Recent Archaeological Discoveries on the Yinxu Xiaomintun Site in Anyang and Related Problems

Wang Xuerong[*1] & He Yuling[*2]

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It was in 1928 that the Yin Ruins (Yinxu) began to be excavated scientifically. During the past 70-odd years archaeologists have carried out some one hundred scientific excavations in various areas of Yinxu. They have revealed the then palace and ancestral temple, royal mausoleum, handicraft workshop and kin graveyard quarters. These vestiges include the palace and ancestral temple area centered on Xiaotun, the royal mausoleum and sacrificial area centered on Xibeigang, the bronze foundry-sites represented by Locus North of Miaopu and Locus West of Xiaomintun, the bone artifact workshops represented by Beixinzhuang and Renjiazhuang, the jade-working places represented by Xiaotun, and the oracle shell and bone stores represented by Locus South of Xiaotun and Locus East of Huayuanzhuang. Within the Yin Ruins that occupy about 30km^2, archaeologists have excavated more than ten thousands of contemporaneous tombs and brought to light quantities of objects, such as bronzes, inscribed oracle shells and bones, jades, bone artifacts and pottery vessels of royal and the common people's use. The discovered vestiges and objects provided direct evidence for studying the social organization and structure, the form of living and technology of production in the Yinxu period.

Xiaomintun is located on the border of the Yin Ruins, and, along with its vicinity, has a good foundation of archaeological work. In the 1950s, the Anyang Archaeological Team, IA, CASS carried out archaeological excavation to the west and north of the village, and discovered weapon molds and other remains related to bronze foundry to the west. In 1969 to 1977, they excavated above 900 Shang tombs and five horse-and-chariot burial pits and over 200 tombs of the Warring States period and after to the south of the village, i.e. in the so-called famous "burial ground of western Yinxu." In 2000, they brought to light molds for casting ritual bronzes and fragments of melting furnaces about 300 m southeast of Xiaomintun Village. In April 2003, according to the idea of the State Administration of Cultural Heritage, with the coordination of the Henan Provincial Bureau of Cultural Relics, the Institute of Archaeology, CASS and the Henan Provincial Institute of Cultural Relics and Archaeology organized jointly our Yinxu Xiaomintun Archaeological Team to carried out archaeological excavation on the Xiaomintun site. We divided the excavation area into the northern and southern areas. The drilling data show that in the northern area, in addition to modern tombs, there is a large spot of ancient cultural remains, which spreads also in the middle part. The recorded vestiges include tombs, ash-pits, cellars and rammed-earth building-foundations. In the southern area, the northern part is main a burial ground, while the southern part is a district of densely distributed tombs, house-foundations, ash-pits and cellars, and pottery molds and other objects concerned with bronze foundry were collected from the ground at many localities.

Based on the results of previous archaeological excavations in the Xiaomintun area, as well as those of a preliminary drilling and the first resurvey, the academic

* *The Institute of Archaeology, Chinese Academy of Social Sciences, Beijing, 100710, China*
1 (Email: wangxr@yahoo.cn)
2 (Email: aystation@yahoo.com.cn)

aims of the present excavation are established as follows. Firstly, bronze foundry vestiges and objects were unearthed at Locus West and Locus Southeast of Xiaomintun, and the present excavation area lies between them, so seeking and extensively revealing the Xiaomintun bronze foundry-site and inquiring into the relationship between the three localities should be taken as the main task. Secondly, the south of the southern excavation area is the already excavated "burial ground of western Yinxu"; on the western and eastern sides of the southern area, excavation also discovered and revealed a number of Shang period tombs, and the two localities were assigned to this burial ground in general terms. Actually the southern excavation area lies in the center of the north of the so-call "burial ground of western Yinxu". Prior to the present excavation, through drillings, approximately 1,000 late Shang tombs were found densely remaining in the excavation area. They must belong to the same burial area as the "burial ground of western Yinxu". The present excavation should make an overall revelation, try the best to clarify the distribution law of cemeteries in the excavation area, and enrich and improve further the understanding related to kin graveyards on the Yin ruins. Thirdly, building-foundations, especially large-sized ones and contemporaneous living vestiges, were seldom discovered within western Yinxu, but results of drilling suggest that large building-foundations exist in both the northern and southern areas, thus it has important academic value to understand their contents and distribution law.

The present excavation covered an area of 60,000m^2 and obtained important academic achievements in many aspects; and, in particular, the overall excavation of late Shang subterraneous building complexes, large-sized-bronze foundry-sites and extensive cemeteries drew great attention from academic circles.

