

# Skill Glory through Thousand Years

Tracing to the Origin of the “Black Copper and Silver Craft”, Intangible Cultural Heritage of Yunnan

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**Abstract**—The Black Copper and Silver Craft is the intangible cultural heritage of Yunnan Province, known as the “Two superb copper crafts” together with Beijing cloisonné. The Black Copper and Silver Craft has a history of more than two hundred years since its formation in the late Qing Dynasty. It can be seen from the study on the traditional Black Copper and Silver Craft that it has achieved the same result as the gilding craft of gold and silver, a traditional metal refining craft in ancient China, by different methods. This paper aims to argue the inheritance relationship between the Black Copper and Silver Craft and the gilding craft of gold and silver from the two aspects of the times and crafts of them. The Black Copper and Silver Craft developed on the basis of the gilding craft of gold and silver, which has produced its own original techniques while combining the advantages of the gilding craft of gold and silver.

**Keywords**—the Black Copper and Silver Craft; the gilding craft of gold and silver; the times; inheritance

## I. INTRODUCTION

The Black Copper and Silver Craft is a unique traditional Chinese copper technology in Yunnan. In this craft, the copper serves as the mold, and a variety of patterns are carved on the mold, and then the melted gold and silver or powdered gold and silver (gold and silver flake can be used in large area) is filled in the pattern, in heating conditions, the liquid gold and silver naturally flows and "goes" all over the pattern groove carved on the copper mold, after cooling, it is polished. For the copper mold used in the Black Copper and Silver Craft is the special "black copper", the copper mold turns black under the oxidation effect, reveals a bright silver (or gold) pattern, and shows black and white (or black and yellow) decorative effect, which is full of antique flavor, elegant and chic. It is the white silver that generally "goes" on the copper, so it's called the "Black Copper and Silver Craft". The craft in which gold "goes" on the black copper is called "Black Copper and Gold Craft". "Fig. 1" is the "Five Blessings and Longevity" Cauldron made by Jin Yongcai, an inheritor of the Black Copper and Silver Craft. This work won Chinese arts and crafts Gold Award of "Tiangong Art Gallery - Baihua Cup" in the twelfth China Arts and Crafts Master Works and International Art Expo.



Fig. 1. “Five Blessings and Longevity” Cauldron.

The Black Copper and Silver Craft originated from Yongzheng's reign in Qing Dynasty, with a history of more than two hundred years. In 2011, it was approved to be listed the third batch of national intangible cultural heritage list by the State Council for the savable development and protection of the Black Copper and Silver Craft. It can be seen from the study of the technological characteristics of the Black Copper and Silver Craft that it has a lot of similarities with the ancient gilding craft of gold and silver, but also has its own original skills. The purpose of this paper is to clarify the inheritance and progress of technological characteristics of the two crafts from the times and technological characteristics of them.

## II. INTERPRETATION OF THE "BLACK COPPER AND SILVER CRAFT"

The Black Copper and Silver Craft were invented accidentally. During Yongzheng's reign in Qing Dynasty,

when a craftsman named Yue Fu in Shiping County, Yunnan Province was refining liquid copper, his gold ring accidentally fell into the hot solution, and the gold ring instantly melted. He was so angry that he put all the metal around the furnace such as a small amount of silver into the furnace, and poured the solution onto the ground, thus, a new copper alloy "black copper" formed accidentally. This copper alloy showed the black color after oxidation, and there was looming bright yellow and white in the black at the same time. After Yue Fu's repeated pondering, the Black Copper and Silver Craft eventually came into being.

#### *A. Processing Step of the Black Copper and Silver Craft*

1) *Raw material refining of the black copper:* The formula of black copper alloy has always been arcane, only seized by a few masters of the Black Copper and Silver Craft. Some scholars have made a technical identification of the metal composition of the black copper, and found that the black copper is a gold-copper alloy, and the proportion of gold is small, at the same time, a small amount of silver and other metal elements is mixed in. So the raw materials of the black copper can not be purchased from the market like those of the brass and red copper, but can only be artificially refined.

