

# Ceramic Models of Wells in the Han Dynasty (206 BC to AD 220), China

by Jiu J. Jiao

## Introduction

The ancient Chinese believed that after a person died, he would take a journey to the next life. He needed all the things he had in his earth life: food, clothes, money, entertainment, household items, and protection from evil spirits for his journey to the afterlife. The family would prepare a tomb for the dead person and fill it with all these things. This was how they honored their ancestors and kept their spirit happy on the journey to paradise (Johnson Museum of Art 2008). By doing this, the deceased's family members could also ensure their own good fortune.

The items buried in a tomb with a dead person are called *mingqi* in Chinese, which has been translated into various English terms such as grave goods, funerary wares, spirit wares, and tomb figures. Many of the *mingqi* are miniature models of objects from daily life. Some were replicas of actual possessions of the deceased. Fashioned primarily of clay, but also of wood and bronze, they included miniature figures of all kinds, including models of pigsties, pigs, goat pens, goats, chickens, dogs, lamps, farmhouses, watchtowers, granaries, grain mills, stoves, and wells. Among all the materials, pottery was the most popular medium for *mingqi* and also the most durable.

The custom of burying pottery *mingqi* in tombs became most popular in the Han Dynasty (206 BC to AD 220), which can be divided into Western Han (206 BC to AD 8) and Eastern Han (25 to AD 220). Between them, there was a short period called Wang Mang's Xin Dynasty (8 to AD 22). The Han Dynasty was the second great Chinese imperial dynasty. It was a period of a unified China with a strong and powerful military. Art, culture, literature, astronomy, and the economy—all

flourished during the Han Dynasty. The Han nobility would have highly impressive, elaborate, and even multi-room tombs. Royalty and nobility might be buried with expensive, specially made objects of jade and bronze, but most people bought objects that were probably mass produced. These *mingqi* provide a wonderful picture of everyday life in the Han Dynasty.

The well *mingqi*, among many other *mingqi*, have been described in the western literature on Chinese antiquities, ceramic arts, and archeology and collected and displayed in museums in western countries beginning in the 1900s (Hobson 1925–1928; Lefebvre d'Argencé 1967; Shoten 1969), but the hydrogeological community does not seem to be aware of their existence. Although wells have been used at least since the early Chinese Neolithic Age (Jiao 2007), many ground water specialists still do not know what ancient Chinese wells looked like. For hydrogeologists, therefore, the most interesting *mingqi* are the models of various wells. These well models provide valuable and vivid information on the wells used by Chinese people living about 2000 years ago.

Recently, the author has been fascinated by the wonderful well *mingqi* and purchased a dozen of them. The author has also collected hundreds of images of well *mingqi* from the literature, the Internet, and the museums. This historical note includes photographs of a few typical well *mingqi* and presents a brief description of their style, structure, functions, and distribution in the Han Dynasty of China.

## Well Mingqi in the Han Dynasty of China

In 1959, the Luoyang Archeological Excavation Team excavated 86 graves in Shaogou, Luoyang, Henan Province in northern China and found 97 ceramic models of wells (Luoyang Archeological Excavation Team 1959). This demonstrates that wells were very popular in the Han families. In the burial setting of a grave, the ceramic well is always near the ceramic model of a kitchen, indicating that a well was a common household item and that most of the wells were probably used mainly to provide water for domestic consumption.

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For ease of description, a typical well is divided into three components: well body or shaft below the ground surface, wellhead above the ground surface, and the superstructure above the wellhead. A primitive well may have only the well body, but a sophisticated well may have all three components.

