (Hole 1994).

Several factors which may have had important impact on the development of complex societies in the Central Plains, including ecological conditions and the patterns of demographic change, in relation to the nature of cultural interaction, will be studied below.

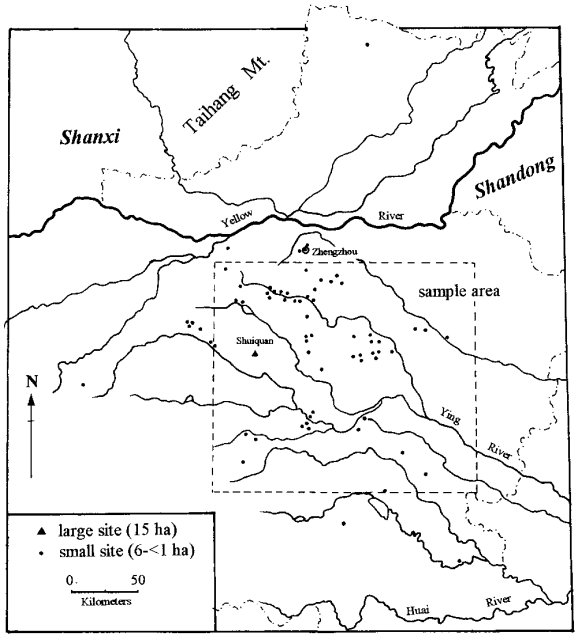


**FIG. 27.** Distribution of Peiligang sites in Henan (redrawn from NBCR 1991: maps 30, 31).

### *Climatic Conditions and Demographic Change*

It is clear that there are different patterns of demographic change in each settlement cluster throughout the Neolithic period. Most of our data from Henan is rather crude because sites are often dated to large time intervals; therefore, our analysis cannot be very elaborate.

Figure 29 compares the site numbers and the largest site size among the seven clusters from Yangshao to Longshan. Clusters 5 and 6 in the noncircumscribed regions demonstrate the highest increase in site number, while Clusters 1 and 2, both found in circumscribed regions, reveal the highest increase in the largest site size. Clusters 3 and 4, in the semi-circumscribed regions, show rather moderate increases both in site number and in site size. In Cluster 7, although site numbers remain almost the same, the largest site size reduced significantly from Yangshao to Longshan.

In order to understand these different patterns of demographic change, we need to take ecological factors into consideration. As mentioned above, the early Neolithic culture, Peiligang, developed at the beginning of the postglacial climatic optimum. Most Peiligang sites have been found in the Huang-Huai Plains where the climatic condition was probably better than other regions concerned in this study. During the next period, the Yangshao culture in northern China experienced very warm weather with high precipitation, accompanied by the expansion of water areas (rivers, bonds, and lakes) on the lowland regions (B. Cao 1994; Man 1991). Thus much of the Central Plains lowlands (Clusters 5 and 6) were probably covered by water. Yangshao sites in these areas are small and scattered, and tend to be located on relatively high grounds (B. Cao 1994). By contrast, in the highlands (Clusters 1 and 2) and the transitional regions between highlands and lowlands (Clusters 3, 4, and 7), the Yangshao culture flourished as indicated by the dense distribution of sites (Fig.

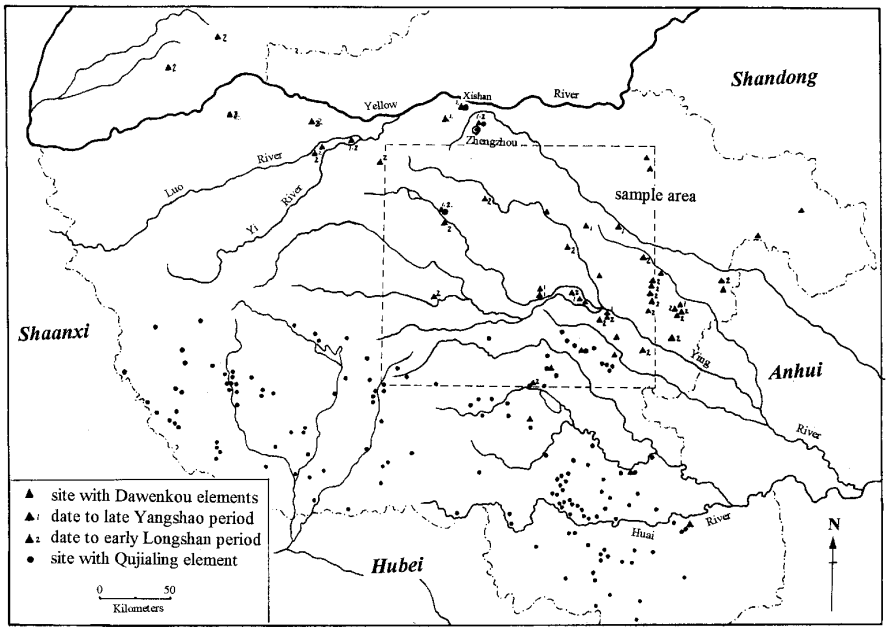


**FIG. 28.** Distribution of sites with Dawenkou and Qujialing cultural elements in the Central Plains (Based on NBCR 1991: maps 38, 39; Du 1992: Fig. 1; Q. Zhao 1994).