2) *Production of the black copper flake:* Segment production and welding are commonly used in the Black Copper and Silver Craft, so the second step is to make the raw materials of the black copper into the black copper flake in the shape, size and thickness needed through steps like forging and tabletting.

3) *Carving of patterns:* The pattern is carved as pre-designed on the black copper flakes on different parts of the produced objects, which is required to be clear with smooth lines. Normally, the silver pattern depth shall not exceed 0.2mm, and the gold pattern depth shall not exceed 0.3mm.

4) *Flowing of the silver:* Flowing of the silver is the key step in the Black Copper and Silver Craft. The silver powder is filled into the pattern groove of black copper flake, and then the silver powder is melted in the high-temperature heating to naturally flow, and evenly fill the pattern groove. Powdered gold or silver "flows" on small objects or patterns, while thin gold and silver flake, gold and silver wire or small gold and silver block can directly "flow" on large objects or patterns.

5) *Component molding:* After the silver of all the parts finishes flowing, assembled and molding is needed, and all the components are assembled together by welding to make it a complete object.

6) *Post-processing:* The post-processing approaches of the Black Copper and Silver Craft include polishing and blacking. Firstly, with the file will be to form the surface of the welded object is filed with file, and then a variety of polishing tools are used for rough and fine polishing to make the object surface smooth, showing a complete pattern of flowing silver. Finally, the object is kneaded with palm, to produce oxidation reaction between the sweat of palm

and the object, and form a layer of black oxidation film on the surface of the object, showing a unique color of objects with the Black Copper and Silver Craft, and this process is called blacking.

### **III. THE TIME RELATIONSHIP BETWEEN THE BLACK COPPER AND SILVER CRAFT AND THE GILDING CRAFT OF GOLD AND SILVER**

Both the gilding craft of gold and silver and the Black Copper and Silver Craft belong to the traditional Chinese metal surface treatment processes, with strong handicraft, and still maintain the characteristics of pure handicraft. The Black Copper and Silver Craft evolved and developed from the gilding craft of gold and silver, whose appearance was far later than the gilding craft of gold and silver. The Black Copper and Silver Craft appeared Yongzheng's reign in Qing Dynasty, with a history of two hundred years, while the gilding craft of gold and silver appeared in the middle and late Warring States, with a history of more than two thousand years.

The gilding craft of gold and silver is a traditional Chinese metalworking craft. "Cuo" is a metal decoration technique, namely decorating patterns on the surface of the object with gold and silver. The gilding craft of gold and silver was a product when ancient science and technology developed to a certain stage, mainly used for the pattern decoration on various practical objects such as bronze wares, chariot and horse appliance, and weapons. It developed rapidly in the middle and late Spring and Autumn period. During the Warring States period and two Han dynasties, bronze wares with the gilding craft of gold and silver appeared in large numbers, and were widely popular in various fields of people's life. As shown in "Fig. 2", the gilding craft of gold and silver was used for decoration on the Copper Cylinder Inlaid with Silver unearthed in the ruins of Qin Great Wall during Warring States in Pingle Village, Yingtou Town, Yuanzhou District, Guyuan City, Ningxia. "Fig. 3" is the Dragon-pattern Pot Gilt with Gold and Silver of the Western Han Dynasty unearthed in the Tomb of Zhongshan Prince Jingwang in Mancheng District, Hebei Province. The body of the pot was finely decorated with the gilding craft of gold and silver. Xu Shen in Han Dynasty explained the word "Cuo" in "Shuo Wen Jie Zi": "Cuo means gold gilding." The outstanding text exegetical scholar Duan Yucai in Qing Dynasty commented: "Cuo is commonly known as gilding, meaning decorating gold on it". In "Ci Hai" edited by Chinese Ci Hai Editorial Board and published by Shanghai Dictionary Publishing House in 1989, the first explanation of the word "Cuo" is: "Cuo means finishing with gold". This shows that the "the gilding craft of gold and silver" is to inlay or gild gold or silver on the object surface to form decorative patterns.



Fig. 2. Copper Cylinder Inlaid with Silver.

