Special Section

'Archaeology of State Formation in Early China'

Archaeological Indicators for Chinese Early States: A Case Study of Taosi in Shanxi

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ABSTRACT

The Chinese archaeologists have researched cities and capitals of historic periods for several decades. They have established a methodology for capital site archaeology that focuses on the micro-settlement patterns of the capital of a certain kingdom or dynasty. As a primary center of a monarchy or kingdom, the capital might be formed with a set of principal features such as palaces, royal tombs, monumental buildings including ceremonial constructions, executive storage areas, executive craft manufacturing zones, common residences, and fortifications (such as walls/ramparts and moats). The author of the present article believes that the diagnostic features of capital cities identified through Chinese capital site archaeological theory can also serve as archaeological indicators for early states in prehistoric China. Over the past three decades, archaeological work at the site of Taosi has yielded remarkable evidence from studies of settlement organization and cognitive archaeology that can be used to demonstrate where and when the early states formed in China.

PREFACE

In Chinese historical documents, Guo (國;国) which is usually translated into English as 'state,' originally meant a city or town fortified by arms and enclosures. The term has ambiguous connotations in English, and could refer to castles, capitals, or state-level political organization. In this paper, I discuss early state societies, but will not modify the meaning of

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the Chinese 'Guo' to fit a definition of 'state' in Western terms. I focus on the site of Taosi in Shanxi Province (ca. 2,400–1,900 BC), which has featured prominently in debates over early state formation in ancient China. Taosi, which covers an area of over 3 million square meters and contains complex features of funeral hierarchy (Gao Wei, Gao Tianlin, and Zhang Dahai 1983: 531–536), has been considered as headquarters of some tribal alliance (Li Min 1985: 34–38, 5), or a highly developed chiefdom (Hou Yi 2004: 13–19), but archaeological evidence from Taosi more and more prominently indicates that we might be dealing here with a capital of a proto-state.

During the past several decades, hundreds of definitions of early states have been proposed by social anthropologists, ethnographers, and historians from diverse theoretical backgrounds (Gordon Childe 1936; Earle 1994: 945; Claessen 1996: 1255; Marcus and Feinman 1998: 4; Elwert 1999: 352; Ember and Ember 1999: 226–229, 242). It is impossible to categorize them into a single synthetic definition. However, the early state can generally be characterized as having two prominent attributes: (a) stratification, and (b) authority or the structure of government itself (Berent 2004: 365–366). According to Marxist theory, particularly stressed by Engels in his famous work 'Origins of the Family, Private Property and the State' (Engels 1884 [1972]), the social stratification of early states was manifested as social classes, hence a state can be identified with the ruling class or be considered as dominated by the ruling class (Berent 2004: 366).

Some Chinese scholars (most of them are historians) have also laid out their perspectives about how these ideas apply to early states in China by examining historical literature and archaeological data. Yi Jianping analyzed the definition of early states provided by Claessen, alerting us that early Chinese states represent only one aspect of state development, and that states can exist in any era, be it archaic, medieval, or modern (Yi Jianping 2012: 4–7). Xie Weiyang and Chen Chun view the Taosi Culture in Shanxi Province as a chiefdom-level society parallel to the period of the sage kings Yao, Shun, and Yu in Chinese historical literature, with the first states not emerging until the subsequent Xia, Shang, and Zhou Dynasties (Xie Weiyang 1996; Chen Chun 2007). Wang Zhenzhong argues that social classes and coercive authorities are key markers of state formation. He regards the Taosi Culture as a Bangguo 邦国 (city-state), and the Xia, Shang, and Zhou Dynasties as kingdoms (Wang Zhenzhong 2013: 56–68).

Unfortunately, archaeologists all over the world find it challenging to identify the diagnostic differences between ranks, rich-poor segregation, and social classes in practice. The kinds of archaeological data that can be used to indicate the existence of coercive power, bureaucracy, and administration are also debated. It is clear that archaeologists cannot directly adopt definitions of state societies provided by social anthropologists or ethnographers and historians.

Renfrew proposes a number of striking archaeological criteria that can be used to identify ancient states. He suggests that chiefdoms and state societies (I emphasize the state) could be identified as having a primary center or even a capital site. Written records, such as inscriptions of the names of central cities or even local folklore and legends, might be helpful in identifying these sites. The discovery of artefacts indicating the presence of elites and administration also contributes to the identification of states. Standardized constructions such as palaces, temples, and luxurious tombs are evidence of social authority and hierarchy. A unified system of weights and measures may also indicate the administrative relationship between the central site and its subordinate settlements. Moreover, storage facilities would be used for governmental taxation and redistribution (Renfrew and Bahn 1991: 182–194).

The Chinese archaeologists have researched cities and capitals of historic periods for several decades. They have established a methodology for capital site archaeology that focuses on the micro-settlement patterns of the capital of a certain kingdom or dynasty. As a primary center of a monarchy or kingdom, the capital might be formed with a set of principal features such as palaces, royal tombs, monumental buildings including ceremonial constructions, executive storage areas, executive craft manufacturing zones, common residences, and fortifications (such as walls/ramparts and moats). The features identified by Chinese capital site archaeological theory appear surprisingly parallel to what Renfrew proposed for the archaeological characteristics of state societies. As Renfrew pointed out, 'the presence of a "highest-order" center, such as the capital city of an independent state, can best be inferred from direct indications of central organization, on a scale not exceeded elsewhere, and comparable with that of other highest-order centers of equivalent states' (Renfrew 1991: 185).

Therefore, I believe that the diagnostic features of capital cities identified through Chinese capital site archaeological theory can also serve as archaeological indicators for early states in prehistoric China (He Nu 2009: 3–58). In addition to settlement patterns and other archaeological data, I also believe that special ideological and cosmological features at Taosi indicate the presence of a state-level society.

Over the past three decades, archaeological work at the site of Taosi has yielded remarkable evidence from studies of settlement organization and cognitive archaeology that can be used to demonstrate where and when the early states formed in China.

I. MICRO-SETTLEMENT PATTERNS AT TAOSI

Taosi is located 7 km northeast of the town of Xiangfen County in the southern part of Shanxi Province. The site covers an area over three square kilometers. From 1978 to 1987, the Institute of Archaeology of CASS ex-

cavated Taosi in an attempt to locate the early capital of the Xia Dynasty. Based on a statement in historical documents that southern Shanxi was once called the 'Ruins of Xia,' many believed that this area likely served as the capital of the Xia Dynasty in the early days of the dynasty (Shanxi Team of Archaeology Institute of CASS & Linfen Cultural Bureau of Shanxi 1980, 1983, 1984, 1986). Archaeologists discovered a commoner's residential area and a huge royal cemetery, where over 1,000 burials were recovered (Fig. 1). Six large tombs were attributed to chiefs or monarchs and contained assemblages of furniture and artifacts (more than 100 in each tomb; Fig. 2) such as ceramic plates painted with dragon designs, ceramic drums, wooden drums covered in crocodile skin, large chime stones, jade axes, and colorful lacquerwares. Many of these artifacts were symbols of authority. In contrast, over 95 per cent of small graves contained no grave goods. There were also 40 middle-sized tombs of aristocrats that contained several dozen artifacts each. The three-tiered burial hierarchy not only suggests that social stratification or even classes had been formed at Taosi, but also that Taosi might have worked as the central town of a polity. It was still uncertain, nevertheless, whether Taosi had acted as the capital of a state society or a dynasty.

