The excavation of the Shigudun Site in Tongling County, Anhui

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Abstract

The excavation of Shigudun site in Tongling, Anhui yielded a rich assemblage of material remains that included features like house foundations, ash pits, ditches, wells and a great number of postholes, and artifacts like pottery, hard stamped pottery, proto-porcelain, stone and bronze objects, and metallurgical debris. The relative chronology of the artifacts indicates continuous occupation of the site with no obvious developmental gap. The cultural characteristics expressed in the material remains are complex. The excavation, therefore, is an important addition to the database for the study of the past cultural characteristics for the region south of the Yangtze River in Anhui Province. The finding of remains attributable to bronze metallurgy is rare in the prehistoric archaeology of China. It throws light on the bronze casting technology during the Shang and Zhou Dynasties and opens a window to the production and circulation of bronze objects in the social context of the times.

Keywords: Bronze foundry–China–to 221 BCE; metallurgy–archaeology; Shigudun Site (Tongling County, Anhui)

A brief introduction of the site

The Shigudun 师姑墩 Site is located in Changlong 长龙 Village, Zhongming Town, Tongling County, Anhui Province. The mountains south of the site are the richest copper distribution zone in the lower reaches of Yangtze River. Several mining and foundry sites of the Shang-Zhou period and since have been found in this region. The Shigudun Site in an oval-shaped plan was about 1-3m higher than the surrounding area. It occupies an area of about 7500sq m. From March to August 2010, Anhui Provincial Institute of Cultural Relics and Archaeology conducted an archaeological excavation that recovered 1300sq m occupation of the site (Figure 1).

Deposition of the site was up to 3.5m thick. It can be divided into as many as 13 strata. Based on the stratigraphy and cultural characteristics of material remains, we simplified it into three successive phases of early, middle and late. The early phase was contemporaneous with the Erlitou Culture. The middle phase was contemporaneous with the Shang Dynasty. Finally, the late phase was contemporaneous with the Western Zhou Dynasty to Spring-and-Autumn Period.

Vestiges

1. The early phase yielded a few features that included two ash pits, one ditch, and a small number of postholes.

Ash pit H8 was an irregular oval-shaped earthen pit outcropped beneath stratum 12 in T7. Its opening measured 1.025m from east to west, and 0.36m deep. The south wall of the pit was relatively straight, and the bottom was flat. The pit was filled with dark brown soil. Material remains yielded comprised of small amount of potsherds derived from vessels in the shapes of ding-tripod, high-necked jar, and gu-goblet-shaped cup.
2. The middle phase yielded a few small ash pits.
3. The late phase yielded a rich assemblage of features that comprised of seven ash pits, two ditches, one well, two house foundations, and a large number of postholes and trenches related to the house structures.

House foundation F1 outcropped beneath stratum 5 in T10. The eastern and western portions of the feature had been disturbed. The plan of the feature was a rough rectangle oriented from the northwest to the southeast. It measured about 8.5 cm from north to south. The remaining length measured 3 m from east to west. A fire-baked earthen wall stood in the center of the feature, partitioning it into a south room and a north room. The remains of the wall measured 3 m long, 0.2-0.3 m wide, and 5-50 cm high. Two postholes were embedded in the wall. There was a rectangular earthen platform located in the north room. It was slightly higher on the sides and slightly sunken in the center of the top. Its western portion had been damaged. The remaining length measured 0.74 m and the remaining height measured about 15 cm. The floor of the south room was flat and slightly depressed at the south. A pile of stones were placed on the depressed place. The upper layer of the feature was filled with 60 cm of baked earthen nodules and a fair number of potsherds derived from yan-steamer, li-cauldron, jar, dou-stemmed bowl, and bo-bowl (Figures 2 and 3).
Well vestige J1 outcropped beneath stratum 10 in T6. The oval-shaped feature had straight wall and flat bottom. It measured 1.2m in diameter from north to south and 1.6m deep. The deposition of the pit consisted of two layers. The upper layer was filled with loose black soil tempered with fire-baked earthen nodules and a fair amount of potsherds comprising mainly stamped pottery. The lower layer was filled with fine grayish-green silt tempered with small amount of bronze slag, fire-baked earthen nodules, wood, stone material, one piglet skeleton, and a few potsherds (Figure 4).

