Social Complexity in Chinese Coastal Neolithic Sites

Richard Pearson

Emerging complex societies show increasing quantities, varieties, and specialization of material goods. Archeological excavations of Chinese Neolithic sites from the coastal provinces of Zhejiang, Jiangsu, and Shandong, carried out in the past 20 years, offer rich evidence of the gradual development of material wealth and its localization.

Summary. Neolithic cemeteries in Zhejiang, Jiangsu, and Shandong provinces from about 5000 to 2000 B.C. show increases in the mean numbers of burial goods, goods found with males, and tools used as grave goods; separation of burial localities; differentiation of sets of tools found with males and females; a decrease in goods found with children; and common ornaments found with males and females. The distribution of tools seems to reflect a sexual division, with an increase in the prominence of males which may be associated with intensification of cultivation. Emergence of ranking is suggested by very rich graves and ornaments shared by males and females. Chinese theories of cultural evolution are introduced.

Ten cemeteries have yielded a total sample of some 600 burials, for which the excavators have provided tabulations of orientation, grave preparation, burial objects, and relative location. An 11th site, at Wangyin, which has only briefly been reported, is said to have yielded another 885 individuals. For four large sites, Yuduncun, Liulin, Dadunzi, and Dawenkou, good preservation permitted identification of age and sex for a large part of the sample. Although Chinese archeologists provided brief summaries of the main trends of excavation results and made general statements about the evolution of complex societies on the basis of the excavations, they did not produce any systematic analysis of trends within sites or comparisons between sites. A radiocarbon chronology has been developed for this region within the past 5 years and shows that the sites span three millennia from about 5000 to 2000 B.C. (Table 1). The subsistence pattern of the people is becoming clearer with the excavation of the Hemudu site in Zhejiang (*1*). Perhaps the technological base for subsistence was set in the Early Neolithic, and subsequent changes in the organization of production led to the increased wealth obvious from the cemeteries. Through comparison of numbers of grave offerings, I document some of the changes that occurred in these sites.

The first part of this article gives background information about the archeological sites. The second part is a synopsis of the ideas that Chinese archeologists and historians have about the patterns which they find in these sites. The third part is an analysis of aspects of the burial data, and the fourth and final part is a discussion.

Archeological Background

In low-lying country along the East China Sea, Neolithic sites have gained increasing attention from Chinese researchers (Fig. 1). Most of the sites are cemeteries. Their classification is a topic of ongoing debate, particularly among archeologists from Beijing, Nanjing, and Shanghai. In the early 1960's all of these sites were thought to be relatively late—the remains of people who migrated from the central plain of North China, the focus of cultural development. Radiocarbon dates in the past few years, however, have shown that chronologically they are contemporary with the advanced Neolithic of the Yellow River basin (*2*). A recent scheme places these sites in three broad groups—the earlier Qingliangang culture spreading across northern Zhejiang, Jiangsu, and southern Shandong from roughly 5000 to 3000 B.C. (recalibrated dates), and the later Dawenkou culture in the north with its contemporary, the Liangju culture, in the south from about 3000 to 2000 B.C. The traditions running through these cultures are thought to have constituted a major element in the emergence of civilization along the southern edge of the Yellow River (*3*). There is considerable evidence to suggest that the Neolithic of eastern and coastal China was somewhat independent of and parallel to the Neolithic of the central plain, being based on different cultivars and ecological conditions.

The stratified Hemudu site, on the southern shore of Hangzhou Bay, has yielded the remains of cultivated rice, *Oryza sativa* subspecies *hsien* Ting (*4*), associated with several radiocarbon dates of about 5000 B.C. (*5*). Other plant remains found in the same layer include water caltrop, sour date, other fruits and nuts, and bones of water buffalo, dogs, mink, crocodiles, pelicans, and fishing cormorants.

Layer 4 of the Hemudu site yielded a large sample of cultivating tools fashioned from the scapulae of an unidentified ungulate; these are thought to have been tied to a long handle and used in the manner of a spade. Since the Hemudu site yielded a large number of tools for cultivation, piles of rice husks, and wooden house remains suggesting permanent occupation, archeologists have concluded that the cultivation system was one of "reclaiming wasteland," that is, short fallow (*4*, p. 23).

Pollen data from the Songze site in the Yangtze delta indicate that in the sixth millennium B.C. temperatures were 2° to 3°C higher than at present and that the Yangtze delta was at an early stage of formation. In the fifth millennium (the middle cultural layer of Songze) the climate was slightly cooler and deciduous tree species had replaced an early forest dominated by broadleaf evergreen oak trees (*Castanopsis* and *Quercus glauca*). By the middle cultural layer, which would be the final period of the Neolithic (third millennium B.C.), the annual mean temperature is thought to have been 1° to 2°C higher. *Morus* (mulberry) pollen dramatically increased, which might indicate the development of active sericulture (*6*).

The Yuduncun site, which lies southeast of the city of Changzhou in the Yangtze delta region, is stratified, and its earliest layer is among the oldest in the

The author is a professor in the Department of Anthropology and Sociology, University of British Columbia, Vancouver, British Columbia, Canada V6T 2B2.

0036-8075/81/0904-1078$01.00/0

local sequence. Excavated in the early 1960's and again in 1972 and 1973, the site is typical of the Qingliangang sites south of the Yangtze River, in the area of Lake Taihu. The three cultural layers represent Early, Middle, and Late Quingliangang. The author of the report states that the site existed within the prosperous period of matrilineal society (*7*).

All of the burials were of single individuals. The excavators could not discern carefully excavated grave pits, and suggest that the dead were laid on the surface of the ground and covered with a mound of earth. In layer 3, the bottommost layer, all but one of the 33 burials were facedown. The exception was a burial for which the position was not clear. In layer 2, 21 of the 29 burials were in a ventral extended position, lying facedown.

Objects were placed at the end of the grave, beyond the head, along one side, or even on top of the individual. Some tools were placed in the hands, and slit jade (*jue*) earrings were apparently attached to the ears. In layer 3, only seven of the 33 burials possessed any grave goods at all. One of these, a child (sex undetermined), had a small jade tube and a jade bead. Of the 17 male skeletons only two possessed grave goods—one middle-aged man's grave contained a red pottery vessel, and in one male's grave there was a jar (*guan*). Three females were buried with grave goods—with a young female there was a piece of stone raw material, with a mature female two jade beads, and with a middle-aged female a perforated adze and antler awl. In general, grave goods were particularly rare and most of the objects were not utilitarian goods but modest ornaments. The richest burial in the entire layer was that of a female (number 16), who was buried with two gray ware tripods (*ding*), a red stand (*dou*), two different kinds of jars, a pottery spindle whorl, a bone awl, and a bone arrowhead. She was the only female in the entire layer to be buried with pottery vessels.

