

Analysis on Chinese Ming Pibian Forms, Techniques and Social Functions

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Abstract

The pibian (皮弁, pronounced as pì biàn in Chinese) is a kind of cap specific to China. Before the Ming dynasty (1368-1644), it was made of deer hide, while in the Ming dynasty, it was woven with bamboo filament. Through analysis on the forms, techniques and materials used in the pibian preserved, we discovered that pibian displayed a superb artisanship level. The sign of status was depicted through the pibian's structures and ornaments in an ingenious way, and its structures and components were closely linked with the social culture.

Keywords

Pibian, artistic characteristics, making technique, modelling and structure, social functions.

1. Introduction

The pibian is a kind of headgear specific to China, whose modeling is similar to that of two palms in juxtaposition, featuring a sharp top and wide bottom, with resemblance to the overall shape of an inverted cup. From the Zhou dynasty (1046–771 B.C.) onwards, the pibian was endowed with extremely important etiquette attributes, and became the cap worn second only to the diadem in ancient China. In the Ming dynasty, with its top evolving into a circular arc, the pibian also entered a developmental maturity in shape, material, decoration, technique and other aspects, meanwhile reaching an unprecedented height in traditional costume. It evolved into a cap which was exclusive to emperors and other imperial palace members. In the Ming dynasty, the pibian was worn not only by China's imperial family members, but also by monarchs of some of China's dependencies on the grounds that they were regarded as officials of the emperors of the Ming dynasty. Thus, when ascending to the throne, the kings of these Chinese dependencies would be granted a pibian according to the laws of the Ming dynasty, as a sign of recognition of the dependency by the emperors of the Ming dynasty [1]. Such was the ritual that the pibian, which had originated in China, thus outflowed to other countries, and even after the fall of the Ming dynasty,

the habit of wearing a pibian was still retained in some countries. Nowadays, only two complete pibians remain in the world, one preserved at the Shandong Museum (Figure 1a) and the other, at the Naha City Museum of History, Japan (Figure 1b). Due to the lack of historical relics, studies on the pibian have been rare. Based on the material object and literature analysis, this article performs analysis on the pibian of the Ming dynasty preserved at the Shandong Museum to investigate some features of the pibian: its shape, technique and function.

2. Chinese Ming pibian's form features, development, and changes

The pibian is so called because of its materials. In the beginning, a pibian was made by cutting white deer skin into pieces and sewing them together. As the Chinese character “弁” (pronounced biàn) has the meaning of cap, it was called a pibian (a cap made of hide) [1]. The development of the pibian went through three phases. The first dates back to the Zhou Dynasty (1056-256 BC), which was 3,000 years ago. At that time, the shape resembled two palms placed together, because the pieces were cut from deerskin, a hard material, and when sewn together, they would bulge under the pressure from both sides, so

that the surface resembled fingers placed together with regular undulations; with a sharp apex, the pibian widened as it descended towards the front, resembling the overall shape of an inverted cup; the seams between the cut pieces of the pibian were decorated with jade beads of five colours. The basic style of the pibian was established in the Zhou Dynasty and had a profound influence on the versions in later generations.

The pibian reached its second stage of development in the Tang Dynasty (618-907). Although 1,600 years had passed since the Zhou dynasty, the pibian of this period was still made of white deerskin, and retained the sharp-pointed top and wide bottom design which had been inherited from the Zhou Dynasty. The differences between the Tang pibian and the Zhou pibian were embodied as follows: First, the former was wrapped in black yarn, and its colour, which had been white in the Zhou dynasty, was now black. Second, in the Tang pibian, the seams where the cut pieces were sewn together were decorated with gold ridges. Finally, the jade beads on the Tang pibian were no longer five-coloured, but all white.

The Ming dynasty (1368-1644) saw the third phase of Pibian development, the period in which the Pibian reached its greatest maturity. The Ming Pibian



a. Pibian (Ming Dynasty) preserved at the Shandong Museum, China



b. Pibian (Qing Dynasty) preserved at the Naha City Museum of History, Japan

Fig. 1. Physical pibian preserved by the museums

inherited etiquette features from the Zhou Dynasty, such as the shape of two palms placed together and the reintroduction of decoration with five-coloured jade beads. Meanwhile, after Chu Yuan-chang, Emperor Taizu of the Ming, ordered “the return of dress to the Tang system”^[2], the Ming pibian imitated its Tang version by using black yarn and gold ridges. However, the Ming pibian was completely different from all its predecessors, the most significant difference being that the sharp-edged tip was now in the shape of a circular arc. As recorded in the Ming Shizong Baoxun, “In ancient times, the top of a cap was sharp, but now it is rounded”, proving that the round top shape was an original creation of the Ming dynasty. In addition, the term “pibian” (a cap made of deerskin) was still used to refer to a Ming cap, but in fact thin bamboo threads had replaced deerskin as the material for making the pibian, and were woven into the shape of a pibian because of their excellent air permeability and resistance to deformation.

3. Analysis on Chinese Ming pibian materials, structures, and workmanship

In this paper, the material objects preserved in the Shandong Museum were selected for analysis and technical restoration to better analyse the modelling and technical characteristics of the Chinese Pibian.