**Artifacts**

The excavation at Shigudun Site yielded pre-Qin era potsherds, stamped pottery, proto-porcelain, stone artifacts, more than 200 small bronze artifacts, and remains related to bronze metallurgy, like slag, fragments of furnace wall, and pottery molds. In addition, floral and faunal remains were also recovered from the excavation.

1. Early phase. The assemblage of material remains of the early phase comprises mainly of potsherds, including a small number of sherds derived from hard stamped pottery, a small number of stone artifacts, and some metallurgical remains.

(1) The pottery assemblage comprises mainly of fine sandy potsherds, followed by that of fine pottery, and a small number of hard stamped pottery. The exteriors of the sherds are mostly unembellished plain and cord-marked. Recognizable vessel forms include ding-tripod, jar, gu-goblet and dou-stemmed bowl.

All the ding-tripods are made of sandy paste and have deep belly round bottom and flat legs. Specimen T8 ⑩:2 has light gray paste and black hue on both the exterior and interior. The upper legs have two pinched depressions. The exterior is embellished with discontinuous cord marks. The orifice measures 15cm in diameter (Figures 5:1 and 6).

**Figure 6** Pottery ding-tripod (T8 ⑩:2).

*Figures 5* Potteries of the early phase.

1. Ding-tripod (T8 ⑩:2); 2. Dou-stemmed bowl (T7 ⑨:1); 3. Basin (H9:3); 4 and 5. High-necked jars (H8:1 and H8:2); 6. Vat (T6 ⑫:37); 7. Bell (T9 ⑪:3).
bowstring and cord mark patterns. The vessel measures 18cm tall (Figures 5:4 and 10).

_Gu_-goblet. A large number of _gu_ were recovered from the Shigudun Site; however, none of them is restorable to a complete vessel. They are invariably made of fine gray paste with black coat. Specimen T7:24 has slender body, gently concaving flat bottom. The edge of the base has a flange. The polished exterior is embellished with ridged bow string pattern. The remaining height measures 12.4cm.

Laced vat base. Specimen T6:59 is a grayish-brown fine sandy pottery ware. The short ring foot has an obliquely pressed lace edge. The ring foot measures 9.6cm in diameter.

Thick-lipped vat. Specimen T6:37 is a light gray pottery tempered with coarse sand. It features straight rim, cylindrical body, laced appliqués and small checker pattern. The diameter measures 60.4cm (Figure 5:6).

_Pottery bell._ Only one specimen (T9:3) was yielded from the excavation. The bell is a sandy red pottery instrument. It features a near-globular body, flat top with two round holes, and serrated ridge on one side. The body measures 10cm in diameter (Figure 5:7).

(2) Stamped pottery. None of the small assemblage of stamped pottery is restorable. The stamped potsherds are fine-pasted, embellished with small checker, small diamond, small dots-filled net, and leaf vein patterns.

(3) The lithic assemblage is small in amount and type.

_Battle-ax._ Specimen T9:2 is trapezoid in shape, slightly damaged on the top, curved blade, and measures 9cm long (Figure 11:1).

_Sickle._ Specimen T7:2 features curved back, straight blade, slightly damaged on the tip, and completely polished body. It measures 10.8cm long (Figure 11:2).

(4) Bronze and metallurgy related remains. The early phase yielded a small amount of bronze artifact and
Figure 11  Stone implements of the early phase.
1. Yue-battle ax (T9②:2); 2. Sickle (T7②:2).

Figure 12 Pottery furnace wall fragment (H9:4).

Figure 13  Potteries of the middle phase.

Fragments of furnace wall.
Furnace wall fragment (H9:4). The specimen is reddish-brown on the exterior and has bronze patina on the interior (Figure 12).

2. Middle phase. The material remains of the middle phase comprises mainly of ceramics, and small amount of stone and antler artifacts.

(1) About half of the pottery assemblage comprises of sandy pottery, followed by fine pottery, and a small number of hard stamped pottery. Other than plain, the vessel exteriors are embellished mainly with cord mark. Vessel shapes included li-cauldron, dou-stemmed bowl and gui-pitcher.