In layer 2, from a total of 29 burials, 21 were interred with grave offerings; 12 of these included pottery. For the children, the grave offerings were pottery vessels and one small slit *jue* earring. For males, the offerings were pottery vessels and other utilitarian objects, as well as a bone hairpin. One stone spindle whorl was found in association with an old man. Only two female burials from a total of ten were without burial goods, and all of those with grave goods possessed a spindle whorl. Weaving at this point seems to have been a female specialty, but the trend varies in later sites.

In general, grave goods were present in more instances for each age and sex category in layer 2 than in layer 3. However, the most dramatic difference was in the case of middle-aged males, with only one individual out of six in layer 3 being accompanied by grave offerings. In layer 2, two out of three had grave goods.

A single grave from layer 1B, that of a middle-aged male lying in an extended dorsal position (the usual position of all of the later burials), contained nine pottery vessels, a pottery spindle whorl, a perforated stone adze, five unperforated

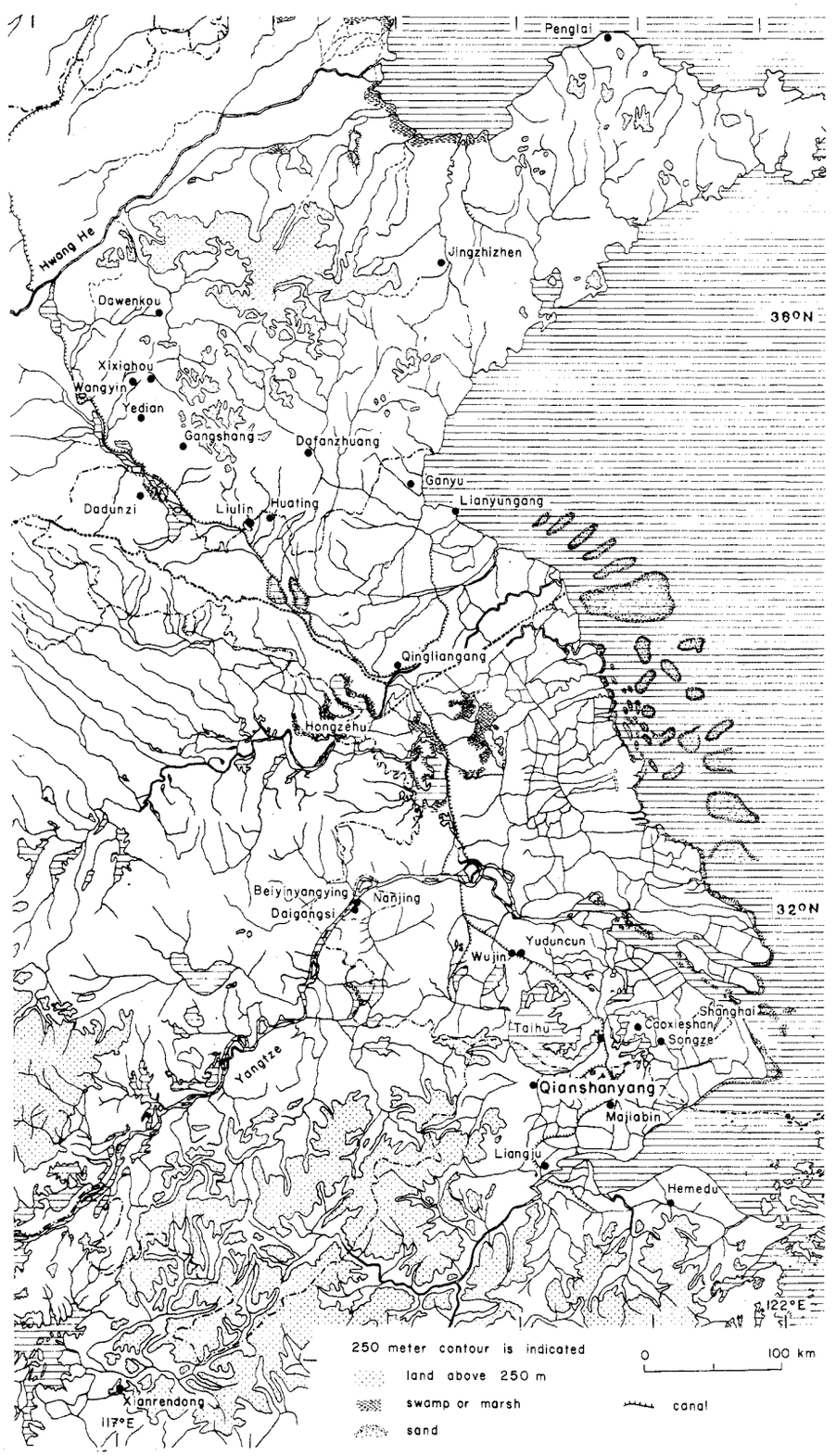

Fig. 1. Map showing locations of Neolithic sites in China.

adzes (*chan*), and a chisel. It dates from a much later period.

Dawenkou, in southern Shandong, provides a good example of a later site. It was excavated in the late 1950's for several months. Some 5400 square meters were uncovered, yielding a cemetery with 133 burials. Three periods were segregated on stratigraphic and stylistic evidence. It is interesting that four graves had no skeletal remains. The authors state that these graves may have been prepared for individuals who died away from home, as done by modern fishing people (*8*). Seven double burials and three triple burials occurred. In addition to pottery and stone tools, grave goods included pig skulls, turtle shells, jade ornaments, and ivory engraved and inlaid objects. Deer teeth (from the hornless local roebuck) were also common. Some of the burials showed evidence of the custom of removal of the upper lateral incisors of both males and females in their teens.

The authors of the Dawenkou report state that usually the deer teeth were placed between the fingers, adzes by the hips, antler and bone objects near the hips, bone arrowheads and points between the legs, pig skulls below the feet, and small objects, such as hair ornaments, over the head (*8*, p. 12). They were able to distinguish small, medium, and large graves in each of the three periods. In addition, special wooden grave lids and chambers were constructed. The first type was a lid made of undressed logs, which went over the pit and rested on a crosspiece. The second had a top and four sides with a bottom of loose logs. The third and most elaborate was constructed of logs that were roughly trimmed after the bark was removed and were fitted together like the sides of a wooden well shaft. This elaborate chamber stood in the middle of a much larger grave pit.