Fig. 1-1. View of the Royal Cemetery

Fig. 1-2. Monarch's Tomb of the Early Taosi period

Taosi is located on loess terraces on the western side of the Chongshan Mountain (commonly referred to as Ta'ershan), facing to the Fenhe River. One of the fruitful outcomes of archaeological work on Taosi in the last century was the discovery of Taosi Culture and its chronology. The detailed periodization of Taosi Culture is as follows:

– Early Taosi period: 2,400 to 2,100 BC
– Middle Taosi period: 2,100 to 2,000 BC
– Late Taosi period: 2,000 to 1,900 BC.

With consideration of the Taosi Culture chronology and the realization that wealth conflict could be clearly seen within the royal cemetery (Gao Wei, Gao Tianlin, and Zhang Dahai 1983), from 1999 to 2014 we conducted successive fieldwork at Taosi to search for archaeological evidence for palaces, mausoleums, altars, shrines, and city walls. The research was organized and financed as part of the Origins of Chinese Civilization Project. Within the last 14 years, we have explored over 6,000 square meters, and recovered some significant archaeological evidence.

Fig. 2-1. Jadeware Cong

Fig. 2-2. Painted Vase

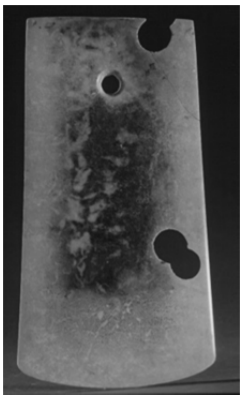

Fig. 2-3. Jade Axe

Fig. 2-4. Painted Bowl with Dragon Design

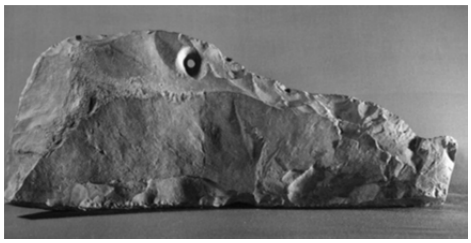

Fig. 2-5. Chime Stone

Fig. 2-6 Ceramic Drum

Fig. 2-7 Wooden Drum Sealed with Alligator Skin

In the spring of 2002, we identified a large city enclosure dating to the Taosi Middle period that covered an area over 2.8 million square meters, including a southern smaller enclosure of 100,000 square meters (Fig. 3). The city was roughly rectangular in shape and oriented at 225°. The large town of Middle period at Taosi has been considered as one of the largest cities in prehistoric China.

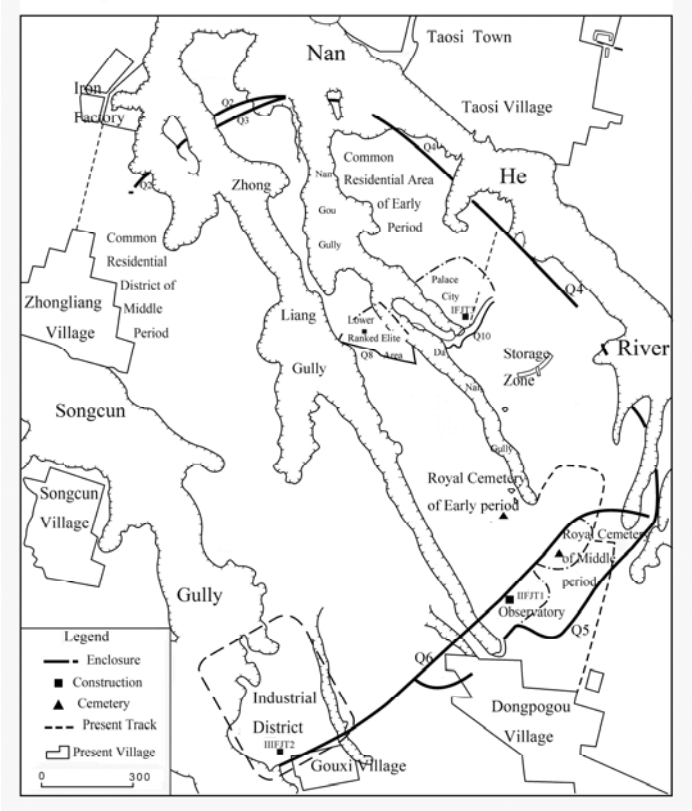

Fig. 3 Plan Map of the Taosi City

[1] **The Taosi City Wall**

Through probing/coring and excavation, we identified that the wall surrounding the Middle period Taosi city was constructed in different ways in different parts of the site. Most of the walls were built with rammed earth blocks, some were rammed in counterfort style, and some had basement trenches filled with rammed earth. The width of wall ranges from 4 to 8 meters, and the height ranges from 2 to 3 meters (Shanxi Team of Archaeology Institute of CASS & Archaeology Institute of Shanxi Province 2005).

So far, the outer wall of the Early period has not been fully mapped. We are currently investigating the northern and western enclosures of the Early period site. According to the current state of our excavations, we can confirm that the palace enclosure of the Early period was fortified with a moat and then sealed with a rammed clay wall.

[2] The palace enclosure

According to the results of probing/coring and excavation, the palace enclosure of Taosi was located in the central part of the Early period town. At first, it was enclosed with a dry moat, which makes me believe that it could already be regarded as a palace enclosure during this phase. Not long after, also in the Early period, the moat of the palace enclosure was filled with rammed clay to build a wall. The palace enclosure was occupied by the rulers of the Early and Middle periods until the end of the Middle period when it was completely destroyed. In the late stage of the Late period, the small enclosure of the palace enclosure might have been partially reconstructed with rammed earth, but at the end of the Late period, the palace enclosure was thoroughly flattened.