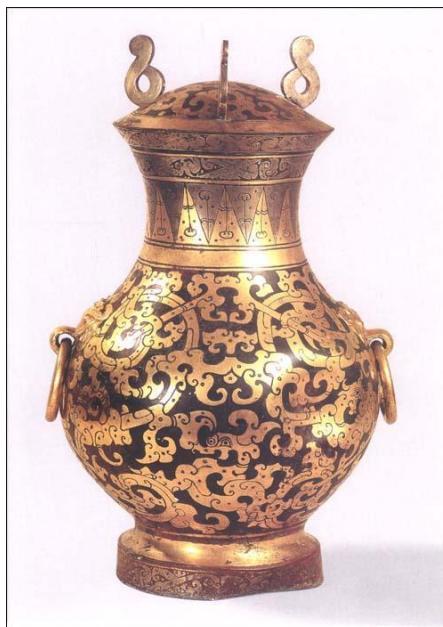


Fig. 3. Dragon-pattern Pot Gilt with Gold and Silver of the Western Han Dynasty.

The gilding craft of gold and silver appeared in the Spring and Autumn Period, and developed with the metal civilization of the Bronze Age, and reached its peak in Han Dynasty. Since then, this craft has always existed. However, with the end of the Bronze Age, the development of this metal decoration process also declined. Although there were also archaeological discoveries of dynasties after Han, there were few surviving works, or only small area for embellishment was used. It was difficult to find the gilding craft of gold and silver and technical height like that of the Warring States period the two Han Dynasties. The Black Copper and Silver Craft was a metal surface decoration

process that appeared in the middle of Qing Dynasty, and the process of silver flowing and decorativeness were similar to that of the gilding craft of gold and silver. From the perspective of appearing time, the Black Copper and Silver Craft was the inheritance, development and variability of the gilding craft of gold and silver.

#### IV. TECHNICAL INHERITANCE BETWEEN THE GILDING CRAFT OF GOLD AND SILVER AND THE BLACK COPPER AND SILVER CRAFT

Metal processes are divided into two kinds: casting and forging. Both the gilding craft of gold and silver and the Black Copper and Silver Craft belong to the category of metal forging process, which are the metal surface treatment processes. Whether it was in the Spring and Autumn Warring States period two thousand years ago or in the modern time when the technology is highly developed, it is difficult to complete these two processes with large-scale mechanical equipment, which can only rely on the handwork of craftsmen and artists, and the works often reflect the simple artisan spirit and rich human feelings. Both take the copper mold as the basis, decorate the mold with gold and silver, and present decorative objects in different color with materials. Although there was also object with the gilding craft of gold and silver based on silver in Tang Dynasty, throughout the archaeological discoveries, the vast majority of the ancient gilding craft of gold and silver was decorated on the copper mold. These similarities reflect the inheritance of the Black Copper and Silver Craft to the gilding craft of gold and silver. In addition, there was also great inheritance between the Black Copper and Silver Craft and the gilding craft of gold and silver, which is also an important reason for me to believe that the Black Copper and Silver Craft developed on the basis of inheriting the ancient gilding craft of gold and silver.

There are two methods of the gilding craft of gold and silver. The one is the gold coating method, in which the gold amalgam is coated on the surface of the object, and then the mercury evaporates in high temperature, leaving the gold, which is also known as gilding. The other is the inlaying method, which inlays the gold and silver wire or flake in the pre-set groove on the metal mold by making use of metal ductility to form decorative patterns.

##### A. Gold Coating Process

1) *Making "gold mud" is also known as "Shajin"*: Make gold into thin flake and heat to about 400 degrees, and then add mercury, stir up to make the gold completely dissolve in mercury, pour into the water for cooling, form silver-white paste-like gold mercury mixture, also known as gold amalgam.

2) *Coating gold is to coat the gold amalgam on the polished surface of copper mold with the "gold stick"*: the "gold stick" is a special tool for the gilding process. It is to beat one end of the copper stick, cover it with mercury and dry it on standby. The process of coating gold needs

repeated pushing to ensure that the gold mud and the object surface adhere firmly.

