

# Touch props on Eternal Offerings Stop and Chat

## EARTHENWARE HORSE'S HEAD

### WHAT IS IT?

This object is an earthenware horse's head. It was likely made during the Han dynasty (206 B.C. – 221 A.D.). As the object is mounted on a base, please leave it on the cart for visitors to touch. Avoid handing it to visitors to hold as it is fragile.

### WHY WAS IT MADE?

This object is a ming-ch'i (pronounced ming- chee, a "spirit article" or "bright object,") that was made solely for burial. It was one of dozens, perhaps hundreds of objects that would have been placed in a multi-chambered tomb.

Although some ming-ch'i were made for specific burials, many were mass-produced and could be purchased on a retail basis.

### HOW WAS IT MADE?

The horse's head was made in a mold out of grayish-colored clay. The molds were carved out of clay and fired at a high temperature. Once cooled, the mold was coated with a parting compound to prevent the clay from sticking.

Wet, unfired clay was then pressed into the mold. The potter would scrape down the object's walls so that the final object would be hollow and relatively lightweight.

The mold with the clay inside would then be fired, but at a lower temperature than that at which the mold itself was originally fired.

To create more complex pieces, an entire horse, for example, several molds would have been used. The pieces would have been assembled before firing by attaching the mold pieces containing the unfired clay. After firing and cooling the mold would be removed. Imperfections were filed off and the object could be decorated with paint. Many traces of pigment remain on this horse's head.

## WHAT AESTHETIC OR CULTURAL VALUES DOES THIS OBJECT REFLECT?

This object reflects the Chinese reverence for their ancestors. By the Han dynasty, the Chinese had already been burying goods with their dead for thousands of years. This practice reached a highpoint in the Shang dynasty when elaborate bronze vessels, along with carved jade, silk, foodstuffs and live human and animal sacrifices were buried in royal tombs. By the Han dynasty, burial of ceramic ware replaced the practice of human and animal sacrifice and the production of ming-ch'i, items specifically intended for burial, was greatly expanded.

Many ceramic ming-ch'i made during the Han dynasty recreated the form of the Shang dynasty bronzes. Most of those bronzes were vessels that had been used for ritual purposes before being buried. The horse's head represents the second type of ming-ch'i and reflects a trend toward naturalism that prevailed during the Han dynasty. Ming-ch'i of this type might include replicas of the deceased's home or farm, servants, guards, musicians, jugglers, and a variety of animals—anything that might bring comfort in the afterlife.

By burying objects with the dead, family members expressed their respect for the deceased and fulfilled the Confucian obligation of filial piety.

This object also reflects the importance of horses in Chinese society. The Han dynasty was founded in rebellion against the harsh rule of the previous rulers, the Ch'in. Horses were essential to the Han rulers establishing and exerting control. As such they were symbols of power and prestige. In addition to their military significance, horses were also used on the trade routes, which extended west to the Middle East and even to ancient Rome, and southward into India. The Chinese exported silk and received horses and other goods in return.

### Questions and Activities

- What do you see? What does it feel like?
- What other images of horses and other animals did you see in the exhibition?
- What traits, characteristics, or symbolic meaning do you associate with horses? With those qualities in mind, why might someone want a horse (real or clay sculpture) buried with them in their tomb?
- What important item(s) would you like to have buried in your tomb?
- What are some reasons why ancient and modern peoples around the world bury significant objects, images, or symbols with their dead?

# RAW JADE

## What is jade?

The term “jade” (in Chinese *yu*) refers collectively to a number of semi precious stones that occur naturally around the world and have been used throughout history. The most common kinds of jade are jadeite and nephrite, which differ slightly in appearance and origin, though both come in a variety of colors from pink to green.

Nephrite, a slightly more expensive stone, comes from Central Asia and has been worked in China since the Neolithic period. Jadeite has a shinier surface than nephrite, comes mainly from Burma and was mostly unknown in China until the 18th century. The piece of raw jade is nephrite.

Jade goes through a remarkable transformation from “raw” when it comes out of the earth to “refined” after it is worked and polished. As you can see on the piece of raw jade, jade naturally forms a skin on the outside hiding its beautiful interior. The highly refined jade objects in the galleries have been carefully worked by skilled craftspeople.

The piece of raw jade was purchased in Hong Kong by a museum guide.

## HOW IS RAW JADE SCULPTED?

It is not really accurate to talk about “carving” jade. Because of its extreme hardness, 6.5-7.0 (talc is 1.0, diamond is 10.0) on Moh’s hardness scale, jade cannot be carved like many other, softer stones. If chiseled, the brittle stone will shatter.

Instead, jade is abraded using a paste of minerals harder than jade such as garnet and quartz. The paste is rubbed against the jade using bamboo or wood sticks and strings or steel cords to incise the jade surface or saw through it completely. As many as ten specialists are required to produce one piece of worked jade.