So far we have mapped a palace foundation platform built with rammed clay; its main body was 100 meters long by 80 meters wide, covering an area of about 8,000 square meters (Fig. 4). We also found an arrangement of 18 postholes on the foundation (Fig. 5), whose diameters range from 50 to 80 centimeters. At the bottom of the postholes are gravel bases of about 30 centimeters in diameter. The arrangement of postholes covers an area over 280 m^2, indicating that this was one of the principal buildings centered on the monumental platform. Within the foundation of the main building, a piece of copper basin rim was unearthed from the rammed-clay matrix (Shanxi Team of Archaeology Institute of CASS & Archaeology Institute of Shanxi Province 2008). According to the identification of wood species, almost all carbonized wood specimens from the palace enclosure at Taosi are cypress, which was traditionally considered as a noble material in China because of its fragrance, straightness, density, and exorcizing function.

During the excavation of the foundation of the palace, we also recovered some artifacts related to the palace construction and courtly life. I estimated that one kind of ceramic slab might have been tiles that covered the roofs of palaces. These are the earliest examples of roof tiles in China. Excavations in this part of the site have also uncovered many jades, red textiles, plaster carved with geometric patterns and painted blue (the pigment was made of azurite), and a ceramic basin handle shaped like an owl head.

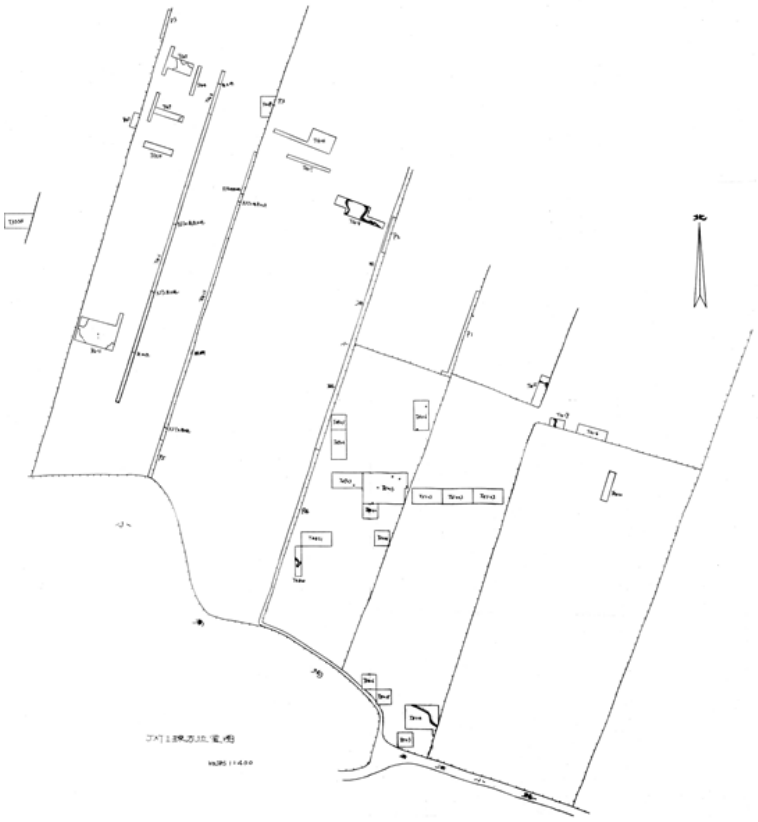

Fig. 4. The Plan Map of Main Foundation IFJT3 in the Palace Enclosure

Fig. 5. Top View of the Main Building Foundation IFJT3

We even found carbonized rice through floatation of soils excavated from the palace enclosure, indicating that rice was a part of elite cuisine or sacrificial rituals. Rice remains are quite rare at sites on the loess plateau during prehistoric periods.

[3] The Royal Tomb of the Middle period

In 2002, we excavated a magnificent tomb in the small town of the Middle period that was attached to the southeastern part of the larger enclosure. This small town was tentatively identified as a holy precinct of the Middle period because it contained the royal cemetery and an observatory/altar.

Fig. 6 Top View of IIM22

Fig. 7 Front View of the Chamber Wall of IIM22

The royal tomb IIM22 was located at the southern end of the royal cemetery and was 5m long, 3.7 m wide, and7m deep, making it one of the largest tombs in prehistoric China (Figs 6, 7). Unfortunately, it was severely destroyed and looted during the Late Taosi period. Nevertheless, many extravagant grave goods were still present including 46 jadewares found near the coffin and 20 jadewares found in the fill of a shaft that was dug into the tomb during the destruction of the Late period. In undisturbed parts of the tomb, we found 8 painted ceramics, 18 additional jadewares (Figs 8, 9), 8 sets of bone arrowheads, 25 lacqurewares, 4 large stone chopping knives, 6 wooden chopping blocks, 10 complete pig skeletons each chopped in half, and 1 wild boar mandible (Shanxi Team of Archaeology Institute of CASS & Archaeology Institute of Shanxi Province, 2003). One can easily recognize that the owner of this tomb could have been the chief ruler of the Taosi City in the Middle period.

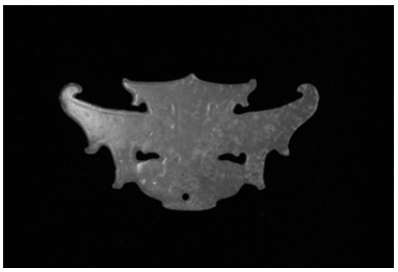

Fig. 8. Jade Monster Mask

Fig. 9. Jade Axe

It is very striking that the boar mandible was found stuck in the center of the chamber's eastern wall. Three jade axes were also placed on the left and right side of the mandible. This arrangement might have symbolized the ideal of subduing enemies by the exhibition of military strength. Moreover, there are seven jade axes unearthed from this tomb in total. Jade axes are usually considered by Chinese scholars as a symbol of royal authority. The offerings of meat in the form of 10 pigs placed on the west side of the coffin, and ribs on 6 chopping blocks with 4 chopping knives reflect the luxurious life of the king. Perhaps the most significant finding in IIM22 was a lacquer staff, which is identified by researches as a gnomon sundial marker and symbolizes the central authority of the ruler (details will be discussed later). The elegance and uniqueness of jade wares and colored ceramics from IIM22 also implies that a monarchy existed at Taosi. Thus, we believe that the person buried in IIM22 was a ruler of the Middle period.

[4] Medium-sized tombs of the Middle period

A number of medium-sized tombs surrounding royal tomb IIM22 were also dated to the Middle period. We believe that such tombs (with the usual length of 3m, width of 2m, and depth of 3m) were burials of important aristocrats. They were also destroyed during the Late period. Except for a few painted ceramics that survived in intact alcoves of burial IIM26, almost all furnishings and grave goods were pulled out, broken, and tossed along with disarticulated fragments of skeletons into a layer of fill that covered the destroyed burials. Some artifacts found in the matrix of this mixed fill layer include jade axes, jade gear-shaped disks, jade bracelets, turquoise beads, and a copper ring. The pottery includes vases, basins, and amphorae that were beautifully painted with ceremonial designs (Wang Xiaoyi & Yan Zhibin 2006). Whereas the small graves in the cemetery contained no grave goods, the middle-sized tombs likely contained several dozens of artifacts each, which leads us to believe that the occupants of these tombs might have been the monarch's bureaucrats. For example, the person who wore the gear-shaped jade disk might have

worked as an astronomic officer. The person buried with a spade-shaped bone ritual farm tool (Si) engraved with an unknown glyph might have acted as agricultural officer.