In order to give a general impression of the Dawenkou site, I give four examples of burials—a large and small example from both the early and late periods of the site. Grave 55, an example of a small grave from the early period, contained a female in an outstretched dorsal position in a pit 0.6 m wide, 1 m deep, and 2.36 m long. Above the head there was one jar; near the right hand, a painted, narrow-necked jar; and below the legs, a tripod, a spindle whorl, and a pig skull. Grave 13, a large grave from the early period, contained a male about 40 years old on the left and a female in her late 30's on the right. The grave contained 14 pig skulls, 19 pottery vessels, an ivory engraved tube, bone spoons, awls, arrowheads, and stone adzes. In total, there were 40 grave objects. The female was elevated above the male by about 7 centimeters.

Grave 10 is an example of a large grave of the late period. The total length of the grave is 4.2 m, the width 3.2 m, and the depth 0.36 m. Inside this large pit is a burial chamber 2.37 m long and 1.28 m wide. The person in the grave was a female 50 to 55 years old. She was lying on her back, with her legs extended. Her hands held deer teeth. Around the body was a layer of black, ashy material 2 cm thick, which may have been the remains of clothes. Around the neck were three strings of turquoise(?) beads. There were also a jade bracelet, a perforated adze, a large ivory tube, and an ivory comb. The grave pottery, 38 vessels in total, includes white and black wares and very fine painted pottery. In the grave pit, beyond the head, there was one group of small white and black pottery vessels, consisting of tripods, narrow-necked jars and a jug (*guei*), basin and cup—altogether 11 items. On top of the head there was an ivory comb and on the forehead a string of oblong plaque-like pendants. On the right arm there was a bracelet of clear green jade. By the right hip there were a perforated jade adze and a bone engraved tube. On each side of the body, at about waist level, there were an elaborately painted jar with handles and a black cup. Outside the grave chamber, but within the pit, there was a large amount of pottery. The vessels seemed to be placed in an organized fashion, suggesting a formal burial ritual.

In the southeast corner there were large vessels—a red painted *guan*, a white narrow-necked jar with handles, and a tall cup, among others. Nearby was a small pile of pieces of crocodile hide. In the northeast corner there was a group of vessels including a white pottery cup and a footed stand. There was also a pile of crocodile hide pieces and ornaments, including bone and jade bracelets. At the west end of the grave there were three rows of pottery vessels of different kinds.

In grave 5, a small grave of the late period, the mature individual (sex not identified) lay outstretched dorsally. Each hand held a deer tusk. On top of the head was a pair of hair ties; near the right ear a piece of turquoise(?). On the left arm was a bracelet, and under the

Table 1. Comparative chronology of the North China plain and eastern coastal areas.

Date (B.C.)	North China plain	Northern Jiangsu, southern Shandong	Southern Jiangsu, Zhejiang
		Incipient *Neolithic*	
5000			
4750	Early Yangshao culture (Banpo type)	Early Qingliangang culture	Hemudu culture
4500			Early Qingliangang culture (Majiabin period)
4250			
4000	Middle Yangshao culture	Middle Qingliangang culture, 1 and 2 (Liulin early and late periods)	Middle Qingliangang culture (Beiyinyangying period)
3750			
3500	Late Yangshao culture (Jinwangzhai type)	Late Qingliangang culture (Huating period)	
3250			Middle Qingliangang, 2 (Songze period)
3000			Late Qingliangang culture (Zhanglingshan period)
2750	Miaodigou period 2 culture	Early Dawenkou culture	
2500			
2250	Henan Longshan culture	Late Dawenkou culture	Liangju culture
1750	Early Erlitou period	Shandong Longshan culture	Hushu culture
1500			

hip, at the edge of the grave pit, there were four beads and a bone hairpin. To the right of the head there was a group of pottery vessels including a footed stand, a narrow-necked jar, a high goblet, a cylindrical cup, and a *guan*.

In this section I have attempted to describe some of the archeological details of the sites. I next briefly summarize some of the interpretations of the sites offered by Chinese archeologists and historians.

Chinese Interpretations of Neolithic Social Evolution

Particularly notable in Chinese writings has been retention of the idea of a shift from the matrilineal clan to the patrilineal monogamous family. In Early Yangshao and at the same time period in Zhejiang, Jiangxi, and Gwangdong, a matrilineal society existed. From Middle Yangshao and the contemporary period of Qingliangang, the possession of private property and a monogamous system emerged (*9*). During a transitional stage between the two forms, an exceptional stage could arise, in which patriliny and polygamy together could impose a special form of enslavement of women.

Wei (*10*) states that as the productive power of the society became stronger, it became necessary that the basic production unit be reduced. The patrilineal family unit replaced the primitive clan unit for agriculture and hunting, causing serious social change. As the clan labor group was replaced by the family unit of labor, the family monopoly and private property system emerged. "The family gained power and threatened the power of the clan commune" (*10*). According to Wei, habitation sites of this transitional period lack large cooperative dwellings or clustered storage pits. Instead, there are relatively smaller dwellings with smaller storage pits.

Dawenkou, belonging to the final stage of the Neolithic, is said to show the process of change from matrilineal to patrilineal society and the stage of dissolution of the clan system (*11*). Tang Lan believes that Dawenkou is the legendary state of Shaohao, with the graves of males richer than those of females and evidence for the existence of slaves. He interprets a change from a clan society to slave society and the separation of craft specialization from agriculture. Peng Bangtung states that Dawenkou represents the slave society level, but still shows final stages of clan social organization. Although he acknowledges private ownership and wealth differences, he considers that the occupants of the graves were not slaveholders but clan heads. Production was not high enough, classes not clear-cut enough, and class conflict not sufficiently well developed to show state emergence. Chen Guojiang represents a third view: that Dawenkou is at the clan level, since the grave offering tools were actually utilitarian, used by their owners as tools of production.

Wei (*10*, p. 3) states that at Dawenkou there is evidence of exchange activities between individuals and families. (I presume that this exchange is indicated by sumptuary items such as jade and bone ornaments.) This is seen as an indication of a "cold exchange system," which is said to have taken the place of a more humane, nonprofit gift exchange among people in clans. In the sites belonging to the final period of primitive society, the skull or jaws of a pig or sheep were almost always included as offerings. These constituted a medium of exchange. In (*12*), the presence of a young female skeleton in a burial of an old couple is taken as evidence that a slave was killed to follow her master.