26). The occurrence of climatic fluctuation from 3000 to 2000 B.C., brought a cooler and dryer condition to northern China. Thus, the Central Plains lowlands may have become more inhabitable for the Neolithic settlers. During this period the Longshan culture developed with its sites spread out over an ever broader region.

Our data indicate a significant population increase in the lowland regions in central and northern Henan, which may have been partially caused by migration from surrounding areas. For instance, Cluster 3 in the Yi-Luo River valley and and Cluster 7 in the Zhengzhou region, which were geographically connected to the lowlands in the Huang-Huai Plains and heavily populated during the Yangshao period, show little increase in site number, and even decrease in site size (e.g., the Zhengzhou cluster), suggesting that partial population in these regions may have migrated away.

In Clusters 1 and 2, Longshan settlement systems became rapidly integrated by settlement nucleation. This is especially clear in the Taosi cluster as indicated by the occurrence of the largest sites and the reduction of site number in the late Longshan period. Such a settlement nucleation was probably caused not only by the natural increase of the local population, but also by the migration of people from other regions, particularly in the north and west.[10] Although it is unclear what factors triggered the population migration from the areas outside the Linfen basin, the circumscribed environment and the optimal climatic condition in the Linfen basin probably contributed to the development of highly nucleated settlement patterns there.

### *Changing Course of the Yellow River and Cultural Interaction*

Many changes, culturally and environmentally, took place in the Central Plains lowlands during the late Neolithic. One of the consequences was intensive interaction

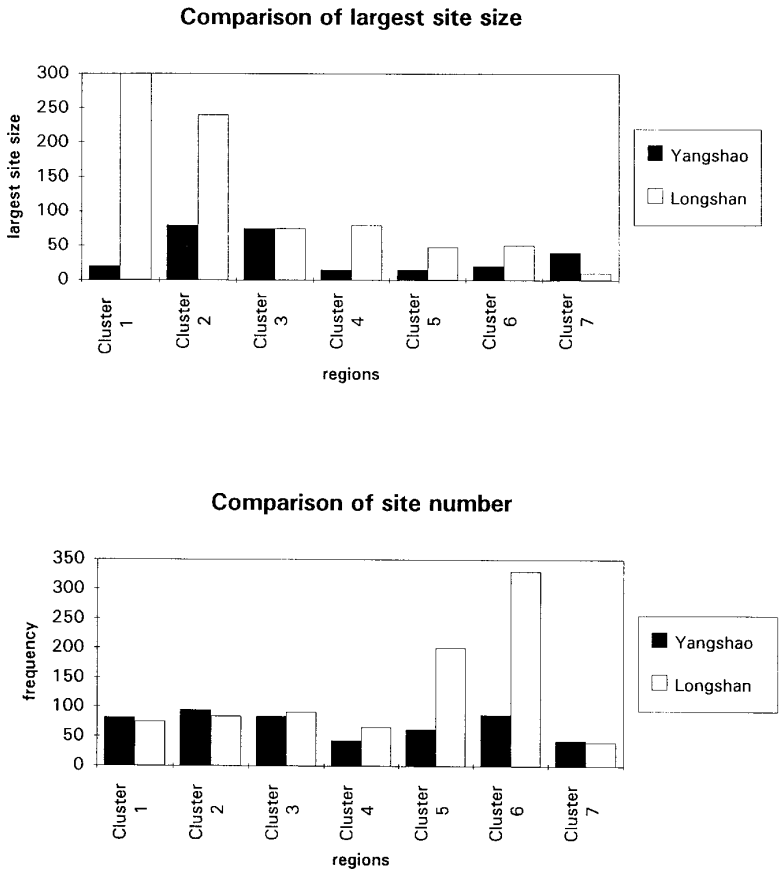


**FIG. 29.** Comparison of site number and largest site size from Yangshao to Longshan in seven settlement clusters.

among different archaeological cultures beginning in the late Yangshao period.

Before circa 2600 B.C., as mentioned above, the Yellow River's lower course in the Central Plains turned to the northeast near Zhengzhou and then flowed through the Hebei Plain into the Bohai Bay (Fig. 4). A few Yangshao sites have been found scattered in northern Henan with a site-free area in the center, through which the Yellow River flooded (Fig. 26). The Yellow River, therefore, may have formed a natural barrier to the cultural interaction between the regions in the west and the east (Wang 1993).

The situation changed when the Yellow River changed its lower course around 2600 B.C., flowing through east Henan and north Jiangsu to the Yellow Sea (Fig. 4). The Central Plains in the north of the Yellow River, therefore, became a massive land where northern Henan and northeastern Shandong were connected without a significant natural barrier. This geographic precondition facilitated interactions between social groups over a broad region. The late Longshan culture then witnessed not only a rapid increase in site number, but also ever strong cultural interactions between the Henan and the Shandong regions. Some cultural elements, such as certain ceramic forms, tools, and architectural styles were shared by the Longshan people in both eastern Shandong and

the Central Plains (e.g., Cai 1992; Wang 1993). The two town walls found at Hougang and Mengzhuang in northern Henan, as well as several town walls identified in western (Wang 1996; Zhang 1995; *Zhongguo Wenwu Bao* 1995a)[11] and northern Shandong (Liu 1994:237–270; Underhill 1994) (Fig. 4) were constructed in this cultural background.

