

## A VARIATION OF THE 'LOST-WAX' PROCESS

Ever since Noel Barnard proved that the ancient Chinese bronze vessels of the Shang and Chou periods could only have been cast directly from piece-moulds, there has been much speculation among scholars as to when and where the 'lost-wax' process, previously thought to have produced these early vessels, was introduced into China. According to Barnard, the 'lost-wax' process was probably brought to China from India with the introduction of Buddhism, traditionally ascribed to the first century A.D., but recent research now suggests a new theory.

Joseph Ternbach has convincingly demonstrated that the plaques in the 'Animal Style' exhibition with the appearance of a fabric on the backs were produced by the 'lost-wax' process. These and related plaques in the Gold Siberian Treasure of Peter the Great in the Hermitage appear to have been made during the third century B.C., by the Hsiung-nu, a nomadic tribe on the north border of China. Their customs were well-known to the Chinese, so it is not improbable that the 'lost-wax' technique could have entered China at this time. John Gettens' most recent theory would seem to support this idea. "There is no clear line of evidence, but it seems that at the close of the Chou Dynasty (third century B.C.) radical changes were introduced in the fabrication of vessels. It is possible that these changes reflect the introduction of *cire-perdu* (lost-wax) or some indirect method of casting from the West, but this has not been demonstrated."

—EMMA C. BUNKER

In the collection "*Animal Style*" *Art from East to West*, shown recently in the University Museum, there are three plaques which, apart from their stylistic relationship, have in common a puzzling schematic feature—a positive impression of coarse fabric on the back.

Although the practice of using a coarse fabric such as canvas or linen seems not to be widespread, its use in the manufacture of these plaques can easily be accounted for. Because their design contains so much openwork as to make them

delicate and fragile, this special step was needed in their construction.

In casting by the so called 'lost-wax process,' the artist creates a model in any material such as clay, wood, steatite, metal or wax, and makes a mold from that model. (He now has a negative impression of the model from which positive impressions, as many as desired, can be produced.) A thin layer of modeling wax, about 1/16 of an inch thick (which is the minimum thickness required for an even casting), corresponding to the desired thickness of the metal, is spread evenly over the surface to fill the mold.

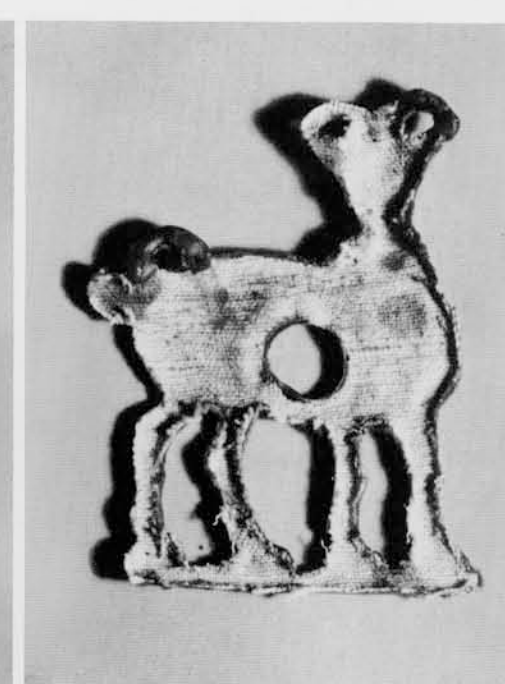
For technical, artistic, and economic reasons, lightness of weight was a most desirable quality for the final casting. But a wax model of the necessary thinness is fragile and difficult to remove from the mold. Therefore, a support in the form of canvas cut to the design is placed on the layer of wax and fused with it by sliding a heavy metal spatula over the canvas. With this reinforcement the wax model can more easily be removed from the mold, handled, and the finishing touches and details applied. When the wax model is encased in a fire-resistant mold and heat applied, the wax—and with it the fabric—melts and burns out. Then the metal is poured in to replace the wax. The metal object created from this 'lost-wax' process has exactly the same impression on the back as does the model on its front. This is not a negative impression of the linen fabric but the replica of linen reproduced on the back of the model.

When an artist models directly in wax, his purpose can be to create a unique casting and he uses his model for casting, without making a mold. If he should make a mold from his wax model, the mold, of course, can be used again and again.