All li-cauldrons are made of sandy pottery. Exterior decorations include bowstring, ridge and cord mark. Specimen T37 ⑨:10 has reddish-brown exterior and dark gray interior. The mouth measures 13.1 cm in diameter (Figures 13:1 and 14). Specimen T5 ⑪:1 is a dark gray pottery. The mouth measures 10.4 cm in diameter (Figures 13:2 and 15).

Dou-stemmed bowl. Specimen T37 ⑨:6, which has a false belly (seemingly deep but actually shallow, the lower part of the belly of which is a part of the stem), is made of fine gray pottery with black coat, flared mouth, out-bending rim, shallow belly, thick and tall ring foot, and decorated with bowstring pattern. The mouth measures 14.6 cm in diameter (Figures 13:3 and 16). Specimen T37 ⑨:3 is a fine sandy red pottery. It has flared mouth, flat bottom, thick ring foot, fine cord mark decoration. The mouth measures 12.4 cm in diameter and the height measures 7 cm (Figure 13:4). Specimen T37 ⑨:7 is made of fine gray pottery. It has flared mouth, flat rim, angled body, and damaged ring foot. The mouth measures 13.2 cm in diameter (Figures 13:5 and 17). Specimen T37 ⑨:8 is made of fine black pottery. It has burnished black exterior, small mouth, curling rim, bulged shoulder, curved body, and a damaged ring foot. The mouth measures 7.4 cm in diameter (Figures 13:6 and 18).

Gui-pitcher. Only one gui-pitcher (T37 ⑨:11) has
Figure 14  Pottery *li*-cauldron (T37 ⑨:10).

Figure 15  Pottery *li*-cauldron (T5 ⑨:1).

Figure 16  Pottery *dou*-stemmed bowl (T37 ⑨:6).

Figure 17  Pottery *dou*-stemmed bowl (T37 ⑨:8).

Figure 18  Pottery *dou*-stemmed bowl (T37 ⑨:7).

Figure 19  Pottery *gui*-pitcher (T37 ⑨:11).
Figure 20 Potteries of the late phase.

1 and 2. Ding-tripods (T11 ①:2 and T36 ②:1); 3. Li-cauldron with cord mark of Type C (T6 ⑤:91); 4. Li-cauldron with scratched surface Type A (T41 ⑤:6); 5. Li-cauldron with cord mark, Type B1 (T4 ⑧:21).

been partially restored. It is made of fine sandy pottery. The dark gray vessel has straight body and pouched legs with oval section. The remaining height measures 11.4cm (Figures 13:7 and 19).

Bamboo joint-shaped stem. A few specimens of bamboo joint-shaped vessel stems were yielded from the excavation. T37 ⑨:2 is made of fine light gray pottery with a light yellow hint. The slender stem has horizontal ridges resembling the sections of a bamboo stick. It is also decorated with vertical strip and net patterns. The remaining length measures 14.4cm (Figure 13:8).

3. Late phase. The deposition of the late phase occupation is the richest deposition of the Shigudun Site. Material remains recovered include pottery, stamped pottery, proto-porcelain, and stone artifacts. The number of stamped pottery and proto-porcelain significantly increased from previous occupations. It also yielded a fair amount of metallurgical remains.

(1) Pottery. A great amount of pottery artifacts was recovered from the late phase occupation. Recognizable vessel shapes include ding-tripod, li-cauldron, basin, dou-stemmed bowl, jar, he-pitcher, yan-steamer, gui-tureen, zun-vessel, vat, pan-basin, bo-bowl, yu-water vessel, bowl, vessel lid, pottery pad, and spindle whorl.

All of the ding-tripods are made of coarse sandy pottery. Most of them are reddish brown in color. Specimen T11 ①:2 features flared mouth, bending rim, curved body, round base, and partially restored legs. The orifice measures 13.8cm in diameter (Figures 20:1 and 21). Specimen T36 ②:1 features flat body, flat triangular legs, and the mouth measures 14cm in diameter (Figure 20:2).

