

The Tianluoshan Neolithic Site at Yuyao, Zhejiang

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The first season of excavation at Tianluoshan site in Yuyao in 2004 is the most important archaeological work of Hemudu Culture in the Yaojiang Valley since the excavation at Hemudu site in 1973.

Geography and Stratigraphy

Tianluoshan, only 7km southwest to the Hemudu site, is situated in the center of a small basin in the eastern part of Ningshao region south of the Hangzhou Bay. The site area is under the administration of Xiang'ao Village, Sanqishi Township, Yuyao Municipality. Between February and July in 2004, the Zhejiang Provincial Institute of Cultural Relics and Archaeology directed the first season of excavation at the site that 300m² of prehistoric occupation had been excavated (Figure 1).

The deposition, as thick as 350cm, can be divided into eight levels. Level 1 was the top soil. Level 2 was a layer of gleying pertained to oceanic sedimentation. Level 3 contained two sub-strata. The sediment of level 3A was tempered with significant amount of pottery

shards, burned clay nodules and a few stone artifacts. The sandy sediment of level 3B contained pottery shards, charcoal and burned clay nodules. Level 4 was a layer of dark greenish grey sediment. Considerable remains of timber structures, such as post holes with wood foundations, and food cellars were outcropped on the base of this layer. Level 5 was a layer of greenish grey sediment. Tips of timber posts and several secondary burials were revealed. Level 6 comprised of dark grey sediment. A number of patterned and preserved timber posts were seen in the lower part of this layer. They were the remains of the wood structures of the early occupation. Level 7 was a layer of wet and loose brownish grey sediment tempered with large shards and rich organic remains. The dark brown sediment of level 8 contained very rich organic material remains. The sediment below level 8 was homogeneous, fine-grained, soft, sticky, and greenish grey silt attributable to the oceanic aggression of early Holocene. The cultural deposits of level 3 to level 8 are comparable to that of level 2 to level 4 of the Hemudu site and can be partitioned into three phases.

Cultural Remains of the Early Phase

The early phase of Tianluoshan cultural deposition, dated to 6500–7000 BP, is comparable to phase I of Hemudu Culture. In Tianluoshan, this cultural phase constituted the material remains and features outcropped on the base of level 6, and the material remains of levels 7 and 8. Because of conservation consideration, the deposition below level 6 has not been systematically excavated. Consequently only three timber structures of the early phase had been revealed by the excavation.

1. Feature F3 Two rows of evenly-paced rectangular posts made of selected and uniformly modified tim-

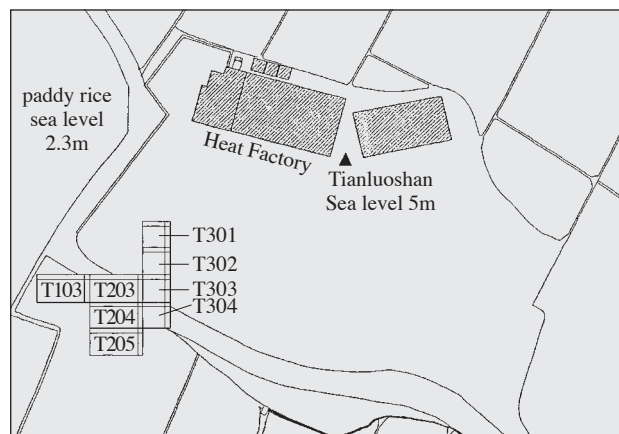


Figure 1. Illustration of location of the excavated grids

ber were recovered from the base of level 6 in the eastern part of the excavation area (T301, T302, T303, and T304). The western row comprised of five posts, spreading more than 10m from one end to the other in intervals of slightly more than two meters. The eastern row comprised of four posts. Because the posts of the two rows were basically corresponding to one another, it is suspected that one post was missing in the southern end of the latter row. These posts evidently were architectural elements of a discrete timber structure of the early phase. Its plan suggests that it was an east-west ori-

ented rectangular stilted house (Figure 2).

2. Feature Q1 This timber structure of the early phase was likely a single-logged bridge or a pier. The feature, located in the western-most grid unit T103, was revealed on the base of level 6. It comprised of two horizontally and lineally placed robust logs and series of supporting stakes on both sides of the logs (Figure 3). Two complete and one fragmented wood paddles were found nearby (Figures 4 & 5). The feature was located in the deeper area of the western periphery of the site. Taken together, this timber structure was likely a small “pier”, riverhead,



Figure 2. Feature F3 (photo taken from north to south)



Figure 3. Q1



Figure 4. Wooden paddle (T103 ③:3)



Figure 5. Wooden paddle (T103 ④:4)

or logged bridge facility. It was stratigraphically connected to the dense dwelling structures to the east: thus providing an important clue in understanding the plan of the prehistoric settlement at Tianluoshan.