Condition of the Xiaomintun Site

It has been known through excavation that beneath a stratum of cultivated soil is yellow-silt, which covers a Shang cultural layer. This is similar to the stratigraphic deposits revealed in the "western Yinxu" south of Xiaomintun Village. Among the discovered remains, two of the three groups embracing six Longshan period tombs are in rather a good condition. But the Shang rammed-earth building-foundations have been seriously damaged, only a part of foundations and exposed stone plinths were left over from them, and the form and layout of the buildings are discernible. The Shang tombs are all small-sized and have been largely damaged by rubbing. The southern area has been covered by Xiaomintun Village since the Song period, and the villager's production and living badly damaged the site during the thousand-odd years, especially in recent times. Before excavation there were already few ancient cultural deposits, even primary soil was mostly disrupted to a certain extent and to a depth of over one meter, which led to the extensive exposure of ash-pits and tomb-openings on the ground, with ancient cultural relics remaining largely in the lower part of vestiges. Our archaeological team carried out an overall excavation in the middle and southern areas that contain relatively rich remains. The results show that the Shang surface buildings left over only a part of foundations. Semi-subterraneous houses have decreased their original depth, some of them can hardly be discerned except for the indoor floor with traces of stepping, and the outdoor floor has thoroughly gone away. The tombs are all small-sized, and most of the Shang burials were robbed. The ruins of bronze foundries are distributed in the south of the southern area. The floor for human activities has thoroughly gone, and the vestiges related to bronze foundry, such as semi-subterraneous casting-rooms, wells, clay precipitating pits, mold dry-in-the-shade pits, cellars and waste material pits, are largely damaged, their original openings have been destroyed in most cases and only the lower part or even only the bottom remain up to the present.

Shape and Layout of the Semi-subterraneous Building Groups and Their Significance

Altogether 135 groups of house-foundations have been excavated. Of them 131 belong to the Yinxu period, including approximately 100 complexes/sets, or about 200 rooms, of the semi-subterraneous type.

To make a stratigraphic analysis, for an overwhelming majority the semi-subterraineans intrude immature soil and are intruded by ash-pits and tombs of Phases III or IV of Yinxu culture rather than by still earlier remains, so the terminal date of the house-foundations must have been no later than Phase III of the culture. A part of the vestiges yielded roughly intact pottery *li* tripods (greatest in number), *dou* stemmed vessels, *gui* food containers, *etc* from niches or cooking stoves. These remains must be of the time when the houses functioned and must go back to Phase II of Yinxu culture and, for a part of them, even to the late stage of Phase I.

To make an examination of the layout and structure

of house-foundations, apart from those related to bronze foundry, the houses are largely arranged in rows and are multiform in structure. Some houses were rebuilt on large scale, but their building techniques are roughly the same as those of the others. It suggests that the difference of houses in structure and grouping reflects hierarchic diversity rather than temporal disparity. In date the revealed house-foundations should be assigned to Phase II of Yinxu culture except for some remains of the late stage of Phase I.

In spatial distribution, the house-foundations in the northern area are unclear as to their number and distribution owing to the limitation of their condition, the rest are relatively concentrated in three spots of the middle and south of the southern area. The clearly open ground between these groups of houses indicates that they were relatively independent and must have formed three settlements featuring both independency from and close relation with each other. In layout, the houses of every group are arranged in rows on the whole, in picturesque order and roughly in the northwest to southeast direction. The house groups are roughly the same in grouping form, house structure and living furniture, such as the making way of doorways and "earthen beds." The heaps of remains formed by collapse in subterraneans suggest that the walls were built of rammed-earth, straw-mixed clay and adobe.

Among the three groups of houses in the southern area, the southern two were seriously damaged for the sake of bronze foundry. The northern one is relatively good in condition, the layout remains rather clear, and the subterraneans total 70 rooms in 27 complexes. Its building features can be summed up as follows.

1) Concentration in distribution and rowing in good order. The rows stretch from south to north. Of them eight are better preserved. They are arranged at an interval of 8–10 m between each other. Certain dislocation was made for the convenience of ventilation.

2) Well-designed structure and rational layout. Every house complex constitutes a relatively independent unit. They are varied in structure, falling into the single- double- triple- and tetrad-roomed types (quintuple-roomed occurred in other groups of houses). Their combination is also multiform, in the "口", "吕", "品" or "十" -shaped pattern, with the doorway generally in the south or east of the building. The single-roomed houses are square or rectangular, and the multi-roomed are linked by passages. In design, great attention was put on the hall or entrance hall, which combined the rooms into an organic whole. To borrow modern architectural terms, these building complexes can be called single-room and single-, double- and triple-room single-hall houses respectively.