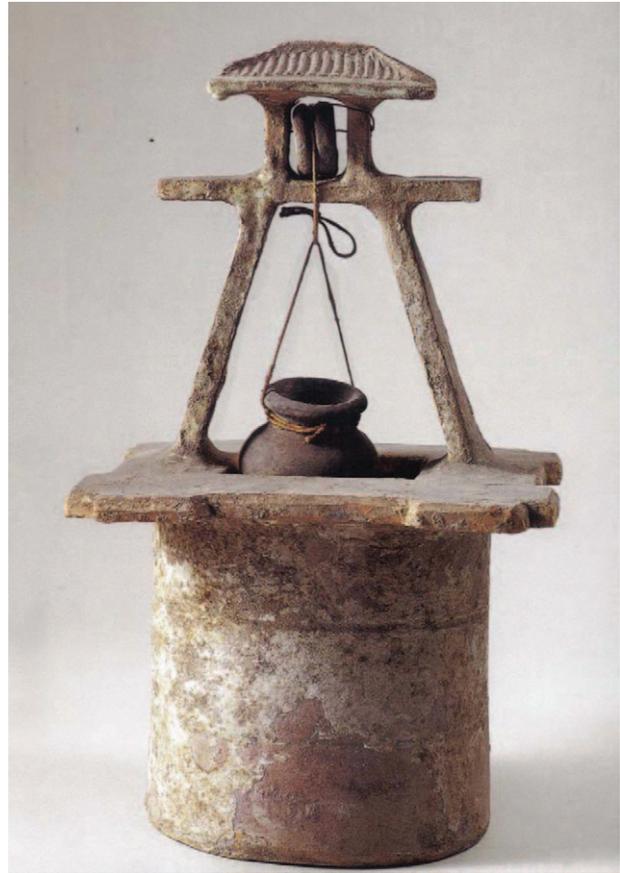
#### Well Mingqi in Northern China

Figures 1 and 2 show two ceramic models unearthed from Shanxi and Shaanxi Provinces in northern China, respectively. These two wells are believed to be typical for well models in the Han Dynasty in northern China.

Wells similar to the one in Figure 1 have been reported in various publications (Schloss 1977; Ma 2004–2005; Liu et al. 2005). The well takes the shape of a narrow-waisted cylinder rising to a broad, flat rim on which is set a small water bucket, waiting to be put into the well and drawn up by the pulley. Above the wellhead is an A-frame superstructure consisting of two inward-leaning struts that rise to support a crossbeam. At the center of the crossbeam, two small posts carry a tiled hip roof. Housed



**Figure 1. Ceramic well model unearthed from Shanxi Province. Height 41.1 cm, rim diameter 18 cm.**



**Figure 2. Ceramic well model unearthed from Shaanxi Province. Western Han, height 35 cm, diameter 15 cm.**

under the roof is a pulley that would have been used for drawing water by means of a rope and bucket.

Attached to either side of the superstructure of the well in Figure 1 is the head of a dragon, which is one of the most important creatures in Chinese mythology and is believed to be the controller of all waters. Inventive and lively variations of decorative subjects and elements, such as a toad sitting on the rim of a well, two roosters, a bird, or a monkey standing or sitting on top of the roof, can be found in the literature (Schloss 1977, 1979).

The bottom of the well in Figure 1 is closed. A very similar well model was described by Liu et al. (2005), but the bottom of that well was open to the ground, indicating that the cylindrical structure is only a wellhead and does not include the well shaft. Liu et al. (2005) speculated that in its burial setting, the wellhead may have been placed over a hole in the tomb floor that imitated a well shaft.

The well in Figure 2 consists of a cylinder of nearly uniform diameter and a superstructure, which includes a small and elongated gable roof and a pulley for raising and lowering a bucket. The well accessories such as bucket and pulley are separated from the well. In many Han Dynasty excavation sites, these small items were easily lost and only the wells were found. At each corner of the surface of the wellhead, the rims intersect and extend outward beyond the cylinder, creating a cross. The setting of the surface of the wellhead suggests that the wellhead must have been originally made of wood.

### Well Mingqi in Southern China

Figures 3 through 5 show ceramic well models unearthed from Guangdong Province in southern China. The ceramic well model in Figure 3 was described in the book by Li (1996). This well has a lid that nicely covers the well mouth. This lid makes it very rare and different from many other such wells unearthed in Guangdong and Hunan Provinces.

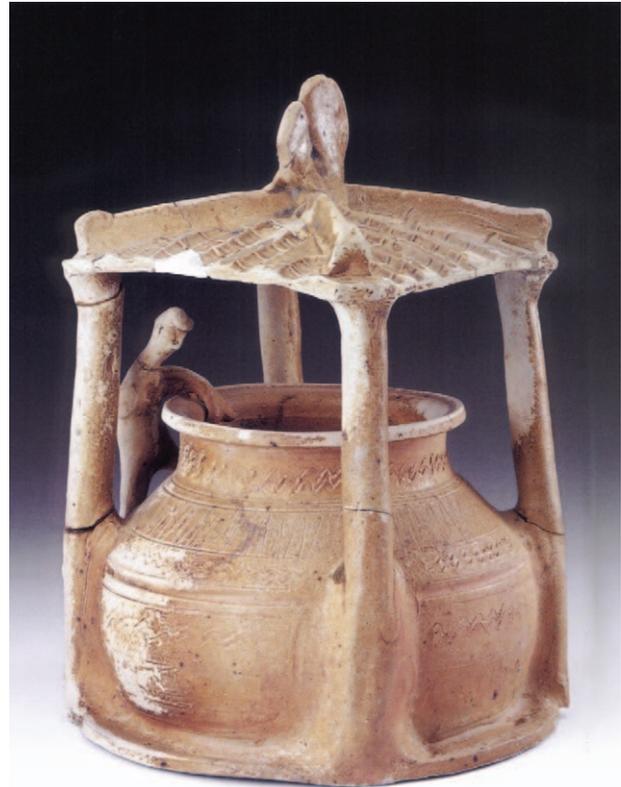
The cylinder of the well sits on a larger round platform. The bottom part of the cylinder is large, but the upper part is small and narrow waisted. There are four slits on the platform, suggesting that there should be four posts that supported some kind of superstructure. The posts, however, may have been made of less permanent materials such as wood that decayed long ago.