Zhong (*13*) surveys in brief the entire span of Neolithic sites in the area of Shandong, Jiangsu, and Zhejiang. He states that the earliest sites such as Erjiancun, near the northern port of Lienyungang, Jiangsu, with few grave goods (a total sample of seven graves) show that the society was matrilineal and that people were economically equal. In the Liulin graves, stone production tools such as adzes and chisels were far more frequently buried with males than with females. Spindle whorls were found almost exclusively in female graves, while dogs were buried in male graves. The various kinds of ceramics from sites such as Liulin and Dadunzi, as well as those of later time periods, are thought to be wine vessels, suggesting some surplus grain for wine production, beyond the needs for cereal consumption.

Zhong states that animal domestication, evident from the pig skull offerings, shows that the people were patrilineal, since domestication was derived from hunting, which is said to be a male activity. In some burials, particular kinds of tools such as bone awls and needles, buried with individuals who died in their prime, seem to mark these people as craftsmen. Zhong states that by this time crafts would have become so complex that it would take a long time to learn the production skills, and that the occupants of Liulin were organized in a clan, which was subdivided into many patrilineal families. Each family is supposed to have owned an independent grave area, distinct from those of other families in the clan. The family is said to have been the basic unit of labor, which owned the materials and the goods pro-

Table 2. Mean number of pottery objects per burial from Chinese Neolithic cemeteries in Zhejiang, Jiangsu, and Shandong (*14*). Pottery includes pottery spoons and spindle whorls as well as vessels. The sites are arranged in very rough chronological order from early to late.

Site, layer, or phase	Total burials			Burials identified as male		Burials identified as female	
	Sample	Percent with pottery	Mean number of pottery objects	Total	Mean number of pottery objects	Total	Mean number of pottery objects
Yuduncun							
Layer 3	33	9.1	0.2	17	0.4	7	0
Layer 2	29	41.4	0.7	7	1.3	10	0.5
Layer 1B	1	100		1		0	
Majiabin	30	11	0.32				
Beiyinyangying	201	78.6	2.7				
Liulin							
Excavation 2, lower	86	69.6	2.6	37	2	33	3.1
Excavation 2, upper	48	79.2	4.6	20	3.7	15	7.4
Excavation 1	52	40.4	1.8	4	0.8	3	3
Songze	51	88	3.8				
Dadunzi							
Liulin layer	27	81.5	3.7	13	4.5	8	5.1
Huating layer	15	86.7	6.5	7	9.6	4	7.5
Dawenkou							
Early	72	91.7	4.9	8	5.6	8	6.3
Middle	17	94.1	7.6				
Late	24	100	22.1	6	25.2	3	39
Xixiahou	11	100	53.6	6	57.5	4	52.8
Dafanzhuang	26	96	27.2				

Table 3. Grave goods in Dawenkou, Shandong. Shown are the number of graves with offerings, the mean number of offerings for all single graves, and the standard deviation.

Value	Ceramics	Adzes, other stone tools	Stone, jade ornaments	Pig skulls	Deer tusks	Turtle shells	Stone beads	Grave pit (present)	Grave ledge (present)
				Early period (N = *72*)					
Graves with trait	66	31	13	23	26	5	1	4	11
Percent	91.7	43.0	18.0	32	36.1	6.9	1.4	5.6	15.3
Mean	4.90	0.97	0.53	0.83	0.93	0.15	0.01		
Standard deviation	4.86	2.11	1.74	1.42	1.46	0.65	0.12		
				Middle period (N = *17*)					
Graves with trait	16	6	2	3	6	0	0	1	3
Percent	94.1	35.3	11.8	17.7	35.3	0	0	5.9	17.7
Mean	7.59	0.76	0.23	0.17	0.53	0			
Standard deviation	8.05	1.56	0.75	0.39	0.80				
				Late period (N = *24*)					
Graves with trait	24	16	12	9	15	2	5	5	3
Percent	100	66.7	50	37.5	62.5	8.4	20.8	20.8	12.5
Mean	22.08	2.41	1.83	0.42	1.25	0.16	5.83		
Standard deviation	24.92	4.38	3.00	0.58	1.44	0.56	17.10		

duced. By the time of the Liangju and Late Dawenkou cultures, the number of types of ceramic vessels had increased enormously and the quality of the ceramics had also risen substantially. There must have been specialists trained to make the various shapes and wares. Jade objects also involved highly skilled craftsmen. Zhong states that in the final stage of primitive society, the emergence of partrilineal monogamous society was closely interrelated with the exchange of commodities.

Analysis of Data from Chinese Neolithic Sites

This section deals with the analysis of tabulated data from 16 components of the nine archeological sites outlined above. In it I attempt to examine the distribution of artifacts and burial treatments in terms of changes in frequencies for different components and subgroupings within them, and also the presence or absence of artifacts that may mark certain statuses.

Increase in mean numbers of components of grave offerings. Table 2 shows the number of pottery objects per burial from the nine sites studied (*14*). From sites at the earliest time level grave offerings are rare, and when they occur their number is low. In the earliest component, Yuduncun layer 3, and in Majiabin, only about 10 percent of all burials have grave ceramics, whereas in the latest component, such as the late period of the Dawenkou site, Xixiahou, and Dafanzhuang, the occurrence of grave ceramics is virtually universal. At the same time, the mean number of ceramics in each burial increases dramatically. It seems logical to state that this is an indication of increasing wealth of the communities to which the individuals belonged.

I did not analyze the situation for stone tools for all nine sites. However, preliminary analysis for the Dawenkou site, with its three layers (Table 3), suggests the same pattern of increasing numbers, indicated by increasing percentages of graves with offerings and higher mean numbers of adzes and other stone tools, jade and other stone ornaments, pig skulls, deer tusks, and jade beads, for which the increase is particularly dramatic. Turtle shells show no such dramatic increase, and one aspect of grave preparation, the construction of a ledge along one side of the pit (the *ercengtai*), shows little change.

In the case of the grave ledges, it is interesting to note that the mean numbers of ceramic objects in burials with grave ledges are 8.1 for the early period, 19.0 for the middle period, and 53.7 for the late period (data not shown in Table 3). In each case the mean is approximately twice the mean for all the graves of the same period. At Dawenkou some graves had carefully constructed log chambers. The mean number of pottery objects for these graves in the early period was 3.75 (one had no pottery), while the mean for the five cases in the late period, all of which had pottery, was 50.6. Thus in the early period it was roughly the same as for all the burials, while in the late period it was more than twice as high. The middle period burials contained a single example of the grave pit. In the late period, three of the five examples had both grave pit preparation and the grave ledge.