Based on the surface embellishment, the li-cauldron family can be partitioned into cord marked, scratched and plain. The majority of the scratched li-cauldrons are made of sandy reddish-brown and grayish-brown pottery with crested rim, restricted neck, jointed crotch, cylindrical legs, and scratched exterior, and some show smeared cord marks. The mouth of specimen T41 ⑤:6 measures 22.2cm (Figures 20:4 and 22). Cord marked li comprise mainly of sandy gray or black pottery. Specimen T4 ⑧:21 has truncated conical legs and the diameter at mouth measures 20.6cm (Figures 20:5 and 23). Specimen T6 ⑤:91 has a partially restored flat handle on the side. The mouth measures 13.2cm in diameter (Figure 20:3).

Dou-stemmed bowl. Most are made of fine pottery. Specimen F2:4 is a red pottery features flared mouth, curved body, tall ring foot, and decorated with bowstring pattern. The mouth measures 13.8cm (Figures 24:1 and 25). Specimen T4 ⑧:20 is made of black pottery. Its mouth measures 16.4cm in diameter (Figure 24:3). Specimen T7 ①:2 is a black-coated sandy red pottery ware. It has a short ring
foot and the mouth measures 16.4cm in diameter (Figure 24:2).

Basin. Specimen T16 ⑥ :1 is made of sandy reddish-brown pottery. Its lower exterior is sooted. It has flared mouth, restricted neck, deep body and flat bottom. The mouth measures 26.8cm in diameter (Figure 24:8).

Jar. Specimen T7 ⑤ :2 is a black-coated fine red pottery ware. It has flared mouth, bulging belly, flat bottom and cord mark decoration. Its mouth measures 12.2cm in diameter (Figure 24:7).

Pan-basin. Most of the pan are fine black pottery or black-coated pottery. Specimen T9 ⑥ :20 has straight mouth, angled shoulder, shallow body, ring foot, and decorated with string of beads pattern and bowstring pattern. Its mouth measures 20.2cm (Figure 24:4). Specimen T8 ⑨ :10 is cylindrical in shape, the transition from the body to the ring foot is non-distinctive. Several rounds of bowstring pattern embellish the body (Figure 24:5).

He-pitcher. Most of the he-pitchers are reddish-brown pottery slightly tempered with sand. No upper part of a he-pitcher has been restored. The remaining features include restricted waist, cylindrical foot, and cord mark pattern on the lower body. Specimen T8 ⑧ :1 has joined crotch, a partially restored handle and small clay chips stuck to the two sides over the spout. The remaining vessel measures 13.2cm tall (Figures 24:6 and 26).

(2) Stamped pottery. A fair amount of stamped pottery was recovered from the late phase occupation. Most of them are hard stamped pottery. The major vessel types include jar and vat. Surface decorations consist of zigzag squares, double zigzag squares, frets, stylized yunlei-spiral patterns, double-lined double squares and leaf vein patterns. Yu-water vessel is one of the most popular vessel types among the stamped pottery. Specimen T4 ⑦ :3 is a fine black pottery embellished with incised lines and bowstring patterns. Its mouth measures 12.2cm in diameter and its height measures 6.2cm (Figure 27:1). Specimen T11 ⑤ :4 is a fine dark gray pottery. Its shape is similar to that of the former. The body is embellished

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**Figure 22** Pottery li-cauldron with scratched surface, Type A (T41 ⑤ :6).

**Figure 23** Pottery li-cauldron (T4 ⑧ :21).

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**Figure 24** Potteries of the late phase.

1–3. Dou-stemmed bowls (F2:4, T7 ① :2 and T4 ⑧ :20); 4 and 5. Pan-basins (T9 ⑥ :20 and T8 ⑨ :10); 6. He-pitcher (T8 ⑧ :1); 7. Jar (T7 ⑤ :2); 8. Basin (T16 ⑥ :1).
with a pair of symmetrical bridge-shaped lugs, incised line and bowstring patterns. The mouth measures 12cm in diameter and the height measures 7.1cm (Figure 27:5).

(3) Proto-porcelain. A large amount of proto-porcelain was yielded from the late phase occupation. The proto-porcelain assemblage mainly comprises of dou-stemmed bowls, and small number of jar, pan-basin, bowl and yu-water vessel. Most of the glaze of the vessels has been worn off; some of them might have been unglazed.

Dou-stemmed bowl. Specimen T6 ④:2 has fine light gray paste. It is wheel-thrown and green glazed. It features flared mouth, angled body, round bottom and ring foot. The mouth measures 11.4cm in diameter (Figure 27:4).