In contrast, central Henan south of the Yellow River was a massive plain before 2600 B.C. The Dawenkou culture in Shandong, as discussed above, had begun to move westward in the late Yangshao period. Dawenkou cultural elements, indicated by ceramic styles, burial customs, and human skeletons with typical Dawenkou cultural characteristics (head deformation and tooth extraction), have been found in the Central Plains. More than 40 sites containing Dawenkou cultural elements haven been identified in these regions. At these sites, Dawenkou remains were found in association at least with 17 late Yangshao sites and 33 early Longshan sites (Fig. 28). The Dawenkou cultural influence had reached the Yi-Luo River valley during the late Yangshao period and, then went further to southern Shanxi during early Longshan (Du 1992; NBCR 1991: maps 38–40).

Moreover, the Qujialing culture in Hubei also spread northward to central Henan during the late Yangshao and early Longshan periods. The Qujialing culture existed as a separate cultural stratum at many sites in southern Henan, but appeared only as distinctive cultural elements (mainly pottery forms) in central Henan (Zhao 1994). Dawenkou and Qujialing cultural elements were found in coexistence with late Yangshao deposits at several sites in the northern part of the central Henan, including Xishan, at which a town wall enclosure was built (Fig. 26). During the early Longshan culture, this influence seems to concentrate in the lowland region of central Henan, again forming a situation in which the three cultural traditions (Longshan, Dawenkou, and Qujialing) coexisted side by side. This area is where the three late Longshan walled sites are located.

The middle and late Dawenkou culture in Shandong (contemporary with late Yangshao and early Longshan) had become highly stratified societies as suggested by the hierarchical distributions of mortuary remains (Pearson 1981; Underhill 1983). The Qujialing culture was also well developed as indicated by the existence of at least five walled town sites (up to 100 ha in size) found in Hubei and Hunan (X. Zhang 1994). These two cultures probably reached a higher level of social complexity than the late Yangshao and early Longshan cultures in the Central Plains region. Therefore, the cultural influence they brought into the Central Plains was not just in ceramic styles, but also in socio-political elements which may not be easily visible in material remains. This multicultural interaction among developed societies may have not only caused interpolity conflict, but also stimulated sociopolitical development toward complexity in the central Henan region.

## SETTLEMENT PATTERNS AND CHIEFDOM VARIABILITY

My analysis of Longshan settlement data reveals that the levels of settlement hierarchy in the Longshan period range from two to three, and that the rank-size curves vary from primate, nearly log-normal, to convex in different geographic regions. The different combinations of environmental preconditions and settlement patterns affected trajectories in the development of complex social organization. In general, these clusters exhibit three regional patterns, which may represent different forms of chiefdoms.

### *Centripetal Regional Systems*

A three-tier settlement hierarchy coexisting with the largest-size regional centers is observed in Clusters 1 (Taosi in southern

Shanxi) and 2 (Sanliqiao in western Henan) in the environmentally circumscribed regions. Minor centers were clustered around the major centers and, in turn, were closely surrounded by a lower level of settlements. Defensive facilities such as town walls, as we know so far, were absent. Rank-size distributions of the early Taosi and Sanliqiao express strong primate curves, suggesting the existence of highly integrated social systems. Although developed into two competitive groups, each subcluster of the late Taosi still maintained a very large center and three levels of settlement hierarchy. These two clusters seem to represent the most integrated social systems in the region in question.

Socio-political integration paralleled rapid demographic growth, which was partially caused by a population pull from other areas to the already well populated and circumscribed regions. The settlement patterns in Clusters 1 and 2, therefore, can be characterized as a ''centripetal settlement system,'' representing the most complex chiefdom systems in the region.

### *Centrifugal Regional Systems*

A three-tier settlement hierarchy, accompanied with large-size regional centers, is revealed in Clusters 3 and 4. The settlement patterns are rather similar to those of Clusters 1 and 2, but with lower degrees of social integration as indicated by smaller regional centers and log-normal or near log-normal rank-size curves. This situation is probably related to the semi-circumscribed environment which facilitated the move of population out to other regions with more desirable agricultural lands. These two clusters can be characterized as ''centrifugal regional systems,'' also indicating complex chiefdom systems in the region, although they may not be as integrated as the ones in Clusters 1 and 2.

### *Competing Regional Systems*

The coexistence of multiple medium/small-sized centers and walled towns are seen in Clusters 5, 6, and 7 in the northern and in the central Henan of noncircumscribed regions. Most of the subclusters express a two-tier settlement hierarchy, and the rank-size distributions from these regions show convex curves, suggesting a low level of integration and competing relationships among centers. This suggestion is strongly supported by the evidence of intergroup conflict as several centers were constructed with town walls and human sacrifices were practiced in some walled centers.

Another significant feature of settlement distribution in these two areas is the regular spacing between subregional centers. It is especially clear in the western part of northern Henan (the distances between the four lineal distributed centers are 36, 42, 52 km, with 43.3 kilometers in average; Fig. 18) and in the northwestern part of central Henan (The distances between three triangular distributed centers—Wangchenggang, Wadian, and Wuhumiao—are 36, 42, 50 km, with 42.6 km in average; Fig. 23). This situation is similar to the Iron Age in Europe, where multiwalled forts greater than 4.9 ha in area showed a tendency towards regular spacing (Hodder & Orton 1976:46), indicating interfort political competition and independence (Earle 1991c:93).