## WHAT IS THE CULTURAL SIGNIFICANCE OF JADE IN CHINA?

Jade is admired for its hardness, translucency, smoothness and rarity. To many Chinese, it is emblematic of virtue, protection, and wealth, among other things.

Han scholar Xu Shen summarizes jade’s properties and is now memorized by many students of art history in China:

“Jade is the fairest of stones. It is endowed with five virtues. Charity is typified by its luster, bright yet warm; rectitude by its translucency, revealing the color and markings within; wisdom by the purity and

penetrating quality of its note when the stone is struck; courage, in that it may be broken, but cannot be bent; equity, in that it has sharp angles, which yet injure none.”

Jade has been used in China since Neolithic times, and it has retained its value. Before bronze casting was invented, jade was the primary material used for burial objects of the wealthy. Even when bronze vessels became high-status burial objects, jade continued to be placed in tombs. In many instances, a jade object known as a han was placed in the mouth of the deceased. The people of that time thought that the jade enabled the deceased to maintain their enjoyment of life, and it was also thought to keep their corpse from rotting ([Hubei Provincial Museum, China](#)).

Patronage by the Ch’ien-lung emperor during the 18th century took the jade industry to new heights, especially in the manufacture of decorative objects as symbols of status and wealth. It was during Ch’ien-lung’s reign that our own Jade Mountain was made in the imperial jade workshop, as well as the majority of our jade objects from the Thomas B. Walker Collection. Jade continues to be a precious material emblematic of China-- the medals for the 2008 Beijing Olympics were enhanced with white jade.

## WHAT OTHER CULTURES VALUE JADE?

Jade has been and continues to be considered valuable in many different cultures including ancient Mesoamerican cultures such as the Olmec, Maya and Aztec, the Māori of New Zealand, and others. Jade is the official state gemstone of both Wyoming and Alaska.

## QUESTIONS AND ACTIVITIES

- Pick up, turn over, and examine this rock. What do you observe? What questions do you have? What surprises you about this object? What do you see that makes you say that?
- Based on its size and shape, what would you make/have made out of this piece of jade?
- Do you think it was harder to make a bronze vessel or harder to carve a jade object? Why?
- Looking at the jades in the galleries, what characteristics and properties do you think might be most admired? How does it compare to the piece of raw jade?
- What other kinds of objects do you see in the galleries made of jade?
- How many other colors of jade can you find in the galleries?

# Bronze Vessel

## WHEN & WHY WERE BRONZE OBJECTS FIRST MADE IN CHINA?

The Bronze Age in China was from about 1700 through 221 BCE, primarily during the Shang and Zhou dynasties.

During this early period, the Chinese experimented with and developed bronze casting techniques. As in many other Bronze Age cultures worldwide, the initial motivation for creating bronze objects in ancient China was to produce stronger weaponry and tools, which had been made of stone in the past. In addition to weapons and tools, bronze vessels like this one were produced in great quantities for ceremonial purposes, including ancestor worship rituals, during which bronze vessels were used to hold wine, water, and food in honor of the ancestors.

Bronze vessels also were often buried in tombs. Chinese belief held that the deceased continued to live on as spirits and needed to take along worldly possessions for the afterlife (not unlike the ancient Egyptians).

Elaborate bronzes like those in the galleries were very costly prestige items. Wealthy people and royalty had a number of bronze vessels in their tombs—some even had hundreds or thousands! The less wealthy would have had fewer and smaller bronzes and/or ceramic vessels (a less expensive alternative). Some particularly lavish tombs even contained chariots and life-sized ceramic sculptures of the tomb occupant's army and servants.

## HOW WAS IT MADE?

Bronze is an alloy of copper (usually about 90%) and tin. The color of bronze is affected by the amount of copper, tin, and impurities, but it is generally reddish-gold. Over time, oxidation causes bronze to develop a typically greenish outer crust called a patina.

Although the Shang and Zhou dynasty Chinese were familiar with the common practice of crafting bronzes by lost wax casting (also used by other Bronze Age cultures), they instead chose to use a much more complex, refined technique called piece-mold casting.

Piece-mold casting consists of a number of steps, summarized below (and illustrated in one of the laminated handouts and the video clips saved on the iPads):

1. A clay model of the vessel shape, with decoration, is made and partially dried.
2. A second layer of clay is shaped over the model and allowed to dry.
3. The second layer is cut away from the model in sections. The inside walls of these sections may be further enhanced with carved designs.

4. After wearing down the original model a few millimeters, the outer sections are re-assembled around the model, leaving an empty space between the two. The vessel was fired upside down.
5. Molten bronze is poured between and fills the empty space.
6. After cooling, the inner and outer molds are broken away and the finished vessel is cleaned and polished.

The repeated pattern on this small vessel is referred to as “interlocking T’s.” This pattern is common in Shang and Early Zhou dynasty bronze decoration. The motif may have been borrowed/adapted from Shang or Zhou textile designs.