3) *Opening gold:* It is to force the mercury in the gold mud on the object surface to volatilize with highbake. The gold mud's color turns from white to yellow, leaving only gold attached to the surface of object.

4) *Post-processing includes scrubbing and calendering:* It is to remove the oxide layer formed during the process of opening gold with a brush, and then repeat grinding on the object surface with agate or other "presser" made of high-hardness jade, until the metals bright luster appears.

### *B. Inlaying Process*

1) *Draw decorative patterns: Draw detailed decorative patterns on the metal surface.*

2) *Make the groove: Groove is carved in the location in need of gold and silver inlaying, and the groove can be preset on the cast mold. The cross-section of groove is swallow-tailed, with small outer edge and large inner edge, so that the inlaid metal can be firmly fixed, not easy to fall out.*

3) *Inlay gold and silver: The gold and silver in the required shape and size are inlaid in the swallow-tailed groove and repeated beat, the superior ductility of gold and silver is made use of to fill the groove inside, and keep consistent to the swallow-tailed shape of the groove.*

4) *Post-processing: The object is repeatedly polished to make the surface smooth, showing the pre-designed pattern decorative effect.*

Gold coating method requires mercury, and mercury is highly toxic, if craftsmen inhale mercury in the production process, it will badly harm the body. Therefore, the gold coating method rarely seen in metal decoration process today, while another method of gilding craft of gold and silver, inlaying method is more used. The inlaying method completely gets rid of the mercury poison, and can decorate gold and silver to the surface of the objects, which is suitable for a variety of pattern decoration.

### *C. Inheritance of Technique*

It can be seen from the comparison with the gilding craft of gold and silver that the Black Copper and Silver Craft and the gilding craft of gold and silver not only have a lot in common, but there is a strong inheritance of technique between them. With the development of the times, people tend to have a more comprehensive and deeper understanding of the physical and chemical properties of metal, and the Black Copper and Silver Craft is exactly the improvement of the gilding craft of gold and silver on the basis of precise grasp of the physical and chemical properties of copper, gold and silver.

1) *Inheritance of smelting technology:* The material used in the Black Copper and Silver Craft is the special "black copper". This copper is different from the bronze and red copper used in the gilding craft of gold and silver, which is a copper alloy elaborately smelted to present the "black"

color of the copper. Ordinary copper objects also change colors after natural oxidation, and usually the colors become darker, but there will not be the "black" color of the "black copper". Therefore, the mold material "black copper" of the Black Copper and Silver Craft reflects the improvement of the previous two ancient copper crafts.

2) *Inheritance of skills:* The Black Copper and Silver Craft is a technological innovation on the basis of inheriting the gilding craft of gold and silver. It is also to decorate the copper surface with silver, but it avoids the harm to body caused by the mercury used in the gold coating method of the gilding craft of gold and silver, also avoids the disadvantage of the inlaying method which only makes use of the metal ductility to fix and thus the parts easily fall off, which is both environmentally friendly and solid. The improvement in the Black Copper and Silver Craft is based on the craftsmen's deep understanding of the chemical properties of the metal. The melting point of the silver is about 960 degrees, and the melting point of the copper is 1083 degrees. If the two metals are heated at the same time, the silver will melt into the liquid before the copper, so it can flow all over the pattern when the copper has not melted while the silver has become liquid, and firmly combine the two materials. The Black Copper and Silver Craft requires more accurate grasp of the melting point of the metal. The melting point of gold is 1064 degrees, very close to the copper, so this requires craftsmen's skilled mastery of technology, for the completeness the step of gold "flowing" requires good control of gold's melting time. The method of carving groove similar to that of the gilding craft of gold and silver is also used in the Black Copper and Silver Craft, so as to guide the melted silver flow to the designated location, and form decorative patterns. But the groove carved in the Black Copper and Silver Craft is more concise, which is generally shallow, and the complex swallow-tailed shape is not required, so that the process becomes simpler and more practical.