The early material remains of levels 7 and 8 were rich. In addition to the collection of macro remains with traditional recovery methods, water-screening on screens of varying sizes were also used to recover remains of micro fauna and flora. They supplied invaluable material for multi-disciplinary study. These material remains can be partitioned into two major classes according to their functions and raw materials.

3. Utilitarian artifacts

The utilitarian artifacts include all the artifacts intentionally modified from different materials and utilized by past people. According to material, they can be classified into artifacts made of pottery, bone, stone, wood, and weaving.

Pottery The large assemblage of pottery shards and reconstructed vessels document the rich information about the making, using, and disposal of pottery. (A) Dark grey pottery with sand temper comprises the majority of the pottery assemblage of the early phase. Black pottery tempered with charcoal is far less in number. Fine clay pottery is absent from this phase. (B) The vessels are mainly constructed with coiling method and sectioning method. They are characterized by non-symmetric morphology, uneven wall thickness, and coarse and uneven surface. (C) Many of the larger vessels show more-or-less even and horizontal spinning traces on the exterior walls. (D) Most of the vessels are embellished with varying motifs on the exterior, mainly on the rims, necks, shoulders, and

bellies. (E) Many of the shards show uneven dark grey coloration. Some burned clay nodules have imprints of plant root and stalk on both sides.

Among the early vessels, round-bottomed cauldrons comprise the majority. This is the only cooking utensil in the pottery assemblage. They can be further divided into four morphological sub-classes: unrestricted (Figure 6), restricted (Figures 7 & 8), straight-rimmed, and single-eared and small-mouthed cauldrons. The style of embellishment is similar to that of the same vessel class of Hemudu level 4. They are cord-marked on the exterior base. Some cauldrons show burned food remnants on the interior bases. During cooking, cauldrons were raised above fire by rectangular or circular-shaped pottery feet or pottery stands, and covered with pottery lids (Figure 9). Moreover, the pottery assemblage also includes vessels classified as basin, plate, bowl, pedestal bowl, pot (Figures 10–12), kettle, etc. The vessel bases are predominantly round-bottomed, followed by flat-bottomed, and a small number of ringed foot. Other than vessels, the pottery assemblage also includes spindle whorls, balls and small artifacts.

Turtle-shaped plant-tempered *he*-kettle The upper part of the vessel shaped like a turtle shell. It is embellished with design comprises of grain-shaped elements. Its lower part resembles that of a pot, incised with a pattern comprises of multiple pig and deer motifs and a flame-shaped geometric design (Figure 13).

Bone artifacts (including artifacts made of antler and animal tooth) The bone artifact assemblage is the largest and richest material assemblage recovered from the site. Bone tools were the major productive and domes-



Figure 6. Pottery cauldron (T103 ⑦:46)



Figure 7. Pottery cauldron (H4:2)



Figure 8. Pottery cauldron (T103 ⑦:39)



Figure 9. Pottery lid (T103 ⑦:40)



Figure 10. Pottery basin (T103 ⑦:6)



Figure 11. Pottery bowl (T103 ③:24)



Figure 12. Pottery pot (T103 ⑦:35)



Figure 13. Pottery he-kettle (T103 ③:25)

tic tools of the time. They comprise a very high proportion of the artifact assemblage that is rarely seen in other Neolithic sites in China. This is indicative of a rich and diverse environment in the vicinity of the site and the importance of hunting in the subsistence and life way of the people. The bone industry is comparative simple. The craft involves the selection of the species and parts of animal bones according to shapes and functions of the finished products, and the technologies of chopping, cutting, chipping, chiseling, drilling, filing, polishing, and incising. The artifact classes include shovel-shaped digging tool, arrowhead, whistle, chisel, awl, spoon,

needle, and apparel. Other than the heavy duty digging tools made of the scapulae of large animals (Figure 14), the remaining artifacts are small in size. Only simple embellishments are applied on the bone artifacts.

Lithics (including “jade” artifacts made of various minerals) The size of the lithic assemblage is small. It comprises of axes, adzes, chisels, and sharpeners. The lithic technology is unsophisticated that the artifacts were chipped into rough shapes and then slightly polished on the blades.