Range of variation of numbers within each site. At the same time that the mean number of grave ceramics increased, not everyone received the same proportion of the increase in wealth. In the later sites, extremely rich graves occur with increasing frequency. To measure the relative concentration of wealth in the burials, a coefficient of variation was calculated for each component (see Table 4).

The coefficient of variation, computed as 100 times the standard deviation divided by the mean, is a measure of relative variability (*15*). Since the variance and the standard deviation have magnitudes that are dependent on the magnitude of the data, a coefficient that expresses sample variability relative to the mean of the sample is used. In the case of the sample from Yuduncun layer 3, the mean is very low, and in this case the relative difference between one ceramic object and no ceramic objects is great. For our purposes, these early high coefficients of variation do not seem to be of particular note. However, the trend in sites with higher means and fewer cases of no pottery is interesting, since there appears to be an increase in relative variability created by large discrepancies between rich and poor graves. As the mean increases, more variability is needed to maintain the same value for the coefficient of variation. For it to increase, the variability must increase more than proportionally. This trend in variation proportional to the mean indicates a widening gap between burials with large numbers of grave ceramics and those with relatively few.

Different numbers of grave goods found with males and females. Sex could be determined for a large number of specimens from Yuduncun, Dadunzi, Dawenkou, and Xixiahou. The mean is higher for females than for males, except in layer 2 at the Yuduncun site, the upper

layer of Dadunzi, and Xixiahou. The later sites show a trend toward a greater number of grave ceramics for males than females. This shift is not evident, however, at the Dawenkou site, where the sample of sex-identified skeletons is rather small, or at the site of Dafanzhuang.

In the Liulin site, female graves have a higher overall percentage of pottery offerings in the lower layer and a higher mean number than males at both levels (Table 5). In the Dadunzi site, which is of a later time period, the overall mean for males becomes higher than the overall mean for females in the upper layer, termed the Huating layer (Table 6).

In the Dadunzi site (Table 7) there was a higher mean number of stone tools and ornaments for females in both layers, and a sharp difference in the percentage of sex-identified graves possessing stone objects in the upper (Huating) layer. Every female-identified grave had stone objects, while only half the male graves had stone offerings.

Differences between age groupings and sex. Liulin (Table 5) and Dadunzi (Table 6) provide data about this relationship. To make intervals consistent and to secure larger samples, I made broad age categories. In the Liulin site (second excavation) grave ceramics occur in the fewest cases, and the mean is lowest for young males (10 to 20 years old). For females in this age category, the mean is low in the lower layer but higher in the upper layer. For females, the means tend to increase in old age. The same trend of an increase for females of greater age can be seen in the Dadunzi site. And in the case of males, the mean drops off after middle age, that of males in the 40-year category being roughly twice that of the males in the 50-year category. At the same time, the mean for younger males (in the 30-year category) is substantially lower than the means for the other categories of age and sex.

Differences between localities within one cemetery. In the second excavation of the Liulin cemetery, the archeologists designated five separate areas. They believe that the entire cemetery belonged to one clan, while each of the five groups might belong to a single family or several closely related families within the clan. The mean frequency of grave ceramics for each of the five groups was noted to show sharp divergence (Table 8). At first it was thought that the differences in these means might reflect differences in relative wealth of the social groupings postulated in the excavation report. From the analyses above, however, it is clear that relative temporal position, age, and sex all have an effect on the frequency of pottery in the graves.

An analysis of variance was done to determine whether the mean number of ceramics varies significantly among the five burial groups. To control for the possible effects of layer (upper or lower), sex, and age (0 to 20, 21 to 40, and 41 to

Table 4. Sample size, mean, standard deviation (S.D.), and coefficient of variation (C.V.) of grave ceramics from Chinese Neolithic sites.

Site, layer, or phase	Sample size	Mean	S.D.	C.V. (%)
Yuduncun				
Layer 3	33	0.21	0.89	424
Layer 2	29	1.00	1.13	113
Majiabin	30	0.32	0.56	175
Liulin				
Excavation 2, lower	86	2.65	3.25	122
Excavation 2, upper	48	4.58	5.34	116
Excavation 1	52	1.79	2.23	125
Beiyinyangying	201	2.65	2.70	102
Songze	51	3.82	3.20	83
Dadunzi				
Liulin layer	27	3.70	3.34	90
Huating layer	15	6.47	5.18	80
Dawenkou				
Early	72	4.90	4.86	99
Middle	17	7.59	8.05	106
Late	24	22.08	24.92	112
Dafanzhuang	26	27.15	27.18	100

Table 5. Occurrence and mean number of ceramics in single graves by age and sex, Liulin site, second excavation, lower and upper layers. (Note that these means differ from those given in Table 2 because some individuals for whom only sex was determined are included in Table 2, whereas only those for whom sex and age were both determined are included here.)

Value	Age (years)					Total and overall mean
	10–20	21–30	31–40	41–50	50–60	
			Lower layer			
Total number of males	4	5	13	10	5	37
Percent with pottery	25	100	61.5	60	80	64.9
Male mean	0.5	3.4	2.1	1.5	2.4	1.9
Total number of females	9	8	5	2	9	33
Percent with pottery	77.8	100	60	100	88.9	84.9
Female mean	1.2	3.8	4.2	2.5	4.9	3.4
			Upper layer			
Total number of males	2	3	11	4	0	20
Percent with pottery	50	100	90.0	75	0	85
Male mean	0.5	2.3	5.7	2.0	0	3.7
Total number of females	3	3	7	1	1	15
Percent with pottery	66.6	100	71.5	100	100	80
Female mean	5.7	4.0	6.0	3.0	27	6.7

Table 6. Occurrence and mean number of ceramics in single graves by age and sex, Liulin and Huating layers, Dadunzi site.

Value	Approximate age (years)			Total and overall mean
	30	40	50	
		Liulin layer		
Total number of males	3	2	8	13
Percent with pottery	66.6	100	75	76.9
Male mean	1.0	7.5	3.4	4.5
Total number of females	3	3	2	8
Percent with pottery	100	100	100	100
Female mean	7.3	3.7	4	5.1
		Huating layer		
Total number of males	0	3	4	7
Percent with pottery	0	100	100	100
Male mean	0	11.7	5.5	9.6
Total number of females	0	3	1	4
Percent with pottery	0	66.6	100	75
Female mean	0	5.0	15.0	7.5

60 years), these three variables were also included in the analysis.