The average distance (around 43 km) between several centers in the Central Plains is similar to the distance (40 km) between central places in many early complex societies throughout the world.[12] The 20 km radius is about one day's round-trip distance on foot according to Johnson, and such a spatial limit ''represented an organizational constraint related to the ability of administrative elites in early complex societies to control rural populations, [and] was probably related to movement costs of rural participation in center economies'' (Johnson

1982:415). The locational patterns of these centers in Clusters 5 and 6 suggest the coexistence of a number of independent political systems with rather regular distance between one another.

In the southern part of central Henan the distances between centers (including medium and small centers and walled sites) are rather short, and the distribution of the centers is irregular, especially in the area near the Haojiatai site. This pattern may have been partially caused by the irregular distribution of river channels as discussed above. They may also reflect, however, a situation in which the political centers were replaced frequently.

The three town walls found in central Henan were all built at the beginning of the late Longshan period, but were functional for a relatively brief time although intergroup conflict may have continued in later period (e.g., evidence from Haojiatai). In some subclusters, political centers changed locations within the settlement system during the Longshan period (e.g., the Huan River valley and Wuhumiao subclusters). In other areas, regional centers may have relocated among polities (e.g., areas near Haojiatai). These phenomena continue to suggest intergroup conflict and constant power shifts among political centers.

While social groups in the northern and central Henan regions were newly established and deeply involved in intergroup conflict, social complexity was not as developed as in other clusters during the Longshan period. Political integration did not happen before the Erlitou culture in this region (see discussion below).

Clusters 5 and 6, therefore, may be categorized as multicentered competing regional systems, representing the least integrated social systems in the region.

## FROM CHIEFDOMS TO THE EARLY STATE

Based on the models of simple and complex chiefdoms proposed by Steponaitis (1978:420) and Wright (1984:42), the Longshan regional settlement patterns seem to fit into both categories. Some theorists have argued that chiefdom societies, especially the complex chiefdoms, were a precursor of states (e.g., Carneiro 1981; Wright 1984:41), leading one to propose that the early state developed from the most complex variants of the chiefdoms represented by the Taosi cluster in southern Shanxi or by the Sanliqiao cluster in western Henan. This was not the case, however.

In recent years, three areas have been concentrated on as the regions where the early states, the Xia and Shang dynasties, possibly evolved. First, a region including southern Shanxi and western and central Henan (where the Longshan culture developed into the Erlitou culture around 1900–1500 B.C.) has been the major focus for the search of the earliest state, the Xia dynasty (e.g., Z. Zhao 1986; Zou 1980). Second, northern Henan and southern Hebei, in which cultural remains contemporary with Erlitou are referred to as being from the Xiaqiyuan culture, are believed to be a general region from which the Proto-Shang culture originated (e.g., Li 1989; Zou 1980). Third, an area near Shangqiu in eastern Henan and western Shandong has also been regarded as a region from which the early Shang state may have emerged (Chang 1987, 1995). The third region has been known as a Yellow River flooding area, from which survey data are rather incomplete. Therefore, the other two regions, from which better survey data are available, will be the focuses in the following discussion on the development of the early states.

### *Trajectories from Chiefdoms to Early States*

*The Xia Dynasty.* The Erlitou culture was named after the discovery of a large Bronze Age site at Erlitou in Yanshi of western Henan in 1959 (Xu 1959). The Erlitou site (375 ha; c. 1900–1500 B.C.), the largest among all its contemporary sites in China,

was the earliest urban center of the Bronze Age. The excavations at the Erlitou site (*Kaogu* 1965.5, 1974.4, 1975.5, 1983a, 1983b, 1984, 1984, 1985) have yielded rich cultural remains including palatial/temple foundations, bronze and bone workshops, burials of different social status, bronze and jade ritual objects, and at least seven written inscriptions (Thorp 1991; Zou 1987). The Erlitou site includes four phases. Material remains dating to Phase I are rather modest, including mainly pottery and small house foundations. Large palatial foundations began to occur in Phase II. During Phase III, the Erlitou site reached the largest scale in size, and yielded a number of palatial foundations, elaborate tombs, bronze workshops, and bronze ritual vessels. The site witnessed a decline in Phase IV, during which palatial structures were abandoned. These data clearly suggest that the Erlitou site gradually developed into a major political, ceremonial, and craft production center, which finally collapsed.

The excavations from this site have generated much debate on many issues, most of all as to whether it was a capital city of Xia or of Shang, and which phases of the Erlitou culture belong to the Xia or Shang cultures. The debates have become less intense in recent years after an early Shang city was discovered at Shixianggou in Yanshi (near Erlitou) (*Kaogu* 1984c). Although some archaeologists still insist that major phases (Phases III and IV), or entire ones, of the Erlitou site reveal the Shang culture (e.g., Y. Yang 1994; Zheng 1988, 1995), most scholars now agree that the Erlitou site represents a capital city of the late Xia dynasty. Chronologically, according to the latter view which I will adopt here, the Xia dynasty existed in a period including a part of the late Longshan and most (Phases I–III), if not all, of the Erlitou culture (e.g., Chang 1986:307–16, 1987; Li 1986; Z. Zhao 1987, 1995; Zou 1990).