Wood artifacts The excavation yielded about ten specimens of well-preserved wood artifacts. Each of



Figure 14. Bone si-shovel-shaped digging tool (DK3 ⑦:52)

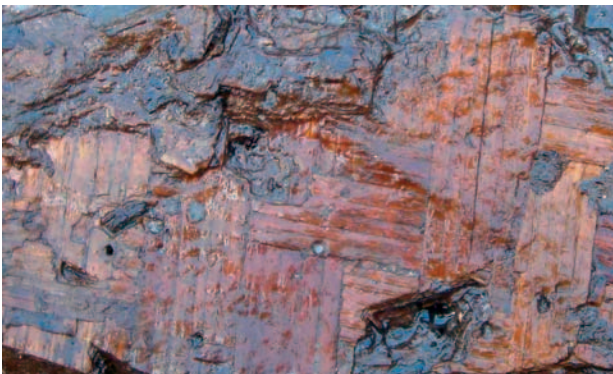


Figure 16. Reed-weaved artifact (DK3 ⑦:60)



Figure 15. Wooden butterfly-shaped objects (DK3 ⑦:55&54)

them was crafted from a single piece of timber. They include paddles, small round stick, shield-shaped artifact, butterfly-shaped artifact (Figure 15), handle, shaft, etc.

Wood paddles The three wood paddles recovered from Tianluoshan are the most complete paddles ever discovered in Hemudu sites. They were delicately made into different shapes. Their finding reflects the local geographic features and the major transportation method of the prehistoric people, and the emergence of ocean fishing.

Reed-weaved artifacts The excavation yielded a few fragments of mat-like artifacts weaved with reed (Figure 16). They were likely used as shades or floor covers in structures. Two small spools of thread, likely spun with plant fiber, were found in a pit filled with fish bones. A single thread is about 1mm across.

4. Humanly modified remains and ecofacts (this assemblage has not been inventoried) This assemblage is large in number and rich in content. They can be partitioned into many classes. One of them is the osteological remains of animals and humans. Another rich class is the timber remains, such as posts, planks, tree branches, wood chips, fruit nuts, pollens, etc., and remains of rice, such as stalks, straw, blades, husks, carbonized grains, phytoliths, etc. In addition, remains of caltrop, acorn, bottle gourd, wild grass seed, and bean were recovered. These remains were closely related to the subsistence, domestic activities and natural environment of the past. Substantial efforts have been invested on the recovery, preservation and curation of these materials during field excavation and indoor study. It is a multi-disciplinary endeavor to unravel the subsistence economy of the prehistoric people at Tianluoshan. For examples, water-screening method was used to recover almost all the material remains regardless of size; cross-section analysis of wood material by the respective specialists of the domestic and international communities; and the microscopic identification, quantification and analyses of the micro fauna and flora.

Cultural Remains of the Middle Phase

Cultural remains of the middle phase, dated to about 6000–6500 BP, are comparable to that of phase II of Hemudu Culture. They include timber structures, burials, ash pits, and artifacts.

1. Timber structures Timber and other organic materials of levels 5 and 6, being buried more than one meter below ground surface, were persevered by the waterlog environment. Relatively dense but non-systematic distribution of “post holes” was seen in these

levels. The openings of the post holes were irregular rectangle or circle with the long side of the rectangle or the radius of the circle as well as the depth measured about 60cm. One or more planks (wood post foundation; Figures 17–19) of varying thickness were often found on the bases of the post holes. In one example, six planks were cross-stacked on the base of one of the post holes

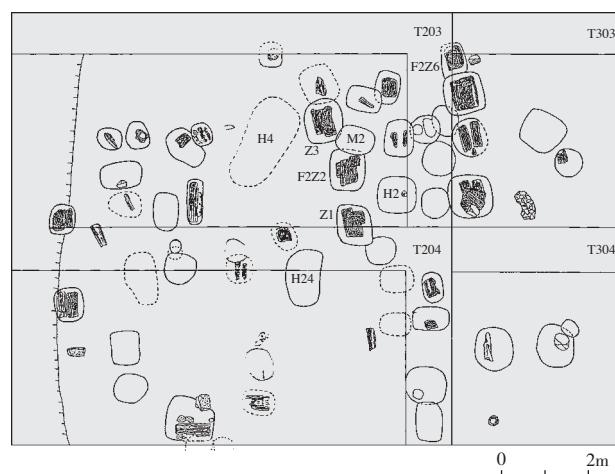


Figure 17. Distribution of post holes, ash pits and burials beneath Level 4 in Grids T203, T303, T204 and T304



Figure 18. Post holes beneath level 4 in the southwest corner of Grid T303



Figure 19. Post holes and ash pits of the 2nd stage

(Figure 20). This particular feature is being considered as the masterpiece of the timber architecture of Hemudu Culture. These planks, functioned as foundation boards, were components of timber structures. Many of these individual timber features were likely elements constituting discrete architectures. They represent the maturation of the prehistoric architectural technique of foundation construction that included “hole-digging, wood foundation setting and post-erection.” Significant amount of food processing remnants and storage cellars distributed in close proximity of the post holes.