An assumption of this analysis is that the variances of the five burial groups are equal; a Bartlett's test showed this to be untrue ($\chi^2 = 19.68$; d.f. = 4; $P = .0006$). The usual solution to this problem is a logarithmic transformation (*15*, p. 184). In this case, since some values are zero, 1.0 was added to each value before the logarithm was taken. This transformation is also useful for bringing data more into line with two other assumptions of the analysis of variance: that the distributions are normal and that the effects of the factors are additive (*16*). A Bartlett's test on the transformed data showed that the transformation had the desired effect of making the variances equal ($\chi^2 = 1.86$; d.f. = 4; $P = .76$).

The untransformed means and the transformed means and standard errors for the five burial groups are shown in Table 9. The results of the analysis of variance are shown in Table 10. Although the null hypothesis that the means of the five burial groups are equal cannot be rejected at the 0.05 level of significance, the results are close enough to significance that the effect of burial grouping should be considered in future studies.

The graves in the Dawenkou site are situated in an oblong cluster with several isolated graves removed from it. Two small clusters, one to the north and one to the east, exhibit a preponderance of large, elaborate, late period graves. Five of the ten burials richest in pottery occur in these two clusters, as well as two of the five burials containing jade beads in the late period, even though these two clusters contain only six of the 24 late period burials. The division between these higher status graves and the others is not totally clear, but some trend toward spatial segregation seems evident.

Grave objects present in one "status" group. I examined briefly the presence or absence of particular grave objects in different groups within sites. By groups, I mean sex or age groups, which might be marked by one object or show occupational specialization.

In Dawenkou age and sex have not been determined for enough individuals to discuss the variation noted above. In later sites the trend of including tools in addition to ceramics continues to increase. From the Dawenkou site, which did yield 133 burials, 57 percent contained tools used in subsistence, manufacturing, or processing. (Function was designated by intuition rather than empirical testing.) Agricultural tools (axes, sickle, spade knife) occurred in 9 percent, fishing and hunting tools (spear, pointed knife, arrowhead, fishhook) in 4.5 percent, and weaving and sewing tools in 13.5 percent. Combinations of agricultural and weaving-sewing tools occurred in 3 percent, and of fishing-hunting and weaving-sewing tools in 2.3 percent. Daily maintenance work tools (small spade, chisel, whetstone) occurred in 11.3 percent. In this analysis, Zhang included multiple graves and graves for which no chronological period was assigned, adding 20 cases to the sample of 113 single graves for which the chronological period was given (*17*).

Table 7. Sample size, mean, and standard error (S.E.) of distribution of stone objects by sex and layer, Dadunzi site.

Sex	Number of skeletons with sex identified		Mean	S.E.
	With stone objects	Total		
	Liulin layer			
Male	6	11	1.18	0.60
Female	4	9	1.44	0.71
Male and female	10	20	1.30	0.45
	Huating layer			
Male	5	10	1.60	0.93
Female	3	3	3.00	1.00
Male and female	8	13	1.92	0.65

Table 8. Mean number of burial ceramics for burial areas 1 to 5, Liulin site, second excavation.

Group	Area in site	Number of burials	Mean number of ceramics
1	T403–405	23	2.56
2	T406–408	18	2.94
3	T412, 413	23	6.83
4	T707, 708, 806, 807	10	1.80
5	T805, 809	24	4.54

Table 9. Number of burial ceramics for burial areas 1 to 5, Liulin site, second excavation; transformed data.

Group	Sample size	Untransformed data	Transformed data	
		Mean	Mean	S.E.
1	22	2.55	0.42	0.07
2	16	2.81	0.47	0.08
3	17	6.77	0.68	0.11
4	9	2.00	0.34	0.12
5	17	5.35	0.63	0.11

Differences in the kinds of tools in graves of males and females in the Middle Dawenkou graves from the Liulin, Dadunzi, Dawenkou, and Xixiahou sites are presented in Fig. 2 (*18*). These show that males possessed more tools than females in almost all categories of agricultural, hunting, and maintenance tools, but that females had more needles and spindle whorls.

Of a total of 30 sex-identified burials from Dawenkou equally divided into male and female, three females and one male possessed stone beads, while three females and five males had stone ornaments. A total of six burials had beads and 26 had ornaments; however, the sex could not be identified in the majority of cases (*8*, pp. 136–155).

Stone and clay balls have been found in the mouths of skeletons, and in other cases extreme wear along the roots of the first molars and distortion of the dental arch has been noted. The custom of retaining a small ball in the mouth during one's lifetime is hypothesized for ten females and four males in the Dadunzi burials and 17 females (two sex identifications uncertain) and two males from Wangyin. The total sample size of the skeletons and correlations with other traits are not given, but this trait seems to be more common with females (*19*).

In three sites burials of young children were observed. These are Yuduncun (layer 2), Liulin (second excavation), and Dawenkou. The mean number of grave ceramics in Yuduncun for small children in layer 2 is 0.83, which is slightly higher than the mean for the whole layer. But in Dawenkou the mean number is 1.0, drastically below the level for the total population in any layer. Of a total of 11 child burials from Dawenkou, only five have grave goods at all. This is drastically below the level for the total population in any period. The number of cases of burial goods for the general population ranges from 91.7 percent (66 examples from a total of 72) to 100 percent (total sample, 24), depending on the time period (Table 2).

Multiple burials were found in the Liulin and Dawenkou sites but not in the others. Seven were recorded from Dawenkou: three from the early, two from the middle, and one from the late period, with one assigned to no particular period. Burials 1 and 35 are often mentioned by Chinese authors, since in each case grave offerings lie alongside the male, while the female, on the left, lies close to the edge of the grave pit,

which appears to have been cut and extended to accommodate her. In this case all of the grave goods lie on the side of the male. These multiple graves are cited as examples of the relatively low status of women. However, grave 13 shows pig skulls placed in the outer portion of the grave adjacent to the female. It is true, however, that grave 13 has been placed in the early period, while grave 1 is in the late period and grave 35 in the middle period.

At the Wangyin site, Yanzhou, Shandong, the third layer, which is thought to date to the Early Dawenkou culture, yielded a large secondary burial pit (No. 2240) of 22 people, mostly adult males (*20*). These are partially articulated and tightly flexed (knees drawn up), with a small quantity of smaller bones gathered up in a transferral from some other burial place. There were three north-south rows of skeletons totaling 17 individuals, with four other bodies set in one corner of the rectangular grave pit, which measured 3 by 2.4 m. Another burial, from layer 2, consisted of a rectangular pit in which skulls were arranged along the eastern side in two north-south rows, and arms and leg bones were placed adjacent to the skulls. A total of 24 skeletons were arranged in three layers, eight on the bottom, nine in the middle, and seven on top. No grave goods are evident in the photographs of these burials.