3) Rather good preservation, satisfactory function and manifold cooking ways. A number of houses are furnished with round or square pits at the inner end or on a side of the doorway, which must have been for retaining water so as to prevent the indoor floor from being soaked by the rain-water flowing from outside. A part of the houses have niches (some containing pottery or bone objects for the southern two groups). Apart from the entrance hall, the rooms are largely furnished with platforms, which are of immature or mellow soil, about 1m wide and 10–15cm high above the indoor floor, and must have been beds for sleeping. Most of the houses have stoves (or remains of fire-using) varied in number and rather good in condition. These fall into four types. The first type is cooking ranges, which are largely in a corner or nearby. They are scooped out in a wall and are more complex in structure, consisting of a fireplace, a heat channel, a flue, and a cooking vessel fixed above the fireplace. The second type is simple fireplaces, irregular in position and mostly in the form of an oval shallow pit hollowed on the floor, which may have been used in association with pottery *li*, *yan* steamer and other cooking tripods. The third type comprises mainly niche-shaped fireplaces with the bottom close to or below the indoor floor and with the chief function to heat the room or keep live cinders. A number of these fireplaces are added with second-type stoves and thus have multiple functions, including heating, live cinder keeping and cooking. Another variant is the combination of a niche and an earthen enclosure. It consists of a niche-shaped half in a wall and the other one is made outside the wall and enclosed with a straw-mixed-clay or rammed-earth protection. A few stoves in this type are furnished with second-type fireplaces. The fourth type embraces heaping fireplaces made on a wall with the other three sides built of straw-mixed clay. In addition, there are cooking ranges exclusively for food preparing. It shows that the dwellers had multiform cooking manners and rather rich diet. Moreover, apart from cooking vessels, daily utensils and waste material were discovered in some rooms. For example, oracle tortoise abdominal shells were yielded from two houses, and animal bones were quite often unearthed from house-foundations (eight bone hairpins are placed in order in the niche near an earthen bed of Room F102-3 in the southernmost group).

4) Clear hierarchical distinction. The houses belong-

ing to the double-room single-hall type come first in number, accounting for about a half of the total. Three complexes are of the triple-room single-hall type; two of them are variants of the former type, and only the other one conforms this term in the strict sense (their rooms are combined in two styles, i.e. the entrance hall leading either to the three rooms respectively or only to two of them with the third one as the innermost room). Single-room houses were discovered only two. The rest are all single-room single-hall houses. The combining style and size of the complexes and their location in the house group reflect to a certain extent the hierarchy of the village. The standard triple-room single-hall house is situated right at the center, occupying a row, whereas the two variants are located in the south and north of the village. The main body of the villagers was the common people living in the double- and single-room single-hall houses. The dwellers of the triple-room single-hall houses were higher in status, and those of the standard triple-room single-hall house obviously held the highest position in the village.

5) In the house group and its vicinity, within radium of several hundred square meters, excavation revealed almost no cellars and rubbish heaps contemporaneous with the house-foundations. The discovery of these house-foundations has great significance to the study of Shang history and archaeology. Semi-subterraneans were scarcely recorded in the past excavations of the Yin Ruins, and our knowledge of them could not be deepened owing to shortage of data. The semi-subterraneous house-foundations revealed this time fall roughly into three areas of relatively concentrated distribution for each area. The houses within every area are arranged at proper intervals and distributed in certain order. Meanwhile, these houses are manifold in form. It is the first time that Shang period archaeology has discovered semi-subterraneous buildings concentrated in villages. In the early Shang period represented by the Shang city-sites at Yanshi and Zhengzhou, single- and multi-room surface buildings are seen very often as the main stream on common settlement-sites; semi-subterraneans occur seldom; and their multi-room version is still more scarcely encountered. Compared with surface buildings, semi-subterraneans may have been a symbol of backwardness. Put on the historical background that surface buildings already prevailed in the Central Plains, they seem extremely incompatible with the whole picture, which, however, may be just a reflection of their special meaning. The discovery of the semi-subterraneans on the Yin Ruins put forward new research subjects, i.e. who and why did live there and what was their social position? These houses were furnished with all kinds of basic facilities and could perform any basic functions in daily life. There was everything needed: either multiform cooking pits, fireplaces and niches or pottery *li*, *dou*, *yan*, *gui*, cooking vessels, bone hairpins and various meats (as known from the unearthed animal bones), which evidence that these buildings must have been the then villagers' dwellings. Nevertheless, in comparison with the then surface buildings that were very perfect technologically and rather great in scale for that time, the semi-subterraneans, small in size and relatively simple in facility, look especially humble and can be inferred to have been lower-level people's dwelling places. Despite this community's poor condition on the whole, still its interior hierarchic difference can be seen to a certain extent.