[5] Observatory – The Altar of Heaven

From 2003 to 2005, in an attempt to find the Altar of Heaven of Taosi, we discovered and excavated a very unique structure in the special precinct within the small enclosure of the Middle period city located in the southern section of the site. Eventually, we realized that the structure might have worked both as an observatory and an altar of the sun and heaven.

Its semilunar-shaped foundation was constructed with small rammed clay blocks, with the arc oriented southeast. The entire structure included a semi-circular border path that was roughly 60 meters in diameter and a central platform that was roughly 40 meters in diameter (Fig. 10). At the center of the platform was an area of undisturbed soil with a diameter of 28 m. The entire structure covered an area of about 1,740 square meters (Shanxi Team of Archaeology Institute of CASS & Archaeology Institute of Shanxi Province 2004, 2007) with the platform covering an area of about 1,000 square meters. The depth of the rammed-clay foundation ranged from 1 to 6 meters. Stratigraphic and material evidence indicates that the structure dates to the Middle Period (2100 to 2000 BC).

The platform might have had three terraces. The first terrace was located on the eastern part of the platform. It was crescent-shaped, faced east, and had a crescent-shaped undisturbed soil core at the center that was surrounded by rammed-clay. We believe this structure might have served as a ceremonial zone relating to the east. One rammed-clay step connected the border path to the first terrace.

The second terrace was formed as a semi-circle, with both ends connecting to the southern inner wall (Q6) of the enclosure. The crucial portion of the platform is the third terrace. It contained an undisturbed soil core and a rammed-clay counterfort wall. Between the core and the wall was a rammed-clay structure composed of pillars and slots arranged in an arc, facing northeast, east, and southeast.

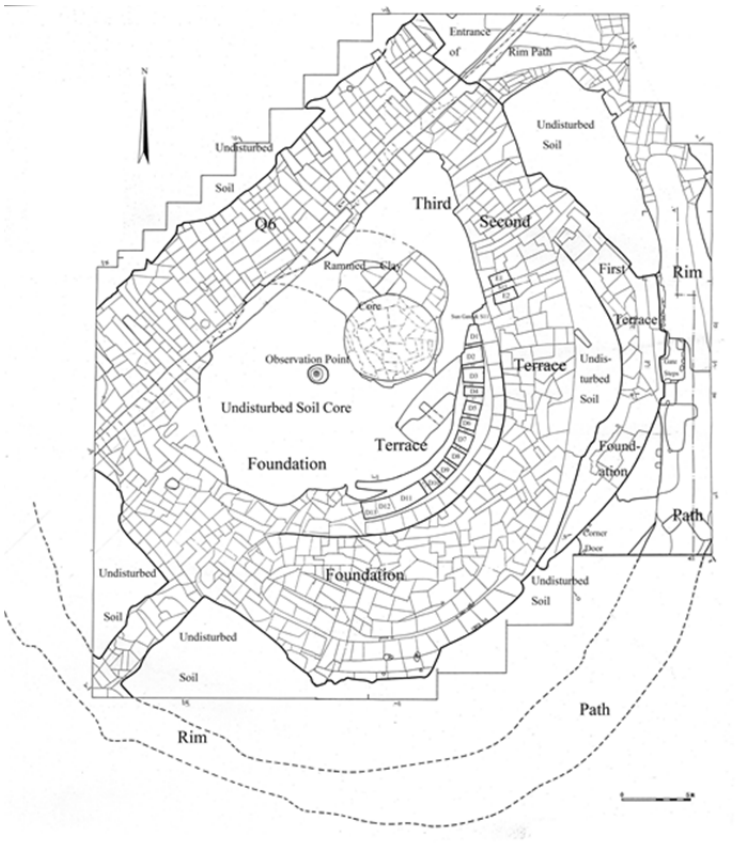

Fig. 10 Altar of Heaven (Observatory) of the Middle Period

Ten slots with depths ranging from 3 to 18 cm were cut into the rammed clay arch-shaped base. The arch-shaped base was around one meter wide and 1.9–3 meters deep. The width of most slots ranged from 15 to 20 centimeters, with a few of them as wide as 30–50 centimeters. On the second terrace, one slot was cut between two rammed-clay pillars for observing the Summer Solstice. Based on these excavated features we reconstructed the vertical slots above ground and found that there may have been 12 slots in total, each focusing on a certain point on the Chongshan Mountain.

The most significant discovery in the observatory was a circular feature that served as an observation point where one could stand to look through the slots in the wall. The point is located almost at the very center of the undisturbed loess core of the platform. It has three concentric circles made of rammed-clay located within a round shallow pit. The pit was

145 cm in diameter. The outer ring was 86 cm in diameter, the middle ring was 42 cm in diameter, and the central circle was 25 cm in diameter. This central circle was just large enough for someone to stand on it with two bare feet. The distance from the center of the observation point to the outer edge of the slots in the wall is about 12.2 m and the distance to the inner edge of the slots in the wall is about 10.8 m.

Based on simulative observations, we postulated that Taosi people might have stood on the center of the observation point to observe the rising sun behind the Chongshan Mountain on certain important days of the calendar (if the sunlight was not too dazzling).

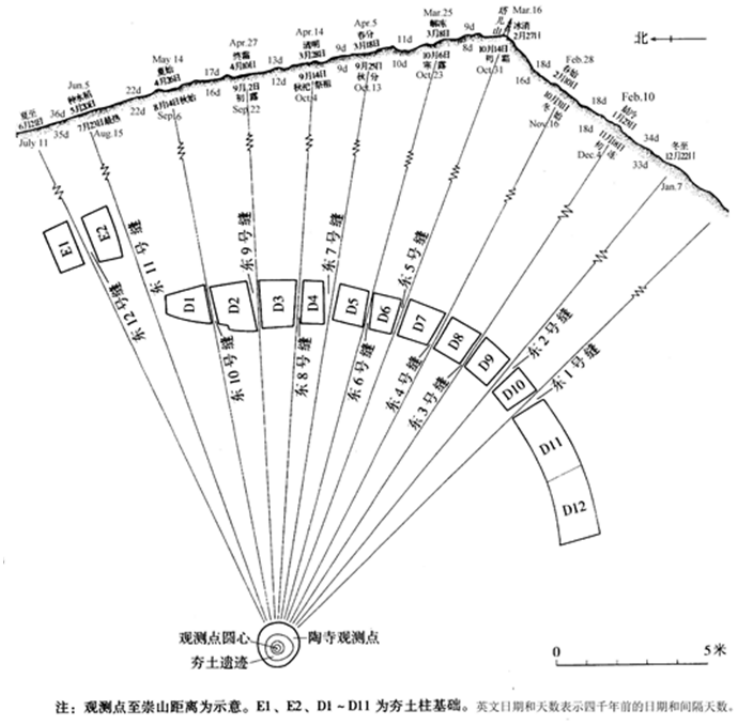

Fig. 11. Illustration of Taosi Solar Calendar Observed with the Observatory

Note: 1. The distances from the observation point to the Chongshan Mountain in this map are sketch drawings.
2. E1, E2, D1-D11 are rammed-clay foundations of pillars.
3. The English dates and numbers of days indicate the dates of 4,000 years ago and the number of days between two neighboring significant days of the calendar.