## QUESTIONS & ACTIVITIES

- Take this bronze into your hands. How does it feel? Based on holding this small example, how would it feel to hold some of the examples you saw in the exhibition?
- How might it have been used? What do you see that makes you think so?
- Using your touch, describe the texture and surface of the vessel.
- If you owned this vessel, what would you do with it? Where would you keep it? What would you put in it? Why?
- What questions do you have about the production of bronze vessels?

## 3D-printed replicas of the Owl Zun

Two 3D-printed replicas of the Owl Zun are available for visitors to touch. One replica is a miniaturized version printed from the 3D scans. The other 3D-printed replica--the owl's head--is to scale. (Please note that the 3D material is rather fragile so have people take care when holding them.)

The larger replica allows the visitor to feel the texture of the surface of the vessel. These replicas were 3D-printed from the special 3D imaging scans created by Mia's Visual Resources staff.

## Sketchfab 3D models on iPad

By employing new imaging techniques, the staff of the Visual Resources department now creates 3D models that are virtual representations of works of art.

The preferred scanning method is photogrammetry, a process of deriving measurement data from photographs. This involves taking pictures of an object from many angles of view and then using software to find the common features on the surface of an object within hundreds of photos.

By calculating this data along with the camera positions and a reference scale placed next to the object, it is possible to reliably map the geometry of a form down to a fraction of a millimeter. The result, a cloud of thousands, sometimes millions of points representing the common pixels gathered from those photos, is then wrapped with color and tone derived from the photographs to make a 3D facsimile of the artwork that can be viewed in virtual space. The ability to freely rotate the object and zoom in for close examination of fine detail provides new opportunities for art historians, conservators, researchers and public audiences worldwide.

There are some limitations to the types of things that can be recorded with photogrammetry or any other 3D scanning technology. Transparent or highly reflective objects, such as glass or silver, are problematic since they challenge the software's ability to distinguish reflection or transparency from opacity. Also, standard commercially available software cannot capture the level of color accuracy or surface detail that museums expect to see when reproducing works of art.

In an attempt to address some of these shortcomings, Mia began a collaboration with a research team at the University of Minnesota's Department of Computer Science and Engineering. Professor Gary Meyer and PhD candidate Michael Tetzlaff developed a novel, image-based rendering system that preserves the realistic qualities of the original photographs used with photogrammetry. It offers enhanced color accuracy and convincing specular reflections that allow the viewer to better interpret the tonal qualities, surface textures and material properties of the object depicted.

The capture method employs a simple flash-on-camera setup that can be achieved with conventional photographic equipment. Knowing the relative position of the camera and the mounted flash allows the algorithm to factor in the angle of the light illuminating the object. With this information, it is possible to achieve dynamic “relighting” of the object after the fact.

In other words, the viewer has the option to move a set of virtual lights around the model independently. This is a remarkable advantage to anyone wishing to imagine how an object will appear under various lighting scenarios. If a curator or conservator would like to see the object illuminated with a raking light to accentuate the shadows falling across a textured surface, for example, this is as simple as navigating the virtual lights within the software interface. And rather than making abstract assumptions about how the light reflects off the surface of the object, the program dynamically applies the jpeg photographs. The result is a highly realistic and accurate rendering of the original work of art.

Mia took advantage of this new approach and documented the large collection of ancient Chinese vessels for *Eternal Offerings: Chinese Ritual Bronzes*. Significant research and study has been underway on the bronzes over the last several years. A team of experts was brought in from China to assist Dr. Yang Liu, Curator of Chinese Art and Head of Asian Art at Mia, in gathering detailed information about this renowned collection. Along with the scholars who closely studied the objects, specialized technical artists made precise measurements, detailed line drawings, and graphite rubbings of the intricately decorated vessels. Photogrammetry is the perfect companion to supplement the other documentation techniques used to gather knowledge on this subject. (A [link to the finished scans](#) is saved on the iPads and can be accessed from the home page.)

## Label of Owl Zun

Zun is a type of bronze wine vessel used by Shang-dynasty (c. 1600–1046 BCE) aristocrats during ritual ceremonies to honor their ancestors. This owl-shaped zun is divided into two sections: the removable owl’s-head lid and the bird’s hollow body. Vessels shaped like animals constitute virtually the only bronze sculpture known from the Shang period. Besides this owl, vessels in the form of buffalo, boars, rhinoceroses, elephants, and rams have also survived. This owl is one of the oldest and most naturalistic of the few remaining owl-shaped zun. Its form exhibits the influence of the Shang capital, Anyang, in the North, but the style and casting technique of the vessel (the indentation on the interior walls corresponds to a relief found on the exterior) indicate that it is related to the bronze tradition of the middle Yangzi region in southern China.

## QUESTIONS & ACTIVITIES

- Hold the head of the owl. Using your sense of touch, describe how the texture and surface feel.
- Based on holding this small example, would you describe the owl as more realistic or more imaginary? What do you see that makes you say that?
- What might be some of the qualities of the owl that the ancient Chinese admired?