The overall excavation of the southern Xiaomintun site, with its approximately one hundred building complexes embracing several hundred semi-subterraneans completely revealed, provided directly perceived knowledge on the condition of dwelling, the mode of living, the level of production and living and the composition of diet. In the history of Xia, Shang and Zhou archaeology, these ruins of dwellings constitute another great discovery and extensive revelation following the Shang period Gaocheng Taixi site in Hebei, and its academic significance went beyond the scope of Yinxu culture. Previously, owing to the shortage of evidence, scholars paid most attention to palace buildings, aristocratic life and the hierarchy they reflect rather than to the lower-status common people's living condition. The results of the present excavation of semi-subterraneans show figuratively and directly living scenes of the common people in the periphery of the late Shang capital. Although the houses are small-sized, their layout and design show rich flavor of life. This formed a sharp contrast with the life in the palace buildings large in scale and strict in institution, and provided completely new scientific data for the study of Shang society at still deeper and still more levels.

Discovery of the Large-sized-bronze Foundry-site and Its Significance

Another important result of the present excavation is the revelation of a large-sized-bronze foundry-site. Judging by the distribution scope of the remains of the bronze foundry-site, the archaeological finds in the vicinity and

previously unearthed data, it can be said that the site and the traces it concerns have been completely excavated on the whole. The site is distributed in a long narrow zone stretching from northwest to southeast, covering an area of approximately 40,000m^2 with a length of about 380m from the west to the east and a width of about 100m from the north to the south. It functioned for rather a long time and flourished in Phases III and IV of the Yin culture.

The related vestiges include mainly clay supplying, precipitating, refining and storing pits, mold drying-in-the-shade pits, large-sized-bronze casting rooms, a "casting platform," sacrificial pits, cellars, wells, cemeteries and ash-pits. Some rammed-earth foundations corresponding to the site in date might also be concerned with bronze foundry.

Casting rooms with sectional molds were discovered at least two, both in semi-subterraneous houses. Of them F43 is better in condition. In its center is a roughly complete base of the mold core left over after the repeated casting and taking away of large-sized round bronze vessels. The casts must have been round *ding*, mouth diameter exceeding 1.54m. In the other casting room, the earth filling yielded a clay *ding* leg mold abandoned before use, which measures approximately 20cm in maximum diameter and about 40cm in remaining height, and bears *tao-tie* motif in relief in the upper part. Mold clay preparing pit was found one. It keeps on the bottom a lot of lumps of immature soil, which vary in size and shape and contain traces of fine sand. Mold clay precipitating pits were revealed two, both storing very pure clay. Clay refining pits were seen two, also containing rather pure clay, with footprints as traces of repeated stepping in the refining process remaining in one pit, on the surface of the clay heap. Mold-drying-in-the-shade pits were discovered four: two square and two rounds, all with charcoal layers on the bottom. The sacrificial pits are quite a lot and contain remains of human, horse, ox, pig and dog victims. The tombs discovered within the bronze foundry-site include several dozen burials in two groups, all orienting to the north and south, with the tomb-owner's head pointing to the south, and the grave goods consisting mainly of pottery *li*, along with pottery blow pipes, small bronze knives and other bronze foundry implements in some cases, which show features distinct from other burials. These tombs must have been related to the bronze foundry-site, even just bronze founders' burials. Besides, there must have been melting furnaces between the two casting places, although the location of original furnaces were not found owing to the ground surface damage in later times. The pits of waste material located on the northern and southern sides and occupying an area of several hundred square meters feature a north-to-south inclination for the heap in the southern pit and a reverse inclination for that in the northern one. Obviously these heaps resulted from the dumping of waste material from the middle to the two sides, which is also evidenced by the unearthed fragments of damaged and abandoned furnaces that were largely discovered in the two heaps.