The Erlitou culture is distributed mainly in southern Shanxi and in western and central Henan (Fig. 30). More than 120 sites have been defined as belonging to the Erlitou culture (Z. Zhao 1987; *Kaoguxue Jikan* 1989; NBCR 1991). The ceramic data suggest that Erlitou culture developed locally from the Longshan culture in the western and central Henan through an intermediate phase, the Xinzhai phase (Fig. 30; Zhao 1986). On the other hand, there is little indication of a ceramic continuity from the Taosi to the Erlitou culture in southern Shanxi (Gao & Li 1987; *Kaogu* 1980). The earliest Erlitou remains in southern Shanxi and the Qin River valley of northern Henan date to Phase II of the Erlitou period, representing an expansion of the Erlitou culture from central and western Henan to the northwestern regions (Li 1989:284; Yang 1994). Therefore, areas in western and central Henan, especially central Henan which seems to be the core area of the Xinzhai phase (Fig. 30), should be the focus of a search for the rise of the Xia state.

Central and western Henan are the regions where Clusters 3, 6, and 7 are defined, representing centrifugal and multi-centered regional settlement patterns. The core area of the Xinzhai phase derived from the Haojiatai phase of the Longshan culture, a central region characterized by extensive cultural interaction, intensive intergroup conflict, and frequent power shifting among polities.

The early phases of the Erlitou culture in this region may have had a social structure similar to the late Longshan period, representing a competing chiefdom system. This is indicated by the following: (1) no evidence suggests that large palatial foundations were constructed before Erlitou Phase II; and (2) some large settlements from the early phases of the Erlitou culture, probably representing subregional centers, were occupied in rather short periods. The Xinzhai site (70 ha), for example, which was a subregional center (Fig. 30), is dated to a period from the end of the late Longshan to the Xinzhai phase of the Erlitou culture (*Kaogu* 1981). It is not until the second phase of the Erlitou culture

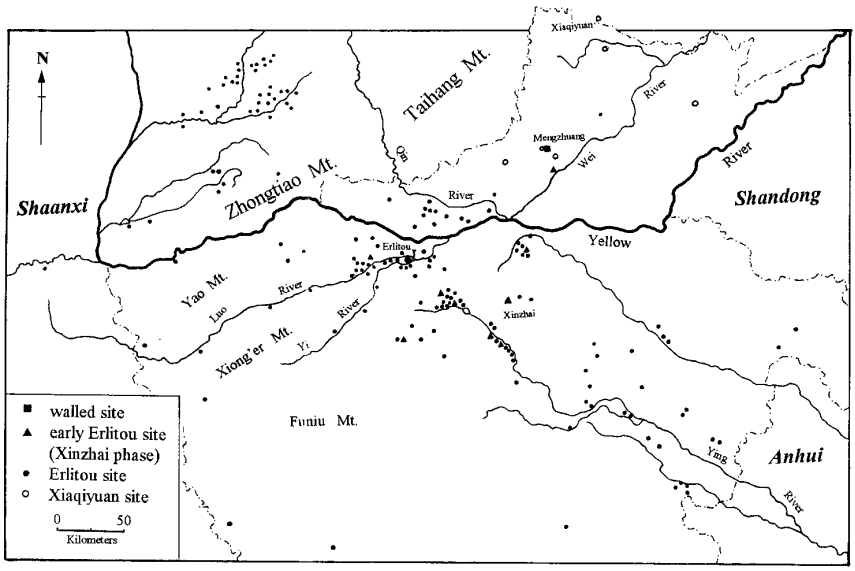


**FIG. 30.** Distribution of Erlitou and representative Xiaqiyuan sites in the Central Plains (Based on NBCR 1991; Z. Zhao 1986; X. Liu 1990: Fig. 1).

that the sign of a state-level social organization can be observed in the construction of palatial structures and in expansion of territory. The third phase reached a peak in cultural development, as the capital city enlarged in size, the state controlled the bronze production, and society became highly stratified.

As mentioned above, the Yellow River once more changed its lower course from south to north around 2000 B.C., a date which nearly coincides with the time referred to in legends as ''Yu the Great,'' the first king of the Xia dynasty, who regulated the flood waters and gained political power. If these events did indeed happen, the flood may have served as an opportunity for charismatic individuals who became politically influential and who lead prestate polities, such as the Xia, to establish political domination over other groups.

*The Proto-Shang culture.* It is believed by some scholars that the Xiaqiyuan culture, contemporary with the Erlitou culture in northern Henan and southern Hebei, was related to the Proto-Shang culture (e.g., Yang 1994; Li 1989; Liu 1990; Zou 1980). The ceramic types of the Xiaqiyuan Culture share many similarities with the Erligang culture (regarded as the early Shang dynasty), but distinctive from the Erlitou culture. A boundary line between the two cultures lays in the Qin River and a part of Yellow River. To the west of the Qin River and to the south of the Yellow River is the Erlitou culture. To the east of the Qin River and to the north of the Yellow River is the Xiaqiyuan culture (Fig. 30). This archaeological cultural demarcation seems to coincide with the development of the territory of the late Xia dynasty, recorded in ancient texts (Liu 1990).

