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Investigation report 28721

Pelt, 2020 January 06 Commissioned by Laboratory Kotalla

Concerning: **Investigation of a bronze Chinese statue**


Front side


Back side

Culture / Period: China, archaistic

Description:
Bronze, a double front sided statue of a standing person, both hands on the hip, with archaic patterns and taotie motif on both sides. Weathered surface.
Origin of the shape: Bronze Age, Sanxingdui culture (1600 BC) during the Shang Dynasty.


References from Sanxingdui bronze statues

Measurements:

Height	:	45	cm
Width	:	21	cm
Breadth	:	12	cm
Thickness	:	± 3	mm
Weight	:	3065	g

Used technique: Lost wax casting

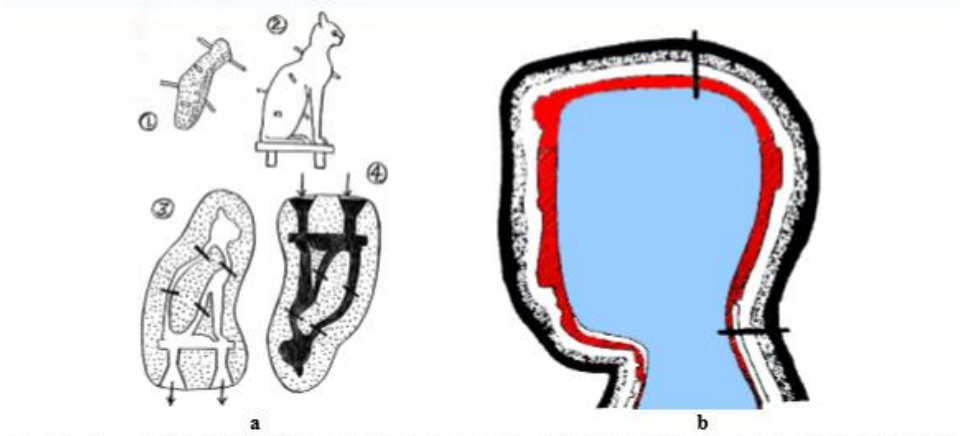


Figure 25 – a) Lost-wax hollow-casting shows (1) core piece, (2) wax mold of cat, (3) cross wax cat and clay mantle, (4) inverted assembly ready to receive molten bronze [30]; **b)** A cross section through a Buddha head during production. The wax image (red) was modeled over an inner clay core (blue). Metal pins hold the core and outer clay casing apart [31].

Note: In the Bronze Age of China, during Shang and Zhou Dynasties (1600 – 300 BC), the piece mold casting technique has been used. Lost wax casting technique was used the earliest in the Spring and Autumn Period (770 -476 BC).

Observations:

Archaïc Chinese patterns of the Bronze Age

Archaïc Chinese taotie pattern on the front and backside

Typical protruded eyes, eyebrows, and ears on Sanxingdui culture masks. This type has never been used by other Chinese cultures, even not in the Shang or Zhou Dynasties
The Sanxingdui culture was completely forgotten until the first discovery in 1929. Later excavations in 1986. This type of archaic bronzes was unknown before 1929.

Microscopic observations

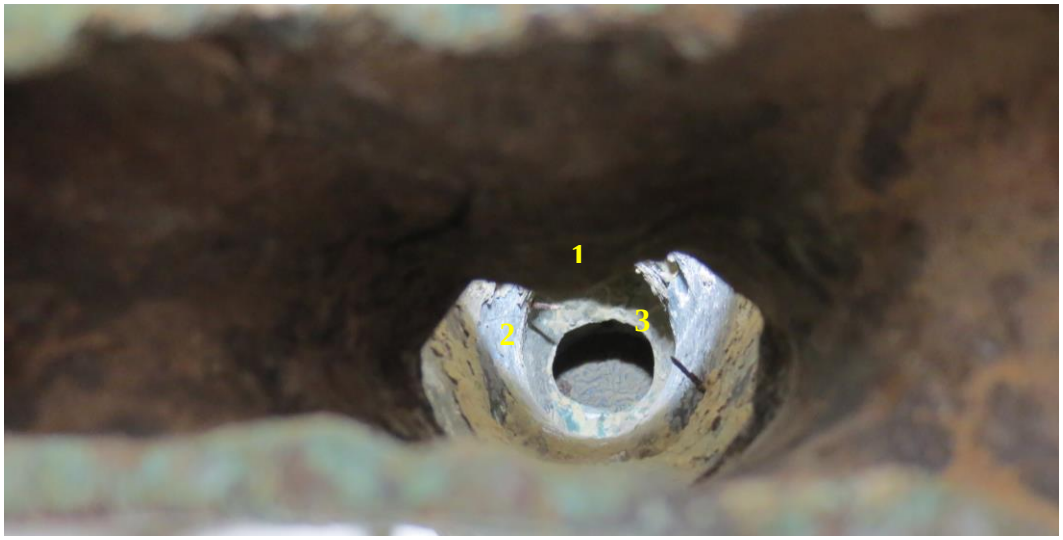
Outside surface

Weathering layers of cuprite (brown, black), malachite (green) and azurite blue.

Artificial weathering by the use of chemicals (acids and alkalines) causes preferential affection of the deeper parts. Natural weathering by burial in the ground would have affected the total surface evenly.