The objects remaining of bronze foundry can be roughly classified into bronze melting, bronze casting, cast retouching and miscellaneous implements. Referring to the smelting area of the Ruichang Tongling site with several meters thick heaps of slag and fragments of smelting furnaces, the absence of slag heaps at Xiaomintun indicates that the furnaces on this site were for melting. There were two types of melting furnaces: ring-built and mud-piled. Of them the larger-sized can be estimated to have a diameter of 1–1.4m as reconstructed according to the curvature of remaining fragments of furnace walls. The casting implements fall into models, molds and cores. The models are mono-block or sectional, mostly for casting accessories, such as animal heads, handles, ears and caps, and partly for the bodies of *ding*, *gu*, *you* swing-handled pots, *gong* wine containers and other vessels; and those for casting spearheads occur in a small number. The unearthed mold fragments number approximately 70,000 pieces, largely for casting vessels and partly for weapons, tools and horse-and-chariot trappings. Among the discernible vessel molds are those for casting *ding*, *yan*, *gui*, *bu* liquid containers, *zun* vases, *lei* pots, *you*, *fangyu* square vessels, *gu* cups, *jue* three-legged cups, *jia* tripods, *zhi* ring-foot cups, *gong* wine containers, *he* tripods, *dou* wine vessels, dishes, lids and stands, with the round *ding*, *gu* and *jue* models coming first in number and the *gui*, *you* and *lei* molds next. The vessel molds bear gorgeous decorations skillful and exquisite in carving workmanship, such as animal-mask, *kui*-dragon, cloud-and-thunder, thunder, lozenge thunder, interlaced thunder, cloud, interlaced cloud, triangular, nipple, lozenge nipple, bowstring, strung-beads, round whorl, straight edge, dragon, serpent, phoenix, cicada, triangular cicada and elephant designs. A part of pottery molds bear inscriptions. The tool molds include those for knives, *xiao* small knives and adzes; the weapons molds are all for casting arrowheads; and the horse-and-chariot

trapping molds are all for making button-shaped ornaments. The cores fall into open and "blind," the former occurring far more frequently as the latter were left in the end products after casting. An overwhelming majority of cores are for vessels of the *ding*, *lei*, *you*, *gu*, *jue*, dish and some other types, and a few for weapons, largely spearheads. Those for button-shaped ornaments were also encountered in some cases. Generally the cores have no designs except for some decorated ones, such as those for casting dishes. The retouching implements include polishing stones, pottery-making paddles, *xiao* small bronze knives, bronze cutting needles and bone awls. The other finds, such as the pottery pipes and "helmet" -shaped objects, burnt clay lumps, charcoal, *etc*. can be gathered into the miscellaneous class.

Taking into account some phenomena that came into our view or mind during the excavation, we made a simulated test by structuring pottery-making kilns on the spot so as to inquire into the selection of raw clay, the standard of proper clay and the making of designs. It has been preliminarily proved that the pottery models and molds were made of the material obtained from the local immature soil buried in a depth of about 2.5–3m by selecting a sort of rather pure clay with a certain amount of fine sand. The clay for making all molds and the models to be carved carefully should be refined first by precipitating and then by repeatedly kneading. For the gorgeously decorated molds, the main designs in thick lines may have been first made on models and then copied onto the molds, and the fine gorgeous ground patterns must have been finished by secondarily retouching.

The excavation of the bronze foundry-site made a new breakthrough for the solution of previously outstanding questions. It enriched our knowledge of the links of the then bronze foundry technology, gave us a new understanding of the whole process of bronze foundry in the Shang period, including the making of molds and cores to the casting of bronzes, and provided abundant data for further studying the bronze-foundry handicraft of the Shang Dynasty in the Yinxu period. Similar sites of this period have also been discovered at other localities within Yinxu, such as Locus North of Miaopu, where a bronze foundry-site functioned for a longer time, from Phase I to Phase IV of the Yinxu culture. The Xiaomintun bronze foundry-site excavated this time lasted from Phase III to the late stage of Phase IV of the culture. In scope, combining the foundry-site under discussion with those at Locus West and Locus Southeast of Xiaomintun, the Xiaomintun bronze foundry-site complex covers an area of 50,000m^2 in total, far larger than the bronze foundry-site at Locus North of Miaopu, and comes first in size in the same type of site known so far in Shang archaeology. Excavation shows that by Phase III of Yinxu culture, as the Shang Dynasty's requirement of bronzes had further increased, which led to the building of new bronze foundries, the Xiaomintun bronze foundry complex emerged as the times required. The remains of large-sized ritual bronze casting revealed this time are incomparable among the previous findings. Of them a round core base reaches 1.54m in diameter, suggesting that ritual bronzes cast at that time must have been extremely huge, far exceeding the famous Si Mu Wu *ding* tetrapod, which well demonstrates the level of the then bronze-making technology. Moreover, the discovery of very large models for *ding* legs and inscribed molds provided data for solving previously outstanding problems, such as the methods of making models, carving designs and adding inscriptions. Various signs indicate that the Xiaomintun bronze foundry complex was an important handicraft workshop producing ritual bronzes for the House of Shang in the third to late fourth phases of the Yinxu culture. The discovery and excavation of this bronze foundry-site not only further enriched our knowledge of the cultural contents of western Yinxu, but also changed academic circles' traditional notion of this area and enhanced their understanding of the important position of western Yinxu in the social, political and economic spheres of the late Shang period.