If the sunlight was bright enough on a significant day, one could stand on the rammed clay core and observe the sunlight piercing through the corresponding slot.

So far, we have observed the location of the sun in relation to the observatory structure over 70 times from the Winter Solstice of 2003 to the Winter Solstice of 2005 and observed 20 sunrises. We estimated that ancient Taosi people observed the Winter Solstice through the second slot, and the Summer Solstice through the twelfth slot (the northernmost slot), although the change of Earth's axis has shifted the location of the sunrise for so the points currently do not line up perfectly. Dr. Wu Jiabi calculated that the point of the Winter Solstice's sunrise 4000 years ago was located at about 38′ 30.95″ south of the present point. Based on these adjustments, we believe that the slots in the Taosi observatory would have aligned with sunrise on the ancient solstices. Taosi natives likely observed the Spring Equinox through the seventh slot. The seventh slot was set at the middle point between the slot for the Winter Solstice and the slot for the Summer Solstice, with four other slots in between on each side (Shanxi Team of Archaeology Institute of CASS 2006). The function of the first slot (the southernmost one) is still uncertain. Some astronomers suggested that it might have been used to observe the southernmost point of moonrise.

Observations and calculations also indicate that Taosi people might have used solar observations to divide one solar year into 20 periods (Fig. 11) that may have helped to guide local crop planting and harvesting, ceremonial dates, and the rhythms of local weather shifts (He Nu 2007). In other words, it was the calendar of ceremonial life determined by the monarch or his astronomical officers. Modern Chinese astronomers are convinced that the structure might have been the earliest observatory in China.

Agriculture was essential for prehistoric complex societies in China. Ancient Chinese people depended on the solar calendar for growing crops, and their religious practices mainly focused on the worship of the sun. Hence, an observatory and sanctuary dedicated to the sun would have been a crucial construction in a prestigious city, as it was a physical representation of the monarch's authority over the calendar and worship. Based on this interpretation and the magnitude of the observatory/altar structure, we believe that Taosi can be identified as a capital city.

[6] Executive Storage Area

As Renfrew notes,

> an important indicator of centralized control of a society is the existence of permanent storage facilities for food and goods, which the central authority will draw on periodically to feed, reward, the thus indirectly control its warriors and local population. It follows that taxes, for instance in the form of produce

> to replenish state storehouse, will also be found among centralized societies: without them the controlling authority would have no wealth to redistribute… Much of a state's bureaucracy will be devoted to the administration of taxation, and direct of bureaucracy, such as recording and accounting systems, in general document it (Renfrew 1991: 192).

Renfrew has provided a diagnostic indicator for state societies from the perspective of governmental administration for taxation and redistribution, which was often ignored by most archaeologists. We believe that such an indicator of state-level administration is also visible at Taosi.

In the southeastern part of the large Taosi Middle period city, we have identified a special storage zone. Covering 1,000 square meters, it was covered with huge storage pits, with diameters of 5–10 m and depths of 4–5 m (Fig. 12). The pits might have acted as storage facilities controlled by the rulers or authorities in the aim of tax storage and redistribution (He Nu 2004a). Probing/coring data has revealed that this special area was surrounded by a buffer zone without any archaeological features, suggesting that the storage area was geographically isolated from other functional districts in the site core such as residential areas, ceremonial areas, and craft production zones. At the entrance of one large pit, we even found a small 1.5 m diameter platform floor covered with lime plaster where we believe a sentry could have stood to guard the pit (Fig. 13). Undoubtedly, at least some storage pits were guarded because they were not dedicated to a given household or family.

We believe that the isolated and guarded storage zone looks like what Renfrew called a ‘state's storehouse’ (Renfrew 1991: 192). The presence of a storage area controlled by a central monarch or city authority rather than households, reveals that the rulers at Taosi had an unparalleled administrative role. The preservation and redistribution of collected tax goods (mainly in the form of grain) was indispensable to governmental and military affairs. This type of activity characterizes the typical economic attributes of state societies.

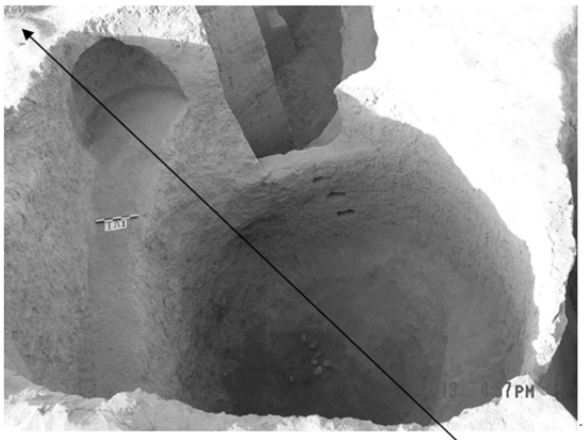

Fig. 12 Typical Storage Pit in Storage District

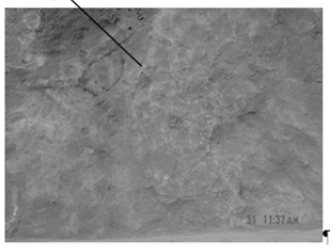

Fig. 13 Plaster Floor of Sentry Guard Room

[7] Craft Production District

According to Renfrew, 'the increased importance of craft specialists is another indicator of a centralized society that can be identified archaeologically. Full-time craft specialists leave well-defined traces, because each craft has its own particular technology and is generally practiced in a different location within the urban area' (Renfrew 1991: 193).