Pan-basin. Specimen T6 ③:1 is slightly deformed. It has light gray paste, green glaze, flared mouth, curved body and short ring foot. The mouth measures 18.2cm in diameter (Figure 27:3).

Bowl. Specimen T7 ④:10 has light gray paste, flared mouth, flat bottom with false ring foot. An “E”-shaped insignia is incised on the bottom of the base. The mouth measures 15.2cm in diameter (Figure 27:2).

(4) Stone artifacts. A small amount of stone artifacts were recovered from the late phase occupation. They include chisel, adze, yue-battle ax, shovel, spearhead, and arrowhead. In addition, it also yielded considerable number of gravels, some of which seem to have associated with metallurgical activities.

Yue-battle ax. Specimen T21 ⑦:1 is flat rectangular in shape. A unilaterally drilled hole was made on the top central part of the shoulder. It measures 13.5cm long.
(Figure 28:2).

Spearhead. Specimen T25 ③ :1 has triangular tip and rectangular tang. It measures 14.9 cm long (Figure 28:1).

(5) Bronze artifacts and metallurgical remains. The majority of the bronze assemblage was recovered from the late phase occupation. It comprises mainly of small weapons, some fragments of vessel rims and legs. Remains related to metallurgical activities include ore material, facility, refuses and casting tools; however, slag and furnace wall fragments comprise the majority of the metallurgical assemblage.

Bronze adze. Specimen T5 ⑦ :3 features rectangular body, restricted waist, and wore blade. The artifact measures 7.2 cm in length (Figure 29).

Bronze cutter. Specimen T5 ④ :1 features elongated body, upturned tip, long and thin handle embellished with oblique lines.

Bronze arrowhead. Specimen T9 ⑩ :1 features diamond-shaped plan and cross-section, and a narrow tang. The remaining length measures 15.8 cm.

Bronze spearhead. Specimen T7 ④ :4 features long body, raised spine, and slightly damaged haft socket. The remaining length is 15.8 cm (Figure 30).

Pottery mold. Specimen T5 ④ :4 is likely a casting mold of a ding-tripod type vessel. It is made of light gray pottery. The specimen is one of the parts of a composite mold, possibly embellished with tendril pattern. The remaining length measured 11 cm (Figure 31).

Stone mold. Specimen T11 ⑩ :1 is the mold of a tool. It is made of brown sandstone with a groove on the exterior, a trough and a runner on the side on the interior. The mold measures 15.6 cm long (Figure 32).

Fragments of furnace wall. Specimen T29 ⑤ :6 has reddish-brown exterior tempered with plant roots, and a relatively thick layer of bronze patina mixed with charcoal fragments on the interior. The remaining length measures

Figure 29 Bronze adze (T5 ⑦ :3).

Figure 30 Bronze spearhead (T7 ④ :4).

Figure 31 The internal design of pottery vessel mold (T5 ④ :4).

Figure 32 Stone tool mold (T11 ⑩ :1).
10.3cm (Figure 33).

Slag. The honeycomb-shaped slag is dark green in color. They are light weight in general. Specimen T6 ⑨ :10 measures 4cm on the long axis (Figure 34).

Conclusions

1. The excavation of Shigudun Site provides an opportunity to reconstruct the regional cultural chronology from the Xia and Shang Dynasties to the Spring-and-Autumn Period of southern Anhui and a larger surrounding region. However, the cultural characteristics of the three eras show considerable difference, among which there might have been some gaps or missed links.

2. The excavation of Shigudun Site provides important information for the study of the social context of bronze metallurgy in the lower reach of the Yangtze River. A small number of remains of furnace wall and slag were yielded from the early phase deposition, and their exact dates need to be determined; nonetheless, they are particularly significant to the study of the development of bronze metallurgy in southern China. The late phase occupation of Shigudun, in spite of small in size, yielded considerable amount of material remains attributable to bronze metallurgy. They include remains derived from domestic, smelting and casting activities. Archaeological survey in southern Anhui has identified four small occupations contemporaneous with Shigudun Site that yielded evidences of smelting and casting. They provide critical information for the study of the development of bronze industry, and the precise chronological datum and social environment in the study of the relationship between the Xia, Shang and Zhou Dynasties with the resource-rich southeastern entities.

References


Postscript

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