Excavation of Large Shang Cemeteries and Its Significance

The present excavation revealed over 1,200 tombs, which cover the time from the Shang to the Ming-and-Qing period. Of them the Shang tombs number approximately 1,000, mostly belonging to phases III and IV of the Yinxu culture, and a few to Phases I and II. The tomb furniture includes wooden chambers and coffins, mats and leather coverings, along with pottery *gu* and *jue* as the most common funeral objects. These burials are roughly concentrated in seven areas, which must be at least seven kin graveyards. Of them the one consisting of about 200 tombs is located in the north of the northern excavation area, while the other six cemeteries with about 800 tombs are distributed in the southern area. About one hundred meters south of the southern excavation area is the famous burial ground of western Yinxu excavated in 1969–1977, which along with the six cemeteries should be assigned to a still larger burial area. Within

the same cemetery, the tombs are often rather straightly rowed in twos or threes at a close interval, even so close that mutual intrusion emerged in some cases. A part of the rows are formed of an earlier burial and a later one, the latter pit was expanded aside so as to prevent the former from being further intruded. A group of burials is formed even by building above-tomb structure, i.e. first building a rammed-earth structure above an earlier tomb-pit, then digging a later tomb-pit in the structure to form a side-by-side arrangement with the former, and finally building again a rammed-earth structure at the top of the latter. The larger cemeteries are usually formed of several tomb rows, each embracing a single or several graves.

A new finding in the Shang Xiaomintun cemetery complex is stake holes in the bottom of tombs. They are generally round, 2–3cm in diameter, and 5–20cm in depth beneath the surface of the immature-soil bottom, and occur usually in twos, fours, sixes, eights, tens or twelves. These holes are made on the four sides of the tomb bottom, somewhat apart from the pit wall and in a symmetrical arrangement. They are mostly discovered in chamber-furnished tombs, near the chamber walls. Obviously the stake holes are closely related to the tomb chamber. Excavation results indicate that the chambers of Shang Xiaomintun tombs are usually made of logs or half-logs; beams were used only atop the chamber walls occasionally. As logs or half-logs can hardly be piled up in a wall without supports, these holes must be the remains of the supporting stakes used in the building course of timber chamber walls.

The excavation of the tombs enriched our understanding on the burial course of Shang period single-coffin single-chamber tombs. When a tomb pit had been dug, the next works were carried out as follows: 1) Burying a dog in the waist pit with the head pointing to the direction opposite to the tomb-owner's, sometimes in association with broken funeral objects. 2) Building the chamber bottom by paving the pit bottom with timber, generally logs 8–12cm in diameter and occasionally planks, which are laid side-by-side lengthways. They are usually as long as the pit bottom with narrow gaps left on the two sides and are combined in an odd number, such as seven, nine or eleven. 3) Building the chamber walls. 4) Putting a lacquered coffin in the chamber. 5) Placing funeral objects between the chamber and the coffin. 6) Covering the chamber, generally with timber similar to that for the chamber bottom. The logs or planks are laid side-by-side transversely, occasionally with gaps left between each other. 7) Covering the chamber top with a geographic-design-painted textile or/and a mat, which are often fixed to the top for keeping their even and spread state. 8) Disposing funeral objects. 9) Refilling and ramming the soil layer on layer and burying a dog upon the soil layers reaching certain thickness. 10) Continuing to refill and ram the soil.