At the beginning of this century, I hypothesized that a special craft district may be located in southern part of the Middle period Taosi city according to the artifact distribution data from surface collections and cross section survey. The entire zone of more densely distributed craft production debris covers an area of approximately 150,000 square meters. In 2008, an archaeological survey concerning to lithic industry in Taosi city was carried out by Zhai Shaodong, Wang Xiaoyi, and Gao Jiangtao that confirmed my previous hypothesis (Zhai Shaodong, Wang Xiaoyi, and Gao Jiangtao 2013: 1–26). From 2010 to 2013, through coring and small-scale excavation we identified two ceramic and three lithic production sub-zones containing possible managerial buildings, craft production activity areas, and related dwelling houses (He Nu 2011: 46–57) located

in the southwestern corner of the Middle period enclosure (Fig. 13). Some possible remains of a moat and wall suggest that the industrial district might have been enclosed and spatially segregated. It is very remarkable that each craft sub-zone has an associated rammed-clay building of a larger size that may have been related to the central management of craft production activities.

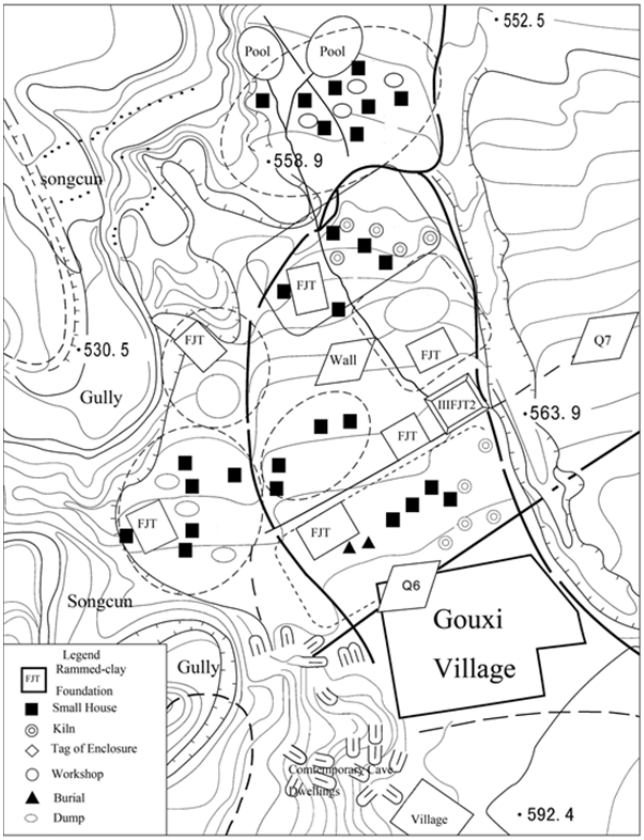

Fig. 13-1. Probing Map of Industrial District of the Middle Period Taosi City

The most significant construction in the Middle period craft production/industrial district is a rammed clay foundation identified as IIIFJT2 (Fig. 13–1), which was excavated from 2012 to 2013. This construction stands on the top of the slope of the whole industrial district, providing a clear view of the entire craft production zone. The building covers an area of about 1,300 square meters and is in the shape of the character '回', with an open

courtyard in the center of a square-shaped building. I believe that there might have been a main building, central courtyard, ambulatories on both sides, and a front gate constructed on the same huge foundation (Fig. 13–2). Such architecture exhibits high-level official construction in the highest order and largest scale within the entire industrial district. We have not found any contemporary craft production debris in this building foundation. Therefore, we believe that IIFJT2 likely was not a workshop, but rather a high-order or even administrative office that could supervise the craft production zone. It suggests that craft production industries at Taosi were supervised by bureaucrats assigned by the monarch, which may reflect the origins of institutionalized official craft industries of later Chinese dynasties.

Additionally, the craft production district of was placed in the southeastern corner of Taosi, located over 1,000 meters away from the palace. This suggest that shabby craftsmen were kept far away from the elite palace enclosure, reflecting the way that spatial divisions were used to further reinforce royal prestige and social hierarchy. The spatial isolation of the craft production district and the possible presence of managerial buildings indicates that the work and lives of craftsmen were supervised and controlled. One question remains is what were the social identities of craftsmen. Where they special citizens such as what were referred to as Bai Gong百工 (diverse craftsmen) in later periods who were engaged in various crafts, or were they slaves?

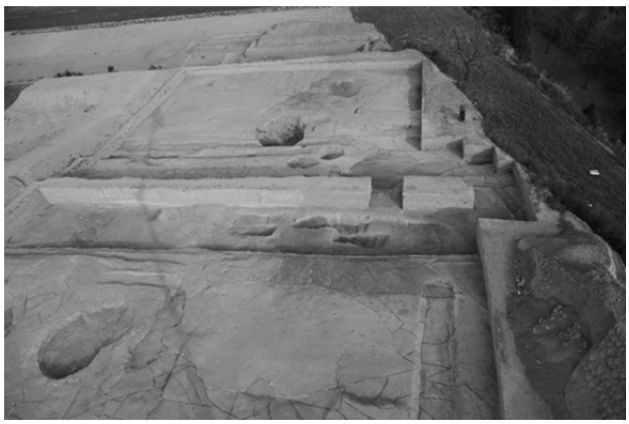

Fig. 13-2. IIIFJT2 (from south to north)

II. SPECIAL COGNITIVE ASPECTS OF STATE SOCIETY

In other articles I have discussed the archaeological theory of Intellectual Culture (He Nu 2012: 18–34), which is involved in the foundation of common sense and forms of social consciousness. The latter is composed

of natural concepts, social concepts, and religious concepts. These three concepts are expressed within art and symbols (including writing).

In historic China, the key cognitive aspects of social consciousness contributed to state society in terms of moral thoughts about the Earth Center, the ideology of bureaucracy and political retaliation expressed in shamanism, the dimensional symbolism of hierarchically organized residential zones, and the creation of the Chinese writing system. Intellectual Culture archaeology at Taosi has provided specific evidence in regards to these distinct ideological or cosmological aspects of state society.

[1] Dimensional Symbolism of Hierarchically Organized Residential Zones

Fig. 14

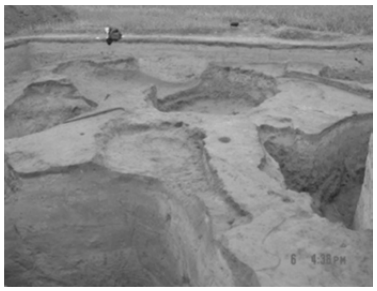

Fig. 15

Renfrew mentioned that 'differences in standards of housing will reveal inequalities between rich and poor and therefore an aspect of the social hierarchy' (Renfrew 1991: 186). Based on archaeological evidence from Taosi, one can easily see that there was a clear residential hierarchy. The lowest status of the local population resided in cave dwellings with single rooms (Fig. 16) that were around 16 m^2 in size. Most common citizens settled in semi-subterranean pit houses with single room structures about 16 m^2 in size. Lower ranked elites lived in above-ground houses or semi-subterranean pit houses with double rooms that were around 50 m^2 in size and often located on top of rammed-clay foundations/platforms that were about 200 m^2 in size (Fig. 15). Rulers resided in palaces built on a monumental platform standing 50 cm above the ground (Fig. 14) and covering an area of 8,000 m^2. It is quite convincing that people living at Taosi symbolized their social ranks in the organization of their residential spaces – social stratifications from bottom to top corresponded to the construction of residences from underground to above ground.