The Xiaqiyuan culture probably derived from a mixed tradition relating to Longshan cultures in northern Henan and central Shanxi (Li 1989:292). Northern Henan, as discussed above, was a region of competing chiefdom systems. The early phases of the Xiaqiyuan culture were contemporary with Phases II and III of the Erlitou culture (Li 1989:289). This suggests that the Xiaqiyuan culture came into existence when the Erlitou

culture began to expend cultural influence toward the northwest. If, as some scholars believe (e.g., Yang 1994; Li 1989; Liu 1990; Zou 1980), the Erlitou culture represents the Xia, while the Xiaqiyuan relates to the Proto-Shang, this implies that the formation of the Proto-Shang was a reaction to the territorial expansion of the Xia state, which probably had a militarily nature.[13]

According to ancient texts, the Xia was frequently engaged in warfares with other ethnic groups, and the Xia kings moved capitals to several locations. It is possible that some of the capitals-movings were the consequences of intergroup warfare. Many of these capital locations have been identified in the core area of the Erlitou culture in central Henan (Zou 1980:219–251), where intergroup conflict and constant shifting of political centers are the major characteristics in the late Longshan culture. The text accounts, therefore, seem to be supported by the settlement pattern information.

We are not certain exactly when the Proto-Shang culture developed into a state-level social organization, but it was probably no earlier than Phase II of the Erlitou period. Nevertheless, it is clear that as with the Erlitou culture, the transition from chiefdoms to the Shang state happened within a competing system of chiefdoms. The intergroup conflict within the region as well as a new military challenge from another region provided a basis for the rise of the Shang state.

It is noteworthy that the core region of the Xinzhai phase of the Erlitou culture (Fig. 30) is situated in the area where the Wangchenggang, Wadian, and Wuhumiao subclusters of the late Longshan culture are defined (Fig. 23). These three subclusters, one with a walled site and the other two with three levels of site hierarchy, express the most complex settlement system in central Henan. The Xinzhai site, relatively large in size (70 ha) and representing a cultural transition from late Longshan to the Erlitou culture, is also located in the Wuhumiao subcluster.

The Mengzhuang subcluster, in which a walled town (the largest among all Henan walled sites) existed from the late Longshan to the Shang (Fig. 18), is the only settlement group with the three levels of site hierarchy in northern Henan. These two areas seem to be the central sectors of the two settlement networks, and may have been the focal points at which change began to take place.

*From competing chiefdoms to early states in noncircumscribed regions.* It has long been recognized that warfare plays a major role in socio-political development (e.g., Carneiro 1970, 1981, 1990; Haas 1990; Lewis 1981). Carneiro (1970, 1981), for example, argues that early states as well as many chiefdoms around the world have risen in areas with environmentally circumscribed agricultural land: Under the situation of population growth, competition for access to circumscribed land would inevitably lead to interpolity conflict, with the resulting dominance of one group over the others. This theory has not been entirely supported by archaeological data through the world (e.g., Haas 1982:133–140). Judging from the data presented in this study, while complex chiefdom systems in the Taosi and Sanliqiao clusters did indeed develop in environmentally circumscribed regions, the early states, represented by Erlitou and Xiaqiyuan cultures, emerged from noncircumscribed conditions.

It has been argued that early states did not exist in isolation, but rather, developed in a system of polities with much interaction (e.g., Price 1977; Renfrew 1975, 1978; Renfrew & Cherry 1986). Such phenomenon in the development of complex societies has been termed as ''peer polity interaction'' (Renfrew 1975, 1978; Renfrew & Cherry 1986) and ''factional competition'' (Brumfiel & Fox 1994). According to this model, in a given region, several autonomous political territorial units with their administrative centers constitute a ''civilization.'' These polities have equivalent scale and status and share similar cultural features. Social change, as Renfrew (1986:6–10) points out,

emerges from the assemblage of interacting polities at the regional level. The forms of the interaction include warfare and competitive emulation.

Renfrew's model is supported by much archaeological evidence from different areas of the world. According to regional studies carried out in Mesopotamia, India, Mesoamerica, and the Central Andes by Henry Wright (1986:357–358), state emergence often occurs in limited areas with dense concentrations of similar-sized centers. The societies in which the early states emerged were often characterized by intense competition and frequent replacement of political centers. It has also been argued that the early states, the Xia, Shang, and Zhou in China emerged in pairs or in a network of multiple components (Chang 1983).

It is further suggested by Clarg and Blake (1994) that certain topographic configurations may serve a favorite condition for the development of social complexity in a network of communities. When settlement groups have greater potential for interaction with more neighboring centers in an unrestricted topographic condition (open settlement pattern) than in a restricted region (linear settlement pattern), social change tends to take place at focal points of regional social interaction, or in the central sectors of open settlement systems (ibid.:20). This hypothesis is certainly supported by the Chinese data presented here. The early states developed from an open settlement pattern in unrestricted regions of the Central Plains, and the core areas (the Mengzhuang cluster in northern Henan and the Wangchenggang-Wadian-Wuhumiao subclusters in central Henan), in which the Longshan cultures began to change into Erlitou and Xiaqiyuan, were the focal points of regional social interaction.

The settlement data from China discussed above demonstrate the processes during which chiefdoms developed into state-level societies. It is evident that ''peer–polity interaction'' or ''factional competition,'' which was mainly military in nature, characterized the socio-political structure of the late Longshan and early Erlitou culture in the lowlands of the Central Plains, thus contributing to the formation of the Xia and Shang states.

External factors, such as geographic configurations, climatic fluctuation, and changes of the Yellow River's course, formed preconditions for social changes. Nevertheless, human actions were the primary dynamics responsible for the development of competing chiefdom systems and the emergence of early states.