The burial ground in western Yinxu the Institute of Archaeology, CASS excavated in 1969 to 1977 is so far the typical evidence for studying Shang period kin graveyards and their burial institution. Due to the limitation of its condition, it was impossible to be revealed completely, and the relationship between the excavated parts could not be clarified. Presently, as the Xiaomintun cemeteries have been extensively revealed and the relationship between the tombs has been known, we have got excellent data for re-understanding kin graveyards of the Yinxu period. There are four aspects of favorable conditions. Firstly, the total of the excavated tombs exceeds the previously revealed, and, as the excavation is carried out in an overall way, few tombs can be left beyond its coverage. Secondly, the tombs fall roughly into seven cemeteries, the relationship between which has been clarified, and six cemeteries of which are relatively concentrated in the southern excavation area, whereas the other one comprises over 200 graves and spreads widely as a large-sized burial ground with no other cemeteries existing between it and the southern cemeteries. Meanwhile, the southern six cemeteries show certain independence, and between them are also no other cemeteries. Thirdly, the burial ground of western Yinxu in the broad sense refers mainly to the 1,800-odd-tomb Shang period cemetery located in the east of the territory of Anyang Iron and Steel Company and discovered in 1969 to 1985. It falls into ten burial cemeteries. At Xiaomintun, the cemeteries in the northern excavation area close to the burial ground of western Yinxu, while the one in the south is surrounded by the burial ground of western Yinxu in the broad sense. Therefore as a whole, the Xiaomintun tombs and the burial ground of western Yinxu should be assigned to the same still larger burial area. The previously excavated ten cemeteries in western Yinxu are linked together with each other, forming an extensive burial area. Fourthly, the tombs excavated this time and those previously revealed in the burial ground of western Yinxu are roughly the same in date and both relatively lower in burial scale and rank, and no higher-rank graves with tomb-passages were found among them.

A Discussion of Related Problems

1. The formation course of the Yinxu culture remains at Xiaomintun. The relevant brief reports so far published brought us preliminary knowledge of the cultural remains of Yinxu period on the Xiaomintun site. Owing to the limitation of space, they contain no account on the unearthed ash-pits, wells and objects, which belong largely to Phases III and IV of Yinxu culture. But the historical evolution of these remains can already be outlined on the basis of available material.

Geographically the northern and southern areas of Xiaomintun site are both close to the Huanhe River, lying in an abruptly turning zone, where the river runs successively southeastward and southward from the north of the northern area to the east of the southern area, and then turns again southeastward on the northeastern side of the bronze foundry-site. The northern area is opposite to the Yinxu royal mausoleum area at Houjiazhuang across the river, on the western and eastern banks respectively, and the bronze foundry-site in the south of the southern area is located less than 200m apart from the bronze foundry-site at Locus Southeast of Xiaomintun that adjoins the southern bank of Huanhe and was previously excavated.

For the late stage of Phase I of Yinxu culture, excavation revealed on the Xiaomintun site an urn burial with the coffin formed of two pottery *yan*, two *li* and a broken *li*, of which the *li* are typical of this phase. A few semi-subterraneous houses had been built by that time. In phase II of the culture, this type of house was built and used in a great number; their abandonment was also in this period. Tombs of the late second phase were excavated in a small number in both the southern and northern areas. But it is puzzling and worthy of inquiry that contemporaneous ash-pits and other remains have not been discovered along with the semi-subterraneans. In Phases III and IV, there still existed a small number of semi-subterraneans, which, as a noticeable matter, were concerned with bronze foundry workshops. In the light of the fact that the revealed at least two bronze casting rooms are both semi-subterraneans, all the semi-subterraneans discovered in bronze foundry-workshops can be affirmed to have been large-sized-bronze casting places, i.e. roughly identical with their counterparts recorded at Locus North of Miaopu. This notion, however, should not be used to sum up the nature of all semi-subterraneans of the two phases. Meanwhile, excavation brought to light on the bronze foundry-site a number of rammed-earth house-foundations, which may represent buildings related to bronze foundry but used for operations other than casting. In the two periods, this district functioned as the most important bronze foundry area of the Shang Dynasty. The discovery of substantial bronze foundry vestiges and remaining objects suggest that this area produced quantities of ritual bronzes to meet the ruling class's requirements. Besides, in the foundry area and its periphery, excavation revealed numbers of tombs and remains of living. Especially a little to the north of the middle of the northern area, although semi-subterranean of Phase II was found only one due to the limited coverage of excavation, in addition to tombs, ash-pits and sacrificial pits of Phases III and IV were discovered in quantities. As for other vestiges of buildings, although large-sized rammed-earth house-foundations were dug out in several spots, as they have been badly damaged, their relationship with the contemporaneous remains in the southern area calls for further research.

2. Distribution, layout and nature of the Shang period villages at Xiaomintun. The semi-subterraneous building foundations fall roughly into three groups at an interval of approximately 100m between each other, each maybe representing a village. To the east of the south of the southern area, along the southern bank of Huanhe River, excavators also discovered some semi-subterraneans, which, however, a little differ from each other in structure and are scattered in distribution, and so should not be assigned to the same group. In the middle and north of the northern area, semi-subterraneans were also brought to light in some odd spots. They are identical with those of the southern area in date and structure, but, lying nearly 500m apart from the latter, they must have belonged to another building group. Thus it can be preliminarily determined that during the second phase of Yinxu culture, there was a dense distribution of villages or houses at Xiaomintun that accommodated a large population. But owing to the limited coverage of the excavation, their distribution and interrelationship in a still wider district, including Xiaomintun and its periphery, cannot be clarified for the time being.