Well models with protruding bottom edges originated in Guangdong in the middle Western Han. This type, featuring a cylindrical well shaft, emerged in the late Western Han and continued to be made throughout the Eastern Han. The shape and ornamentation seen here are typical of well models from Guangdong and Hunan in the mid- to late Eastern Han period. An almost identical well was collected by Lefebvre d'Argencé (1967) but was mistaken as a silo.

The main part of the well model in Figure 4 is also a cylindrical structure. The bottom part of the cylinder is large but the upper part is small. There is a person standing somewhere in the middle of the cylindrical structure. There is a large square, gabled roof supported by four posts that covers the entire well. There is a bird sitting on the top of the roof.

The posts were made of the same clay as the rest of the structure and are nicely preserved, which is rare among these wells. The posts would have deteriorated long ago if made of wood. In many of the examined graves, only the wellhead and sometimes the cover were found. Only slits in the wellhead suggest the possible existence of posts, such as those shown in Figure 3.

In this well model, there is no pulley system to draw water. The person looking into the well and his left hand



**Figure 4. Well model unearthed in Guangdong Province. Eastern Han, height 25 cm, bottom diameter 18.4 cm.**

reaching into the well suggest that water was drawn with a bucket attached to a rope. His right hand is somehow damaged and missing. Many ceramic figurines from the Han Dynasty are not to scale, and the heads are usually



**Figure 3. Wellhead model unearthed in Guangdong Province. High-fired earthenware, Western Han (25 to AD 220), height 17.7 cm, diameter 22.8 cm (Li 1996).**



**Figure 5. Ceramic well model unearthed in Guangdong Province. Later Eastern Han (77 to AD 220), height 22.2 cm.**

disproportionately large. However, this does not appear to be the case for this figurine; thus, the figurine may serve as an approximate scale for the well. Other well models showing figurines drawing water from the well without a pulley system can be seen in the Guangzhou City Museum and Panyu Museum in Guangdong Province.

The well in Figure 5 has a style similar to that of the well in Figure 4 except for the rectangular shape. The well sits on a larger rectangular platform, representing the ground surface, so the model depicts only a wellhead and its superstructure. The cross created by the rims intersecting at the corner of the well suggests that the actual wellhead was originally constructed of wood.

### Comparison of Wells in North and South China

The obvious difference is that most wells in northern China have a pulley system, but those in southern China usually do not. Both wells from southern and northern China have a gabled roof, but the roof for the wells in northern China usually is very small and seems designed to protect only the pulley system. Only two posts are needed to support the small gabled roof and the pulley system. The roof in southern China, however, is very large and covers the entire well. Four posts are needed to support the roof on these wells.

These differences probably reflect different weather conditions and differences in the local water table. The major differences in the weather conditions between south and north China have remained unchanged for the past 2000 years. In southern China, there is always abundant rainfall, the water table is shallow, and ground water can be drawn simply with a bucket attached to a rope. However, in northern China, the weather is usually much drier and the water table is typically deeper, so some mechanical device such as a pulley or winch system is needed to draw water out of a well.

People in southern China in the Han Dynasty, probably just like today, were concerned more with water quality than quantity because quantity was not a major problem. Having the wellhead much higher than the ground surface could prevent waste water or flood water from flowing into the well. The wide or protruding bottom edge as seen in Figure 5 accurately depicts a Han device used to prevent soil erosion around the wellhead, which otherwise would result from the frequent spilling of water as it was transferred to individual containers. The huge roof would prevent windblown dust and other material from falling into the well. It may have had other functions, such as shielding people from the direct sunlight so that they could work comfortably at the well during the typically hot summer days in the south.

As shown in Figure 3, there may have been a lid to cover the well mouth in addition to the roof covering the entire well to ensure that the water was protected. The lid has a handle pierced with a hole, which is then connected with a ring that was probably made of metal. In addition to protecting the well, the lid may have had other functions such as preventing children from falling into the well.

In the north, water is much more valuable because rainfall is very limited. Some villagers still dig a large

hole in the ground to collect water in the rainy season and then save it for dry periods. This water may initially be very muddy, but it can be placed in a container and used after the dirt settles to the bottom. The small roofs on the northern wells may have reflected the desire to allow rain to fall into the well.