## CONCLUSIONS

We are now able to reconstruct a brief picture of the cultural development of the prehistoric Central Plains, in which societies evolved from chiefdoms to early states. Below, I will also summarize the theoretical implications.

### *A Reconstruction of Processes from Chiefdoms to States in the Central Plains*

Chiefdom social organizations may have already existed in the Yangshao period in selected regions. In the late Yangshao culture, intergroup conflicts suggested by the construction of town wall at the Xishan site in Zhengzhou began to take place. This may have been partially triggered by population movement from other cultures (Dawenkou and Qujialing) in the southern and eastern regions of the Central Plains (Table 1).

During the Longshan period, social development toward complexity was commonly experienced in all regions, but with different patterns. Integrated social systems occurred from circumscribed and semi-circumscribed conditions in the highlands or in the transitional regions from highland to lowland, while decentralized social organizations developed in the noncircumscribed lowlands of the Central Plains.

Accompanied by climatic fluctuation and by the changing courses of the Yellow River,

the lowlands in central and northern Henan became areas in which abundant agricultural lands attracted people from the surrounding regions. The intensive interaction among different social or ethnic groups led to interpolity conflict in these areas, which is clearly reflected in such archaeological remains as the construction of town walls and evidence for violence against humans (Table 1). These competing polities were probably politically independent based on convex rank-size curves and regularly spaced centers, and not very complex in social organization judging from medium-sized settlement centers and mostly two levels of decision-making hierarchy. They also did not have large territories as indicated by the regularly short distances between the centers. However, it was from these decentralized chiefdom systems with less integrated political structures that the early states, Xia and Shang, were derived.

Spatially and temporally, the transition from chiefdom to early states occurred in the Erlitou (in western and central Henan and southern Shanxi) and Xiaqiyuan (in northern Henan and southern Hebei) cultures and probably the contemporary culture near Shangqiu in eastern Henan, as well. The traditionally called ''Xia dynasty'' may have not been a state level social organization in its early period. The earliest state-level society emerged in Phase II of the Erlitou culture, when palaces began to be constructed at Erlitou and territory became expanded. The formation of the Proto-Shang culture (Xiaqiyuan culture) in Phase II of the Erlitou period was probably a political reaction to the military expansion of the Xia state.

The Erlitou and Xiaqiyuan cultures represent two systems of peer–polities, each sharing similar cultural elements, among which Xia and Shang were the most powerful ones. The relationships between those polities in each system may have been military conflicts and/or competitive emulations in nature. Along with intergroup warfare, political polities reduced in number. The multicentered competing system of chiefdoms gradually transformed into two major competing forces, represented by the Xia and Shang with their aligned polities in the Central Plains. Therefore, the transition from chiefdoms in the Longshan culture to early states in the Erlitou period was a long process. The formations of the Xia and Shang states in the Central Plains were accelerated by intra-regional conflict as well as by inter-regional competition.

### *Theoretical Implications*

By adopting the theoretical concept of chiefdom and by employing methods of settlement archaeology, especially settlement hierarchy and rank-size analysis, this article proposes a new approach to the study of the Neolithic culture and the development of the early state in China. The results of the analysis, in turn, have led to a revision of certain hypotheses about chiefdoms previously proposed by Western archaeologists.

Based on analysis of size and distribution among Longshan settlements, three models of regional settlement pattern correlating to different types of chiefdom systems, have been identified. These are: (1) the centripetal regional system in circumscribed regions (Taosi and Sanliqiao) representing the most complex chiefdom organizations; (2) the centrifugal regional system in semi-circumscribed regions (the Yi-Luo River and Qin River valleys) indicating less integrated chiefdom organizations; and (3) the decentralized regional system in noncircumscribed regions (northern and central Henan) implying competing and the least complex chiefdom organizations.

In the Chinese case, as in many cultures of the world, the early state emerged from a competing system of chiefdoms characterized by intensive intergroup conflict and the frequent replacement of political centers. The concept of ''peer–polity interaction'' or

''factional competition'' seems to be well supported by the data presented here.

The earliest states such as the Erlitou culture, however, were not derived from the most complex chiefdoms in the Taosi and Sanliqiao settlement clusters, which manifest three levels of settlement hierarchy and the largest regional centers. It seems that the least complex chiefdom systems in the central and northern Henan regions, mostly with two levels of settlement hierarchy and medium-sized regional centers, were directly related to the emergence of the early states. In this regard, the hypothesis that the state developed from more complex variants of chiefdom seems to receive little support from the Chinese data used here. However, in the competing chiefdom systems of the northern and southern Henan, where the early states developed, the socio-political changes may have initially taken place in the sectors with relatively higher degrees of complexity (indicated by more levels of decision-making hierarchy and the existence of town walls). Therefore, the ''complex chiefdom to early state'' hypothesis should not be rejected either. Thus, it is important to comprehensively consider both external and internal factors, including environmental systems, settlement patterns, and human actions as we continue to study the development of complex societies.