Table 10. Analysis of variance for burial groups, Liulin site, second excavation.

Source of variation	Degrees of freedom	Sum of squares	Mean square	*F* value	*P*
Total	80	12.331			
Burial group	4	1.200	0.300	2.136	0.09
Layer	1	0.051	0.051	0.362	0.55
Age	2	0.393	0.197	1.400	0.26
Sex	1	0.233	0.233	1.660	0.20
Group × age	7	0.836	0.119	0.850	0.552
Layer × age	2	0.152	0.076	0.540	0.586
Group × sex	4	0.753	0.188	1.340	0.267
Layer × sex	1	0.006	0.006	0.046	0.83
Sex × age	2	0.832	0.416	2.963	0.06
Error	53	7.44	0.140		

Summary and Conclusions

I have surveyed burial data from sites belonging to one of the major Chinese Neolithic traditions, from its earliest manifestation to just before the beginning of the Bronze Age, a span of almost three millennia.

As one progresses from early to late sites, the mean number of pottery objects and the percentage of burials possessing ceramics both increase. In addition, the later sites have a wider absolute spread between abundant offerings and sparse offerings than the early sites. With objects other than ceramics, the same pattern of higher means for adzes and other stone tools, jade and other ornaments, pig skulls, deer tusks, and jade beads occurs, at least for the site of Dawenkou. When a coefficient of variation is calculated, and the variation between graves is seen as proportional to the mean, the increase mentioned above is not so dramatic. Nevertheless, there is an increase from sites in the middle period to sites in the late period, and very elaborate graves with abundant offerings become more frequent in the later sites, while they are nonexistent in the earlier sites.

The pattern of distribution of objects among people in different age groups varies between sexes. Both sites from which suitable data were available are in about the middle of the period, the Dadunzi site being slightly later than Liulin. In these sites the mean number for females tended to increase with age, while it dropped off for males. In the upper (Huating) layer of Dadunzi, the mean for males was higher than that for females. In two sites, one slightly earlier than the middle of the time span (Liulin) and one near the end (Dawenkou), there was evidence that some subgroupings in the cemetery were wealthier than others; however, much more analysis is needed to establish this trend. Spindle whorls, which were associated with females in early sites such as Yuduncun, were associated with males in the later site of Dadunzi. Bone artifacts and turtle shells were associated with males. Finally, although children's graves do not differ greatly from others in early sites such as Yuduncun, in later sites such as Dawenkou they are much poorer than those of adults. Multiple burials occur only in later sites. In the Wangyin site there were communal secondary burials, apparently without grave offerings.

The same pattern of sociocultural development can be seen in the stratified site of Caoxieshan, at the southern end of the Qingliangang cultural area, near Shanghai. From layer 8, which has 106 burials of the same date and type as Majiabin (see Table 1), 24 percent had no offerings at all, 24 percent had one object, 37 percent had two, 13 percent had three, 2 percent had four, and one (No. M38) had nine objects. Burial M38 was a female, 25 to 35 years old, buried with

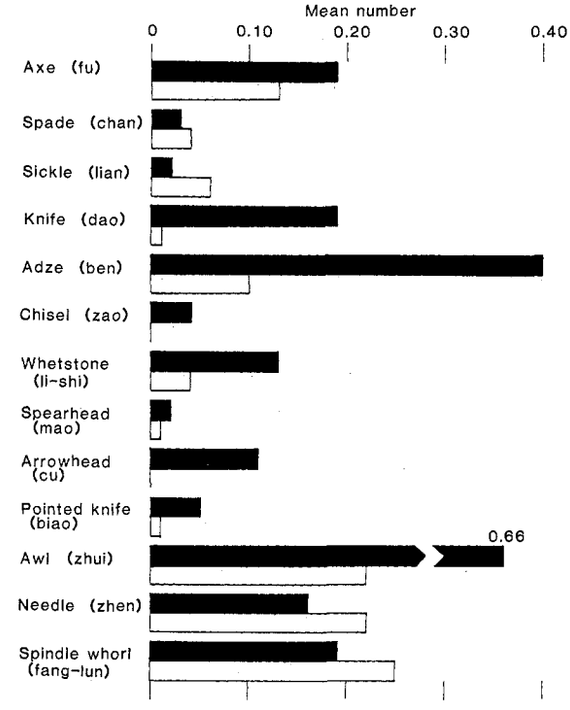

Fig. 2. Mean numbers of tools in graves of males (filled bars) and females (open bars) in graves of the Middle Dawenkou period from the Liulin, Dadunzi, Dawenkou, and Xixiahou sites. Data represent 102 males and 77 females.

two pottery vessels, three bone awls, one stone adze, two antler objects, and a jade ornament. The burials of layers 7 and 6 show an increase in grave goods. In layer 6, which yielded 89 burials thought to be contemporary with Songze, 18 percent had one to five objects and 45 percent had more than six objects. In 25 percent of the graves tools were found, and in 13 percent a semicircular jade ornament was found. The burials of layer 6 were particularly interesting because they were divided into a north and a south group separated by a space of 8 to 12 m. The excavators interpreted these cemetery areas as belonging to two different social groups. In both groups there are double burials of male and female, and luxury items are found with both sexes (*21*).

There appears to be a shift in relative wealth from females to males (Table 6), and there may be emergent differences in one lineage over another—if we accept the postulate that different burials within the cemetery belonged to different lineages. This might be checked by looking for correlations of certain styles of artifacts with certain parts of the cemetery. Dawenkou has empty graves, suggesting that lineage consciousness and ritual demanded funeral ceremonies even for an absent person.

In Dawenkou, however, there is no evidence of violent burial of slaves, which can be seen in Longshan sites where bodies were thrown into a pit, skeletons show postures of people struggling to escape, or heads are separated from bodies and bones scattered (*17*, p. 131).

The communal graves at Wangyin suggest transferral of a lineage from one location to another. The wealth manifested in Dawenkou and Xixiahou suggests the emergence of chiefs. In particular, the latest sites in the sequence show a proliferation of jade objects in a variety of badgelike forms which bear little or no relation to the shapes of utilitarian artifacts. The jade, which must have been imported from long distances, is accompanied in rare cases by pieces of crocodile hide, which must have come from the south. Although there are wealthy graves, they are not completely segregated spatially and there does not seem to be any evidence for a hereditary ruling class.