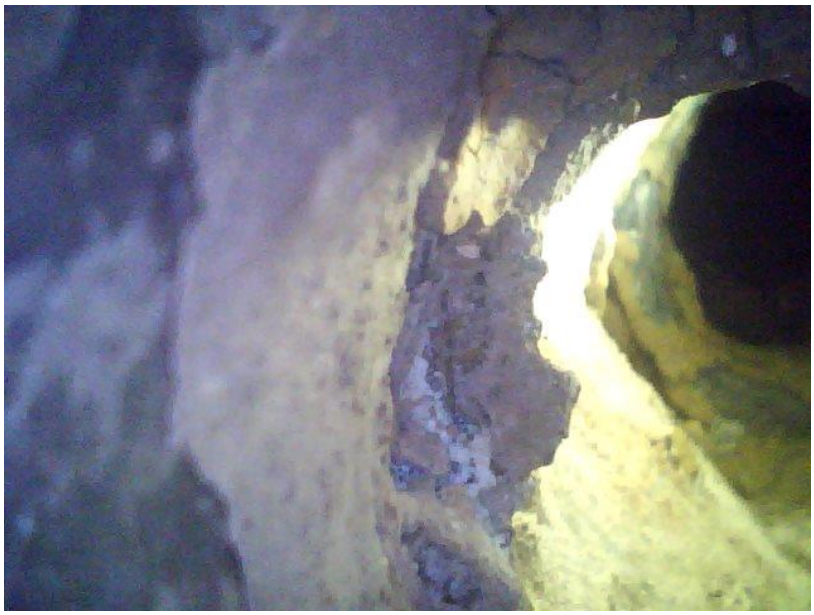
Inside surface: endoscopic observations

View inside the object from bottom to top.
No oxidation (weathering) of the inside surface.
It's impossible if the object was buried over thousands of years that the inside is not weathered.
At least a malachite oxidation layer should have been formed.



Three assembling edges can be observed. (see numbers)
The object is assembled from at least 5 parts (3 for the body, 2 for the arms)


Detail of the first assembling edge.


Detail of second assembling edge


Detail of the third assembling edge
Also, remark the chaplet at the right side (round iron nail with tetragonal tip) for holding the inside mold in position.


The inside surface is barely oxidized. The white oxidation layer is zinc oxide.


Details of the yellow silt layer

This is not an inner mold core material.

Chaplets used for lost wax casting


Inside view: Iron nails with a round shaft and tetragonal tip are used as chaplets.


Outside view of the iron round chaplets.

The use of iron was impossible in the Sanxingdui culture (Bronze Age, 1600 – 1100 BC). Iron appears for the first time at the end of the Bronze Age (Eastern Zhou Dynasty 770 – 476 BC).
Round iron nails with tetragonal tip are machinal produced since the end of the 19th century.

UV observation

Observation under UV-radiation of 385 nm: total absorbance, no fluorescence detected.
No use of synthetical binders.

Elemental composition:

Analysis of the metal surface by EDXRF (Energy Dispersive X-Ray Fluorescence Spectrometry)

		Front side	On top	On chaplet core in the surface
element		%	%	%
Pb	**Lead**	8.36	7.29	6.40
Fe	**Iron**	1.85	1,46	18.2
Ni	**Nickel**	0.25	0,29	0,16
Sn	**Tin**	2.03	1.73	1.02
Cu	**Copper**	62.8	62.7	52.3
Zn	**Zinc**	24.8	26.5	21.8

References for comparison: composition of archaic bronze alloy from the Bronze Age
(source: Dept. of MSEM College of Engineering and Computer Science, California State University, Northridge, 2006 Sep)

Elemental composition of bronzes from early Bronze Age

	Date BC	Objects analyzed	% Cu	% Sn	% Pb
Erlitou	1500	32	35-99+	0.04-23	0.03-6 1
Zhengzhou	1500-1300	5	53-80	0.53-18	6-41
Sanxingdui	1200	24	64-98	0.03 -12	0.03-33

Note: the parts of the statue are made of the same alloy (brass) but probably not at the same time.
The composition of the alloy is significantly divergent of the archaic bronze composition:
bronze of the Bronze Age does never content zinc (Zn) as an alloying element.
This high-level zinc brass is not earlier than the first half 19th century.

Summary

This object is made of brass (copper-zinc alloy). (19th century or later)
The statue has been made by a lost wax technique, not used in the Sanxingdui culture, using round iron tetragonal tipped chaplets: the earliest late 19th century.
Surface weathering has been achieved by artificial oxidation processes.
Since all objects known from the Sanxingdui culture were buried, The inside of this object has not weathered layers of a burial.
The silt layer at the inside surface is no part of the inner mold core. This yellowish silt is made of mineral material from the Late Bronze Age, probably to mislead TL aging analyses.
Since the first typical Sanxingdui objects were discovered in 1929, this object must be created later.

Statement
This archaistic object of the Sanxingdui culture type has been made in the 20th century or later.
The observations and analyses give rise to a suspicion of forgery or contemporary copy.

This statement is an opinion and therefore gives no right to redress or liability of any kind.

Pelt, 2020 January 6th

RJM. Bové

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