### Special Purpose Wells

#### *Irrigation Wells*

During the Han Dynasty, agriculture flourished everywhere and various irrigation techniques had been adopted (Rawson 1996). Historical documents show that ground water was used for irrigation. For example, Rawson (1996) presented an exceptionally large and complete model of a manor excavated from a multichambered Western Han tomb in Henan Province, which had a well in the vegetable garden.

Figure 6 is a Western Han burial object unearthed at Shaogou, Luoyang, Henan Province in 1953. This well has three components: well shaft, wellhead, and superstructure. The wellhead and body were made separately.



**Figure 6. Pottery model of a well with pulley and water trough. Western Han, 47.8 cm high, unearthed at Luoyang, Henan Province in 1953 (Yu 1997).**

The well shaft is more or less oval shaped near the wellhead but becomes progressively smaller and cylindrical toward the bottom. The long well body suggests that the well was quite deep. The wellhead is rectangular in shape and has patterns on each side. The nails at the corners of the wellhead suggest that the sides were made of wood and connected by tenon and mortise joints. The accessories of this pottery model include a water funnel and a water trough, which are believed to be evidence that the original well was used for irrigation (Yu 1997). The pulley was used to lift large quantities of water from the deep well.

#### *Wells for Extinguishing Fires*

The Eastern Han period was a time when many families built huge estates, as reflected in the tomb models of the period (Rawson 1996). Chinese buildings have always been built primarily of wood, so fire was a constant hazard. Figure 7 is the model of a well for extinguishing fire. It was found in Luoyang, Henan Province in northern China.

The main part of the well is a rectangular enclosure constructed of thick posts and railings with a square cross section. It has several accessories such as a roof, a bucket, and a pulley; two connected beams are included to support the pulley. There is a water trough in front of the well. There are four holes on the rim of the well, indicating that there were four posts that were probably made of wood. The wooden posts in Figure 7 were added later for display purposes. Of course, the original wood deteriorated long ago.

On the front long side of the wellhead is the figure of a man walking with a banner on which is written the

characters *miehuo*, “extinguish fire” (this is difficult to read from the model shown in Figure 7, but a similar model with sharper Chinese characters can be found in Li [1996]). A banner hangs from a pole slung over the man’s shoulder and behind him is a rooster. This scene is flanked by a rectangular panel decorated with triple lozenges. At the far ends are the characters *miehuo* (as on the banner) on the right and *dongjing*, “eastern well,” on the left. The other three sides of the wellhead have relief designs as described in detail by Li (1996).

Quite a few wellheads with the characters “eastern well extinguish fire” have been reported in the literature (Mino and Robinson 1983; Li 1996; Rawson 1996), but the well in Figure 7 is a very rare example because it has all the accessories including the trough. Because such accessories are usually separated from the wellhead, they can be easily lost or treated as items irrelevant to the well. For example, without knowing what the pulley and the beams were for, Hobson (1925–1928) mistakenly turned them upside down and suggested that they were “a model of a wheel-barrow with a single wheel in the center and handles at both ends.”

In front of the well is a trough, which has a small hole at the bottom near the front edge, suggesting that the trough could be drained if necessary. It is unclear what this trough was for, but it might have been used to store water for quick use during emergencies. The robust structure of the well suggests a high water productivity, but if large amounts of water were needed for quenching a fire, drawing water from the well alone may not have been sufficient.

## Conclusions

Numerous ceramic models of wells from the Han Dynasty have been unearthed in China, but this does not seem to be widely known in the hydrogeological community. The well models described here were *mingqi* that originally served as burial items in the graves of the deceased. Because they imitate real wells of that period, they give us a good idea of what Han Dynasty wells looked like.

The typical well models presented and described here shed some light on the ancient wells in China about 2000 years ago. The wells in northern China typically had a pulley system for raising and lowering a bucket to draw water, suggesting that the water table was generally deep. However, the wells in the south usually do not have such a pulley system, and water was probably drawn from the mouth of the well simply using a bucket attached to a rope, indicating that the water table was relatively high. The roof of the superstructure over the well in the north was small, whereas the roofs on the southern wells were large enough to cover the entire well. This suggests that people in the south wanted to protect the quality of the well water. Some well *mingqi* show that the water from the wells was used not only for domestic consumption but also for irrigation and for putting out fires.

Well development has long been part of Chinese civilization. These elaborate and sophisticated models



**Figure 7. Pottery model of a well with roof, pulley, bucket, and water trough. Unearthed at Luoyang, Henan Province.**

suggest that the technique of well construction in China was already mature and quite advanced in the Han Dynasty. From these widely distributed well models, it is reasonable to infer that field hydrogeology was probably also equally advanced because there must have been specialists who were knowledgeable about aquifers and the best locations for digging and constructing wells.

## Acknowledgments

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