3) *Inheritance of object type embodiment:* As an important carrier of human's production activities, metal objects are engraved with a strong imprint of the times. Different natural environment and material environment breed matched production and lifestyle, followed by the corresponding object types. In early stages, metal objects in China mainly appeared as farm tools like hoe and sickle, cookers like pot and wok, and practical tools like nail, rivet, adze, wedge and trowel, and later they gradually transformed into weapon, ritual vessel, article for amusement, precious metal decoration and other objects that served the royalty and nobility. The development of metal objects in ancient China gradually demonstrated the characteristics of advocating ritual vessel while neglecting practicability, valuing armament and serving the royalty, favoring the nobility while neglecting civilian. According to the known archaeological discoveries, the earliest object with the gilding craft of gold and silver was the Gilded

Copper Belt Hook unearthed in Chu Tomb in Changtaiguan, Xinyang, Henan and the Tomb in Shaogou, Luoyang, once the object with the gilding craft of gold and silver was found, it has been out of the scope of labor tools, with decorative function and symbolic function of wealth status. The reason for this phenomenon is that the gilding craft of gold and silver appeared more than a thousand years after the development of bronze craft, when the metal smelting technology and metal decoration art had been highly developed, therefore, such fine metal technology served the ruling class, monarchy and nobility as soon as it appeared. The objects with the gilding craft of gold and silver in archaeological discoveries were mainly decorations such as belt and hook, and ritual vessels such as Gui, Fu, Dou, Jue, Zun, pot and so on, as well as weapons and decorations for carriages and horses. The Black Copper and Silver Craft represented in the forms of study appliance such as brush pot and ink box at the beginning of its appearance, mainly as small articles for amusement. Although some award-winning works of Jin Yongcai, the modern inheritor of the Black Copper and Silver Craft, are archaic ritual vessels, such objects have broken away from the feudal cultural and ecological soil, merely an imitation of the descendants to the traditional culture. The object types of the Black Copper and Silver Craft embody the development characteristics of objects in the mid-Qing Dynasty, in which the glory of Bronze Age had ended, large copper heavy machines could be hardly seen, while porcelain, gold and silver objects and jade objects played a more important role in people's daily lives. The shape of such objects was often small, more suitable for display and amusement. The Black Copper and Silver Craft met such development characteristics of the times at the beginning of its appearance, so the object shape was smaller, mainly as study appliance and article for amusement, with a strong cultural atmosphere.

The change from the object types of the gilding craft of gold and silver to the object shape of the Black Copper and Silver Craft reflects the evolution rule of the metal objects brought about by the development of the times: the shape of the objects turned from large to small; from ritual vessel, sacrificial vessel to study appliance and article for amusement; from practical tools for agriculture and handicrafts to decorations like jewelry and ornament. These excellent crafts were created by the working people, and turned to serve the feudal aristocracy, while the feudal soil disappeared but was also shared by the general public.

## V. CONCLUSION

The Black Copper and Silver Craft appeared in the mid-Qing Dynasty, two thousand years later than the gilding craft of gold and silver, which was a revival of the gilding craft of gold and silver during its decline after the germination in the Spring and Autumn Period and the Warring States Period, the heyday in Han Dynasty. Different from the beginning of rise of the gilding craft of gold and silver when it was mainly ritual vessels and decorations for carriages and horses, the

object types of the Black Copper and Silver Craft were mainly study appliance such as brush pot and ink box, which also reflected the development rule of China's metal object type. The Black Copper and Silver Craft was very similar to gilding craft of gold and silver, for they both used gold and silver for the metal surface decoration on the copper mold, which was a combination of advantages and disadvantages of the gilding craft of gold and silver for improvement. At the same time, the Black Copper and Silver Craft also carries the modern people's precise understanding and grasp of metal technology, and creatively uses the physical and chemical properties of the metal. I believe that the Black Copper and Silver Craft developed on the basis of inheriting the gilding craft of gold and silver, which is not an original metal surface treatment process, but an innovation of craftsmen in Yunnan in Qing Dynasty after grasping the complex metal smelting and surface treatment process, an inheritance to the ancient gilding craft of gold and silver, carrying the modern metal culture and object function.

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