Moreover, the different social ranks were located in different residential districts. Rulers occupied the palace enclosure that covered nearly 120,000 m^2 (Fig. 3). The palace enclosure was filled with a dozen rammed-clay platforms that were spatially separated from both trash mid-

dens and craft production areas, perhaps in an attempt to maintain the purity of the royal zone.

Lower ranked elites lived 300 to 500 m away from the palace enclosure, and their houses were concentrated in a zone covering an area of about 50,000 m^2 (Fig. 3). Unlike the palaces, the lower elite apartments were surrounded with midden pits, suggesting that the people living here were at a lower social level than those who lived in the royal palace district.

Fig. 16. Residences of Commoners

The residences of the common population (most of them might be farmers) at Taosi were located over 1,000 m away from the palace enclosure (Fig. 3). A large number of Middle period houses were located in the northwestern corner of the city. These semi- subterranean pit houses were surrounded by midden pits and storage pits, with a much more chaotic organization than in the elite residential districts.

Interestingly, the Taosi cemetery contained large burials, medium-sized tombs, and small graves all in the same location. This contrasts with the strict spatial segregation of houses belonging to different social classes (for example, the houses of lower elites and commoners were never found in the palace enclosure). This difference may imply that residential hierarchy at Taosi might have been established according to classes, whereas mortuary hierarchy was still organized according to kinship hierarchy. A revolution in social organization occurred first in the living world, and then later in the world of the dead.

[2] Political Retaliation in Late Period Taosi

A striking feature of most Late period features is their association with violent phenomena. In the palace zone, many Late period midden pits destroyed the palace foundations. These pits contained several layers of human skulls combined with large quantities of lithic debris, broken bone tools, garbage associated with daily life, and construction waste (Figs 17, 18) (Shanxi Team of Archaeology Institute of CASS & Archaeology Institute of Shanxi Province 2005; He Nu 2004b). Meanwhile, the city en-

closure walls were completely leveled and most of the royal and aristocratic tombs were looted and damaged. The core part of the observatory/Altar of Heaven was also entirely demolished and violated with abnormal burials. Such violent behavior and destruction of Middle period elite structures leads us to postulate that political retaliation might have swept across Taosi in the Late period.

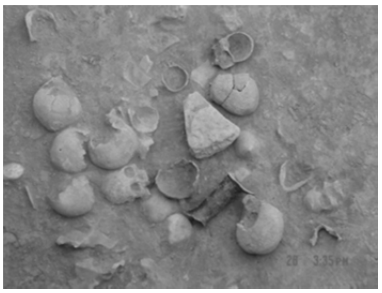

Fig. 17. A Layer of Skulls from Midden Trench IHG8①

Fig. 18. Female Skeleton from the Midden Trench IHG8③

[3] Gnomon sundial template and 'Earth Center' ideology

In 2002, excavations of Middle period royal tomb IIM22 uncovered a lacquered wooden staff at the top part of the burial chamber (Fig. 20). The staff was found standing against the southeastern wall of the chamber. The intact portion of the staff was 171.8 cm in length, with a damaged section measuring 15.7 cm, suggesting that the full reconstructed length of the staff was 187.5 cm. The artifact's identification number is IIM22:43. The staff was painted with lacquer in alternating black and green sections, separated with pink lines, implying that this artifact had a special function (He Nu 2009; Li Geng & Sun Xiaochun 2010). What is very striking is that the tenth green section was abnormally interrupted by a pink line (Section 11). The length from the end of the staff to this eleventh pink section is 39.9 cm. According to research on units of measurement used during the Taosi period, one chi is equivalent to 25 cm, so that 39.9 cm is 1.596 chi. This is roughly the same as the length of a solar shadow at noon on the summer solstice – 1.6 chi, based on the records in historical document entitled Zhou Bi Suan Jing周髀算经.

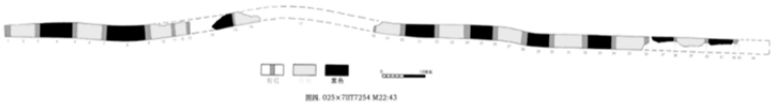

Fig. 20. Lacquered Gnomon shadow template from IIM22

The length from the end of the staff to the 34th section is 142.6 cm. Such a length suggests that it might have been used to measure a solar shadow during the spring equinox and autumn equinox. If two identical staffs were placed end to end, the entire length from the end of the first staff to the 37th section would reach a total length of 343.6 cm, which matches a shadow length on the winter solstice at Taosi four thousand years ago. Given this, I believe that the staff (catalog number IIM22:43) might have served as a gnomon sundial shadow template that dates to the Middle Taosi period (2100 to 2000 BC).

Dr. Zhao Yongheng, a Chinese astronomer, has raised a question about IIM22:43, namely that the real solar shadow length for the summer solstice at Taosi around 4000 years ago should be 42.25 cm or 1.693538~1.694476 chi rather than 40 cm. or 1.6 chi. Fortunately, the length from the end of the staff to the 12th painted section on the staff is 42.3 cm. or 1.69 chi, precisely matching the shadow length on the summer solstice at Taosi 4000 years ago. It is clear that the staff marked both the theoretical summer solstice shadow length recorded in Zhou Bi Suan Jing and the actual calculated shadow length for ca. 2,000 BC based on astronomical observations. This raises the question of why the Taosi people marked the theoretical summer solstice shadow length, which would have been useless in practical application.

It is also interesting to make comparisons with the ideal summer solstice shadow length of 1.5 chi recorded in another historical document, the Zhou Li周礼, which notes that the 1.5 chi length was a criterion used to define the 'Earth Center.' Traditionally in ancient China, the Earth Center was recognized as an exclusive divine plot where an exclusive channel connected the center of the Earth to a zenith point. The zenith point was the residence of the Lord of Heaven or Ancestral Deity. It was a religious concept. Originally, this channel was considered as an exclusive path for accessing divine political power certified by the Lord of Heaven or Ancestral Deity; however, the religious concept later changed into a political ideology – the state and its capital should be established in the Earth Center in order to enable the monarchs to monopolize the divine channel and receive the divine authority from the Lord of Heaven or Ancestral Deity. In this way, most populations in ancient China believed that when the state and its capital were settled in the Earth Center, they had a moral legislative authority. It was so necessary to proclaim the Earth Center with a physical signal. The prehistoric inhabitants in Middle Yellow River Valley used the local gnomon shadow length at noon on the summer solstice as the visible criterion of the Earth Center. In the same way that modern Coordinate Universal Time was determined according to Greenwich Mean Time and the Basis Meridian according to the longitude that passes through Greenwich Royal Observatory in the United King-

dom, the ancient Earth Center in China also was established from arbitrary political and historical criteria.