Figure 20. Planks on the base of one of the post holes



Figure 21. Burial M5 (photo taken from west to east)

2. Burials A small number of features were recovered below level 5. Several simple burials were yielded in the western portion of grid T203, in the vicinity of the residential zone. These burials did not show obvious earthen pit, lack of receptacle and furnishing. Most of the skeletons were that of young individuals, wherein bones were missing and the remaining elements were unarticulated, indicating practice of secondary burial of unnatural death (Figures 21 & 22).

3. Ash pits Some of the small earthen pits have morphology and size similar to that of the post holes, which had wood planks deposited on the bases. Instead, a thin layer of sandy silt and remains of acorn were found on the bottoms of these pits. They were likely food cellars located underneath and around the stilted dwelling structures.

4. Artifacts Because of shallow deposition, the organic material of the middle phase is not as rich as that of the early phase. In the artifact assemblage, pottery (Figures 23–28) and stone artifacts (Figures 29 & 30) comprise the majority, and the number of bone artifacts is relatively small (Figure 31). Specimen M2:1 is a double-eared, deep-bellied, and charcoal-tempered pottery jar. Its large size suggests that it might be used as the receptacle of urn burial.



Figure 22. Burial M9 (photo taken from north to south)



Figure 23. Pottery cauldron (T103 ⑥:58)



Figure 24. Pottery cauldron (DK1 ⑤:1)



Figure 25. Pottery cauldron (T205 ⑤:39)



Figure 26. Pottery cauldron with one lug (T303 ⑥:8)



Figure 27. Pottery bowl (T302 ⑤:50)



Figure 28. Pottery pot (T205 ⑤:40)



Figure 29. Stone adze (T301 ⑤:11)



Figure 30. Stone axe (T301 ⑤:5)



Figure 31. Bone si-shovel-shaped digging tool



Figure 32. Pottery pot (M2:1)



Figure 33. Post holes of the 3rd stage

Cultural Remains of the Late Phase

Cultural remains of the late phase, dated to about 5500–6000 BP, are comparable to that of phase III of Hemudu Culture. They include features and artifacts.

1. Features Features of this phase were infrequent and scattered. However, there existed a concentration

of stones and burned clay nodules. Otherwise, the material remains comprised of scattered ash pits, post holes (Figure 33) and burials.

Burial M3 was likely the remains of special urn burial practice. It had a near circular pit orifice and round bottom. The burial yielded three pottery vessels, including two unique basin-rimmed cauldrons (Figure 34). Burial M4 was cut by a post hole. The skeletal elements were piled into a bundle, suggesting that it was a secondary interment (Figure 35). The burial was unfurnished.

2. Artifacts

Compared to the artifacts of the early and middle



Figure 34. Burial M3 (photo taken from west to east)



Figure 35. Burial M4 (photo taken from west to east)



Figure 36. Pottery cauldron (H4:2)



Figure 37. Pottery cauldron (T203 ④:4)



Figure 38. Pottery cauldron with a plate-shaped mouth (M3:3)



Figure 39. Pottery support foot (T303 ③A:1)



Figure 40. Jade jue-earring (DG3 ③A:1)

phases of the site, the artifact assemblage of the late phase shows some new elements within the traditional context (Figure 36–40).

Conclusions

First and foremost, the discovery and excavation of Tianluoshan provides an invaluable opportunity to broaden the study, preservation and publicity of the Hemudu Culture, and enriches the knowledge about it.

Second, the excavation improves the understanding of the distribution pattern of the early Hemudu culture

sites in the Yaojiang drainage. It confirms that this region was “the core of the settlement cluster of Hemudu Culture.” Tianluoshan is an ancient site situated in a landscape of rolling hills and expansive water. It had the best surface condition among all the known sites of Hemudu Culture, and a corpus of considerably preserved subsurface deposition.

Third, the stratigraphic relationship between the cultural layers and the Holocene oceanic deposition has two important implications. On the one hand, it indicates the unique characteristics of the formation and development of the Hemudu Culture in the coastal region. On the other hand, it outlines the processes of the rapid oceanic aggression and the subsequent changes of the natural and humanistic environments in about 6000 BP.

Fourth, the recovery of multi-layered post holes indicates the characteristics and technology of foundation construction in architecture. It also indirectly reflects the interplay between the adaptive activities of the Hemudu people and the changes of physical environment. The excavation furnishes invaluable data for the study of the beginning and development of stilted architecture.

Fifth, charcoal remains and fragments of pottery shards yielded from a 10m deep geological core provide important clues in the search of the origin of Hemudu Culture.

Notes: The original report was published in *Wenwu* 文物 (Cultural Relics) 2007.11: 4–24 with 59 figures and two tables, was written by Sun Guoping 孙国平 and Huang Weijin 黄渭金. The present abridgement is prepared by the first author and translated in English by Lee Yun-Kuen 李润权.