The existing examples in this exhibition and in the Hermitage are testimony that these castings were made in the 'lost-wax' process in use in the first millennium B.C.

The step by step procedure of the 'lost-wax' technique, including the application of fabric on the wax model is illustrated by the photographs on the following pages.

—JOSEPH TERNBACH



Cheekpiece of a horse bit from Luristan, early first millennium B.C. (Reverse)

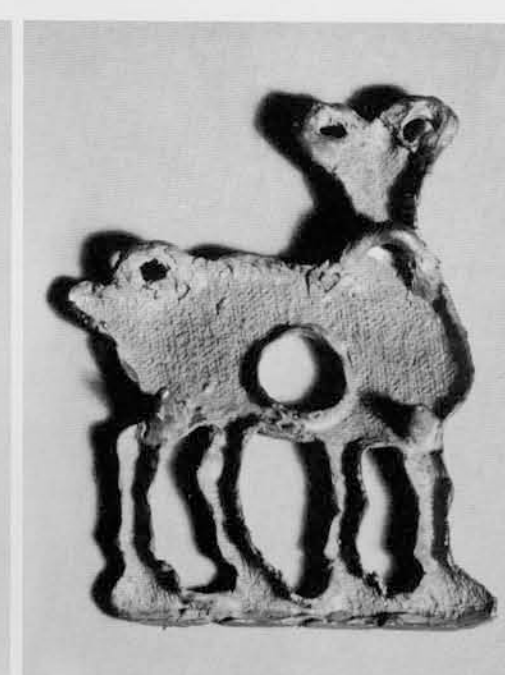
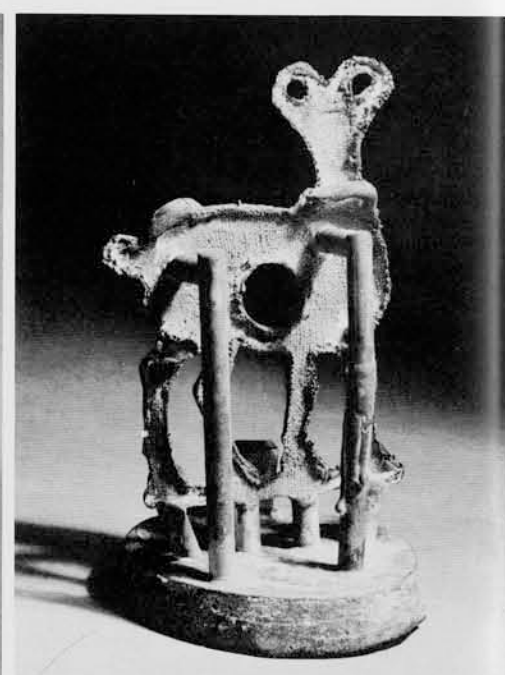
(Left) A mold is made by impressing the model in wet clay. When the mold is set, it is placed in the furnace to harden permanently. (Right) A rubber mold, as used nowadays, has the advantage of giving a firmer impression; it also makes for easy removal of the model.

Hot wax about 2 mm. (1/16 inch) thick is spread in the mold, making a wax impression. When the wax is set it can be removed from the mold and is ready to be cast.

A wax impression with canvas backing is made by spreading the liquid wax in the mold, about 2 mm. thick, and adding a canvas cut-out of the design. With a little pressure from a warm metal spatula, the canvas is fused to the wax.

A wax impression with gates attached

N.B. Pictures run from left to right over the two pages.



(Left) The wax impression is encased in a fire-resistant clay container (held by a metal cylinder) with the gates showing on top to indicate where the metal will be poured. (Right) The same container in which the wax is replaced by the metal.

The model removed from the clay container, with the gates and casting head still attached, showing the canvas impression on the back. The metal varies in thickness between 1.5 and 2 mm.

The model free of the gates and head, cast in bronze. (Left, obverse; right, reverse.)

Sample of fabric reinforced with wax and cast in bronze.

SUGGESTED READING

NOEL BERNARD, *Bronze Casting and Bronze Alloys in Ancient China*. 1961.  
EMMA C. BUNKER, "Animal Style from East to West," Chapter VI in *Animal Style Art of the Far East*. 1970.  
RUTHERFORD JOHN GETTENS, *The Freer Chinese Bronzes, Vol. II, Technical Studies*. 1969.