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## NOTES

[1] The locations for these Longshan cultural phases are defined as follows: (1) Liangcheng in southeastern Shandong, (2) Jiaodong in the Shandong Peninsular, (3) Yaoguanzhuang in the Wei and Mi River valleys of northern Shandong, (4) Chengziyai in northwestern Shandong, and (5) Yinjiacheng in central southern Shandong (J. Xu 1993), (6) Wangyoufang in eastern Henan, northwestern Anhui, and western Shandong, (7) Wangwan in central and western Henan, (8) Hougang in northern Henan, southern Hebei, and western Shandong, (9) Haojiatai in central and southeastern Henan, (10) Xiawanggang in southwestern Henan, and (11) Sanliqiao in southern Shanxi, eastern Shaanxi, and western Henan (G. Cao 1994: 123–147), (12) Keshengzhuang in eastern central Shaanxi, and (13) Shuang'an in western central Shaanxi (Ji 1986), and (14) Taosi in southern Shanxi (*Kaoguxue Jikan* 1989).

[2] Eleven written signs were recently identified on a pottery sherd found at the Dinggong site in Zouping, Shandong (*Kaogu* 1993.4). Interpretations of pottery signs vary among specialists. While some scholars are suspicious about the Neolithic date of pottery signs (e.g., Ming 1993; E. Wang et al. 1993), others believe that the signs were indeed written by the Longshan people (Feng 1994; E. Wang et al. 1993). According to the latter, since the graphic structures of these signs differ from those of the Shang oracle bone inscriptions, these pottery scripts are believed to represent a different writing system belonging to an ethnic group, the *Dongyi,* who were separate from the Shang people.

[3] All radiocarbon dates (5570 half-life) referred to in this article (Institute of Archaeology, CASS 1991) have been calibrated according to the system described in ''Calibrations of Radiocarbon Dates: Tables Based on the Consensus Data of the Workshop on Calibrating the Radiocarbon Time Scale,'' by Jeffrey Klein, J. C. Lerman, P. E. Damon, and E. K. Ralph, in *Radiocarbon* 24 (1982), 103–50.

[4] Two types of survey information are used here: (1) archaeological survey reports published in major archaeological journals in China; and (2) survey information published in *Zhongguo Wenwu Dituj-Henan Fence* [*An Atlas of Chinese Cultural Relics: The Henan Volume*] (NBCR 1991) which is the result of a nationwide archaeological survey project, conducted mainly for the purpose of cultural preservation during the 1980s.

[5] It is impossible, based on the survey reports, to estimate the proportion of sites which were overlooded in the surveys. Therefore, the sample proportion used in this analysis refers to the percentage of ''Longshan

only'' sites in the site population which were actually uncovered in the surveys.

[6] In recent years, systematic regional surveys have just begun to be conducted in some areas of eastern Henan and eastern Shandong by Sino-American cooperative archaeological teams, but no result has been published.

[7] The four sites are: Qushetougou, 50 ha, in Xiangfen (*Kaogu yu Wenwu* 1986.5); Nanguanwai, 40 ha, in Fencheng, Xiangfen (*Kaoguxue Jikan* 1989); Xiagao, 28 ha, in Yicheng (Zhang & Gao 1987); and Nanyuan, 24 ha, in Yicheng (ibid).

[8] In southern Shanxi, most Neolithic sites were distributed in the Linfen basin.

[9] In 12 of the 13 sacrificial pits found, only half of each pit was excavated, in order to leave some deposits to be studied in future digs. Therefore, the actual number of skeletons may be more than what has been reported (HPCRI&ADHMC 1992:5,38–39).

[10] According to a preliminary observation of the human skeletal remains by Pan (1989:296), the Longshan population at Taosi includes mixed groups of people who did not all come from the local areas. There were some skeletons showing similarities with those from the northern regions (Personal communication with Pan Qifeng in 1993). Also, a marked decline in site size and site number from Yangshao to Longshan are observed in the central Shaanxi region to the west of southern Shanxi, suggesting that partial population in central Shaanxi may have moved to other regions including southern Shanxi (Liu 1994:258–259).

[11] Some 32 Longshan sites were found in Guyang, Dong'a, and Renping counties in western Shandong (Zhao and Guo 1991). Recent surveys and excavations suggested that these sites tend to cluster into two groups, each of which is centered on a medium-sized walled town (33 and 35 ha) and several small-sized walled settlements (S. Wang 1996; X. Zhang 1995; *Zhongguo Wenwu Bao* 1995a). Excavations at some of these walled sites are still ongoing, and there is disagreement among Chinese archaeologists as to whether the identifications for the rammed-earth walls, especially the small ones, are reliable (Personal communication with Prof. Yan Wenming of Beijing University, 1995).

[12] According to Renfrew's (1975:14) observation of early complex societies, the ''early state module,'' consisted of a central place and associated hinterland, and fell within a restricted size range of approximately 1500 $K^2$ in area with a mean distance of about 40 kilometers between the central places of neighboring modules. Renfrew's model seems to be supported by examples of chiefdoms and early states from both the Old World and the New World. For instance, the minimum spacing of 44 kilometers has been identified between major competing ceremonial-civic centers in the Olmec area during the Formative period (Earle 1976:221). Also, the spatial organization of the Susiana Plain of Iran during the period of early state formation suggests that administrative control was limited to a radius of about 20 kilometers from a political center (Johnson 1982:415, 1987).

[13] Evidence of violence against human has been found in the Erlitou culture region near the Xiaqiyuan culture. Two skeletons with traces of scalping were discovered in an ash pit at Dasima in Wushe, dated to Phase III of the Erlitou culture. This site is located 5 kilometers south to the Qin River (Yang et al. 1994).

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