Wright (*22*), in his analysis of Natufian burials of the eastern Mediterranean, proposed provisional correlations of grave goods with sex and age. Burials of children, infants, and adults in the same location suggest that ranking and subgroup affiliation were present. This can be seen in the Dawenkou cemetery. Grave goods indicating a division of labor between males and females suggest an egalitarian society, whereas grave furniture that cuts across sex lines suggests a ranked society (*22*). The distribution of stone tools in burials of the Middle Dawenkou period (Fig. 2) showed differences between males and females but not complete segregation, except for arrowheads and chisels, which were found only with males. Both males and females possessed stone beads and stone and jade ornaments, suggesting the emergence of ranking.

In very sparsely populated regions, where shifting cultivation is used, women do most of the farm work. In regions of dense population, where cultivation is done by plough, women do little agricultural work. In regions of extensive cultivation on irrigated land, both men and women work hard at cultivation. In the first case, we could expect to find a high incidence of polygyny and polygamy with bride wealth being paid by the future husband and his family. Farming by males is also linked to more complex politics (*23*).

With the development of intensive cultivation, land becomes a scarce and differentiated resource, and women become valued for their ability to produce male offspring, who will be important in cultivation and production. The status of men appears to be at least as great as that of women. For example, the mean number of ceramic grave objects increase in later sites such as the upper (Huating) layer of the Dadunzi site (Table 6). Also, males possessed more tools than females in categories of agriculture, hunting, and maintenance in several sites (Fig. 2). Although the data are equivocal, there seem to be more males with stone ornaments than females from Dawenkou, judging from the small number of cases in which sex could be identified.

The sequence of burial sites in the Chinese coastal Neolithic, leading to Dawenkou, shows increasing wealth and social differentiation and a decline in the status of women and children. However, in Late Dawenkou, at about 2000 B.C., there are still indications of an egalitarian society with a sexual division of labor. The society was gradually changing to one in which males appear to have had power and wealth, and craft specialization was beginning to emerge. Some spatial segregation of burials, into groups of men, women, and children together, suggests the increasing importance of lineage.

The Chinese archeologists and I seem to agree on some, but not all, of the general trends. There appears to be a shift in the relative importance of males and females and a trend toward concentration of wealth. Direct archeological evidence of a shift from matriliny to patriliny, or the presence of slaves, is not clear. The methods by which we reach the conclusions and the reasons for the trends are quite different. From their reports, the Chinese appear to have argued from a general theoretical position, with relatively little detailed analysis. Yet my analysis seems to support some of their statements. I offer different reasons for the trends, linking them to broad changes in subsistence patterns in the manner of ecological anthropology.

References and Notes

1. R. Pearson, in *Origins of Chinese Civilization*, D. Keightley, Ed. (Univ. of California Press, Berkeley, in press); in *Origins of Agriculture and Technology: West or East Asia?* (Scandinavian Institute of Asian Studies, Copenhagen, 1981); K. C. Chang, *The Archaeology of Ancient China* (Yale Univ. Press, New Haven, Conn., 1977), pp. 133–143 and 158–172.
2. Nanjing Museum, *Wen Wu* **4**, 46 (1978).
3. H. Zou, *ibid.* **3**, 64 (1979).
4. X. L. Yu, *ibid.* **8**, 21 (1976).
5. J. C. Qian *et al.*, *ibid.* **12**, 31 (1979).
6. K. F. Wang *et al.*, *Kaogu Xuebao* **1**, 59 (1980).
7. S. Wu, *Kaogu* **4**, 223 (1978).
8. Shandong Cultural Properties Commission, Jinan City Museum, *Dawenkou: Report on the Excavation of a Neolithic Cemetery* (Wen Wu Press, Beijing, 1974), p. 6.
9. Banpo Museum, *Chinese Primitive Society* (Wen Wu Press, Beijing, 1977), p. 7.
10. J. Wei, *Wen Wu* **8**, 2 (1976).
11. Editorial Staff, *Kaogu* **1**, 33 (1979).
12. *A Brief History of Social Development* (Committee from the Department of History, Beijing University, and Beijing Locomotive Factory, 1975).
13. L. Zhong, *Kaogu* **3**, 165 (1976).
14. Data are taken from S. Wu, *ibid.* **4**, 223 (1978) (Yuduncun site); CPAM (Committee for the Preservation of Archaeological Materials), Zhejiang Province, *ibid.* **7**, 345 (1961) (Majiabin site); Nanjing Museum, *Wen Wu* **4**, 46 (1978) (Beiyinyangying site); Nanjing Museum, *Kaogu Xuebao* **2**, 9 (1965) (Liulin site, second excavation); Archaeological Team, Kiangsu Province, *ibid.* **1**, 81 (1961) (Liulin site, first excavation); CPAM, City of Shanghai, *ibid.* **2**, 1 (1962) (Songze site); Nanjing Museum, *ibid.* **2**, 9 (1964) (Dadunzi site); Shantung Provincial Cultural Properties Commission, Jinan Museum (*8*, pp. 136–155) (Dawenkou site); Shantung Archaeological Team, Institute of Archaeology, Chinese Academy of Science, *Kaogu Xuebao* **2**, 57 (1964) (Xixiahou site); Archaeological Team of Linyi County, *Kaogu* **1**, 13 (1975) (Dafanzhuang site).
15. H. H. Zar, *Biostatistical Analysis* (Prentice-Hall, Englewood Cliffs, N.J., 1974), p. 34.
16. N. Gilbert, *Biometrical Interpretation* (Clarendon, Oxford, 1973), p. 58.
17. Data from Z. P. Zhang, *Jilin Daxue Xue-pao* **1**, 93 (1979).
18. K. Luo and Y. S. Zhang, *Zhongguo Shi Yanjiu* (July 1980), p. 125.
19. K. X. Han and Q. F. Pan, *Kaogu* **2**, 185 (1980).
20. Shandong Archaeological Team, Institute of Archaeology, Chinese Academy of Social Science, *ibid.* **1**, 5 (1979).
21. Nanjing Museum, *Wen Wu Ziliao Congkan* **3**, 6 (1980).
22. G. Wright, in *Social Archaeology: Beyond Subsistence and Dating*, C. L. Redman *et al.*, Eds. (Academic Press, New York, 1978), p. 213.
23. E. Boserup, *Woman's Role in Economic Development* (Allen & Unwin, London, 1970), p. 32.

24. I thank Carl Whitney for aid on the statistical portion of this paper. I assume responsibility for errors in calculation and interpretation. Kazue Pearson translated the sections on Chinese Neolithic social evolution. This study was supported by a faculty research grant from the University of British Columbia. The maps and diagrams were drawn by Moira Irvine, Laboratory of Archaeology, University of British Columbia.