Judged by the structure and scale of the house-foundations, there existed hierarchic difference in the villages, which is reflected, for example, from the discovery of exquisitely made bone hairpins in a niche of a higher-grade large house. In the Xiaomintun cemeter-

ies excavated this time, some tombs date from Phase II of Yinxu culture, while an overwhelming majority from Phases III and IV. In the western area of Yinxu, "of the 939 tombs excavated in 1969 to 1977, the datable number 697, of which 74 belong to the second phase." The two groups are quite similar in chronological composition, with graves of Phase II occur lesser in both cases. There seems a clear quantitative difference between the tombs and the village populations. Moreover, as early as the early Shang period, small-sized simple-structured surface buildings became common in the central Plains, whereas semi-subterraneans were lesser in that region. Compared with the latter, the former must be a sign of improvement in living condition. The small-sized surface buildings of the early Shang period are furnished with walls of the wattle and daub type, which, in comparison with rammed-earth walls, permitted to use man-hours sparingly, and so was also an indication of the advance of building technology. Nevertheless, the dwelling houses of Yinxu II dug out at Xiaomintun in a great number are not only built in the semi-subterraneous style but also partly furnished with rammed-earth walls, which reflects clearly a sort of retrogression. Just in the same place, the houses dating from the third and fourth phases of Yinxu culture were commonly structured in the surface building style. What was the cause? It is probably that the semi-subterraneous building groups discovered at Xiaomintun were villages of residents of some special status or occupation.

3. Layout of the bronze foundry-site and technological process. Compared with the bronze foundry-site at Locus North of Miaopu, the Xiaomintun foundry-site features a series of newly discovered traces. There are vestiges of clay-supplying, -precipitating, -refining and -storing pits, mold-drying-in-the-shade pits, large-sized-bronze casting rooms and a "casting platform," sacrificial pits, wells and cellars. Of them clay-supplying, -precipitating, -refining and -storing pits and mold-drying ones are unknown at Miaopu. On the other hand, the mold-baking kiln and the spots of burnt clay and powdered lime concretions discovered at Miaopu have no counterparts on the Xiaomintun site. The comparison of the two bronze foundry-sites much contributes to the reconstruction of the then bronze foundry technological process. But as the cultural layers of the Xiaomintun foundry-site have been destroyed on the whole and the original floor of activities has gone away, some questions still remain unsolved after the present excavation. For example, where were the pottery mold and core making and baking places? Although the furnaces can be roughly located in the light of the ash-pits yielding fragments of furnace walls, we remain unable to find out how the melting furnaces were used in the foundry process, how the bronzes were cast, and how and where they were retouched at the later stage. Without stratigraphic evidence, all vestiges occur at the same level with the cemeteries and bronze foundry remains distributed in an interlocking pattern. Thus which of the sacrificial traces are concerned with bronze foundry and which are left over from cemeteries? Such problems all call for careful judgment, and some of them are really difficult to solve.

4. On the cultural elements from the outside. The present paper does not report the ash-pits, wells and other vestiges of living as well as the massive pottery objects brought to light in the excavation, but in the preliminary systematization of these data we discovered exterior cultural elements coming from the outside of the Yinxu culture. We put this problem forward so that scholars will pay sufficient attention to it and research jointly into it. Previously in a good many articles and monographs and especially in archaeological excavations round the domain of the Shang Dynasty, a lot of scholars pointed out the influence of the Yinxu culture upon those existing in its periphery, but the influence of the latter on the former was seldom specially discussed in their studies. Actually, simultaneously with its strong influence on the peripheral cultures, the Yinxu culture was also under the influence of the latter. A proper indication was discovered just in the present excavation at Xiaomintun. According to the results of a preliminary analysis, exterior pottery objects were often unearthed in association with those typical of the Yinxu culture, which plays a key role in their dating. Their style suggests that they share a series of features with their counterparts among the contemporaneous cultural remains of Taigu Baiyan and Fenyang Xinghua Village of Shanxi and in the Zhukaigou culture within Inner Mongolia. Moreover, some objects show simultaneously features characteristic of either the local Yinxu culture or exotic cultures. Evidently these pottery objects are local products of Yinxu. To clarify their makers and users will play a certain role in researching into many problems related to the Yinxu period, including the relationship of the Shag Dynasty with local states and feoffs. The specific solution of these problems awaits an all-round systematization of relevant data.

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