The ideal summer solstice gnomon shadow length of 1.6 chi recorded in the Zhou Bi Suan Jing might have also been considered as another indicator of the Earth Center in prehistoric China that is different from the 1.5-chi-criterion of a certain Earth Center recorded in Zhou Li. It is quite certain that Taosi people pursued the Earth Center marked on their gnomon shadow template. Given this, we now realize that the title 'China' (中国 Zhong Guo) linguistically explained word by word in archaic Chinese should read as 'Central State.' Zhong means 'central' and Guo means 'state.' In other words, the state and its capital should be established in the Earth Center identified by gnomon shadow template according to the summer solstice criterion of a shadow length of 1.5 or 1.6 chi.

The striking mark of 1.6 chi on the gnomon shadow template from Taosi could have been propaganda stating that the site of Taosi was the Earth Center, and that the state and capital established there was the Central State – literally translated as China (He Nu 2010).

[4] The First Chinese Writing System

In 2006, a fragment of a ceramic flask was unearthed from a Late period Taosi midden pit in the former palace enclosure area. Part of a glyph written with vermilion paint was still visible on the inner surface of the sherd. This specimen is very similar to another Late period flask sherd with two glyphs that was discovered several decades ago during excavations of a midden pit in the palace enclosure (Fig. 21–1). One of the glyphs on the flask was identified as 'Wen' 文, meaning 'civilized'. The other on the backside was identified as 'Yang' 昜 (which means 'bright' or 'sunlight'), 'Ming' 命 (which means 'fate'), or 'Yi' 邑 (which means 'town') by some scholars. I argued that it could be interpreted as the character 'Yao' 堯, originally meaning a city (enclosure), a palace, or an altar constructed with rammed earth blocks on a loess terrace (He Nu 2004c). Yao was also the name of one of most distinguished sage kings in Prehistoric China.

The possible 'Yao' glyph is composed of three parts. The top stroke in a '◇' shape may mimic the outline of the enclosure of the Taosi City. It may have also depicted the blocks of rammed clay used to construct both of city wall and elite buildings. The bottom stroke is a '己' shape, imitating a profile of a man. The middle stroke is a '—' shape, indicating that the city is located on the top of the man. The entire glyph depicts the city with its enclosure built on the top of loess terraces above a gully. The entire 'Yao' glyph forms a picture illustrating that when one stands at the bottom of the gully that runs through the center of Taosi and looks up, the city enclosure is above him on the top of the loess terrace (Fig. 21–3).

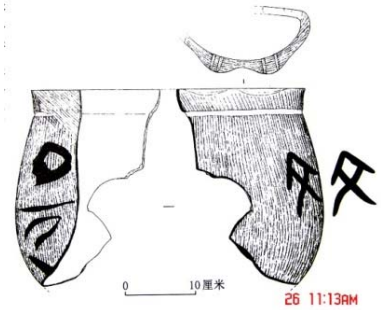

Fig. 21-1. Glyphs on a Flask from Taosi

Fig. 21-2. 'Yao' Glyph in a Shang Dynasty Oracle-bones Inscription (14th–11th Century BC)

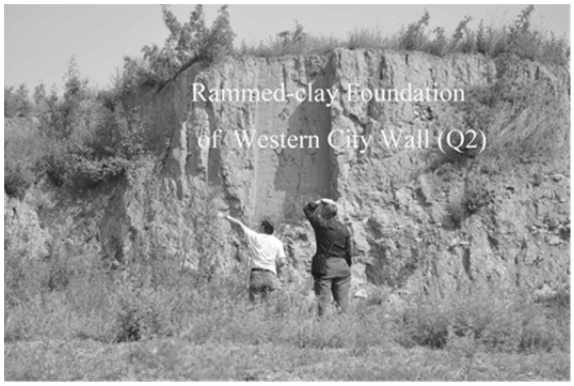

Fig. 21-3. Topography of Taosi

Strikingly the character Yao (堯) was interpreted as meaning 'high' by Xushun, the most distinguished linguist in the Western Han Dynasty, in his work entitled as Shuo Wen Jie Zi. The character Yao (堯) in the Han Dynasty was considered as a character with components both of Yao (垚) and Wu (兀). Yao (垚) was interpreted as '壘土为垚' meaning a construction made of rammed clay blocks (畾). Further more, Wu (兀) was interpreted as 'high and flat' by Xushun. It may be not coincidence that the loess terrace landscape is characterized as high and flat. It reminds us of the 'Yao' glyph from Taosi, which emphasized the landscape of the loess terrace where Taosi was located. According to current archaeological evidence, Taosi is the only capital enclosed with rammed clay on the loess highland.

It is also very surprising to us that two glyphs written on the broken flasks appear to be rather similar to Yao (堯) in oracle bone inscriptions (Fig. 21–3) and Wen （文）in bronze inscriptions. Given this, the two characters from Taosi could also be read together as Wen Yao, meaning the civilized King Yao, the mythical sage king who was characterized as civilized and merciful in Chinese historical documents.

Some linguists have agreed with my interpretation of the glyphs (Ge Yinghui 2007), but no matter how the glyphs are interpreted, we can all agree that a writing system may have already been in place at Taosi 4,000 years ago.

I believe that the invention of a writing system may have emerged to meet the requirements of administrative management of a state society, rather than to fulfil the needs of farmers and craftsmen. Given this, the writing system at Taosi reflects not only the invention of Chinese characters, but also the formation of a recording system. This change was like the ringing of a gong that marked the end of China's prehistoric period, and prayed for the newborn Chinese state.

CONCLUSION

The above archaeological evidence from Taosi indicates that during the Middle period the Taosi City had extended from a small town to one of the largest sites in prehistoric China. The site's high wall and grandiose palaces are markers of the emergence of state society, with royal and aristocratic tombs demonstrating the emergence of class conflicts. Unique characteristics of the observatory or altar for the sun and heaven suggest that the Taosi calendar system might have helped to legitimize political authority, and that the observatory itself helped to distinguish the site as a capital. Large, possibly guarded storage pits may have played an important role in taxation and redistribution for the state polity. The remarkable political retaliation during the Late phase of occupation at Taosi, the hierarchy of residences, the political ideology relating to the Earth Center concept as identified by the gnomon shadow template, and the invention of earliest Chinese writing system also reveal unique cognitive attributes of the early Chinese state. Taosi predates Erlitou, which is often considered the earliest state in China. Based on the new evidence, one can conclude that Taosi might be the earliest state society or the first proto-state in Central China, although there are still many questions that needed to be examined further.

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