3.1. Basic information on the Chinese Ming pibian

The Ming Pibian preserved in the Shandong Museum was excavated from the tomb of Lu Huang King in Zoucheng, Shandong Province. As the tenth son of Chu Yuan-chang, Emperor Taizu of the Ming, Lu Huang King was a member of the imperial family entitled to wear it. When this pibian was excavated, it was in good condition, with structural integrity and complete accessories. Therefore, it can serve as a classic case for analysis, with the following basic information (Table 1).

As shown in Table 1, the Ming Pibian is composed of various components, including a central piece - a net structure woven with bamboo strands - that is embellished with nine concave seams on both the front and back to secure the gold ridges. Additionally, nine precious stones in red, white, green, yellow and black shades are perforated along the structure's apex. The cap's front is fastened with a rectangular decorative frame featuring perforations in its four corners that allow silk threads to be attached to the preform woven with bamboo thread. On top of the pibian, two flower-shaped gold hairpin buttons decorate each side, while similarly patterned flower-shaped holes are at the bottom. A hollow conical hairpin is also employed to secure both the hair and the pibian. Overall, despite significant differences between the Ming pibian and its predecessors, its main body retained a resemblance with respect to

being joined with undulations akin to the ones seen in ancient times. As a result, it appears that the Ming pibian not only brought innovative features but also merged characteristics from those of the Zhou and Tang dynasties.

3.2. Analysis on primary materials of the Chinese Ming Pibian

Over the 276 years of the Ming Dynasty (1368-1644), the materials used for crafting the Pibian demonstrated a considerable level of durability as alterations or substitutions were scarcely made. For instance, the pibian of Lu Huang King, who passed away in the early Ming Dynasty (1389), was made of bamboo thread and wrapped in black gauze decorated with jade and gold on the edges and upper seams. Similarly, the pibian of Emperor Shenzong of the Ming, Zhu Yijun, who passed away during the 1620s, was composed of the same materials as that of Lu Huang King. This similarity is also found in a fragment of pibian discovered in provinces such as Jiangxi and Hubei. The materials used in producing a pibian were incorporated into the legal code of the Ming Dynasty early on, ensuring stability and compliance with the law for any modifications made to the pibian. The Ming Dynasty's legal code and archaeological reports published by Chinese research institutions contain references to the substances employed in the creation of a pibian. Therefore, a comprehensive analysis of the Ming


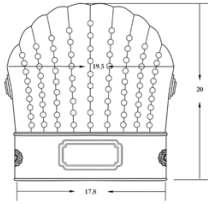

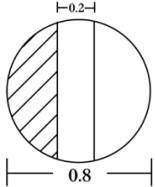





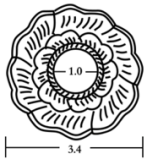
Name	Features	Materials	Figure	Dimension drawing (unit: cm)
Pibian's principal part	The top is mellow and full, and the body presents ups and downs, resembling juxtaposed palms.	The skeleton comprises a mesh woven with bamboo filament; the surface is covered with black yarns and the inside is pasted with red silk. They are all rotted.		
Pibian's jade bead	A centrally perforated sphere	Jade, agate and coral		
Pibian's decorative frame	A rectangle with four perforated rounded corners facilitating the threading ropes to be fastened on the pibian.	Gold		
Pibian's gold hairpin	The hairpin comprises three-layered flat-topped square steps, and a conical long needle which is welded in the center.	Gold		
Pibian's hairpin button	It resembles a round flower comprising three layers from the center to the outermost external circle of the flower, and the petals are engraved with lines to represent their venation.	Gold		

Table 1. Main components of the Pibian of the Ming dynasty

Pibian from China will necessitate the integration of ancient texts, artifacts, and archaeological records.

3.2.1. Material of the body of the Chinese Ming Pibian

The structure of the Chinese Ming Pibian is primarily formed by the body. This essential component consists of a net frame composed of hexagonal grids woven from delicate bamboo threads, as depicted in Figure 2. This material is known for its exceptional structural stability and breathability. The identification of the body's material relies

on three key clues. First, the Collected Statutes of the Ming Dynasty (*Da ming hui dian*; 大明会典) clearly define that a ritual cap was “made of lacquered bamboo thread” [4]. This evidence is significant as these statutes were formulated by the Emperor of the Ming Dynasty, akin to a national constitution, regulating individuals' clothing, sustenance, dwelling, and conveyance - hence, all clothing accessories and materials had to comply with this law. Once a law was established and refined, it was challenging to overturn. The material used to make the pibian remained unchanged for over two centuries. The organization responsible for the pibian's

creation during the Ming Dynasty was “*Nei Guan Jian*,” which was accountable for the materials' procurement. Upon examining the material records referenced by *Nei Guan Jian* throughout the Ming texts, it was found that an archive existed which verifies the prior documentation in the Collected Statutes of the Ming Dynasty. The registry specifies that “40 catties of long-sectioned bitter bamboo strips and 600 catties of soft bamboo strips” [3] were used, indicating the use of “lacquered bamboo thread” in making the ritual cap. Numerous archaeological experts have extensively studied pibians excavated from various Ming tombs, either as physical objects or fragments.

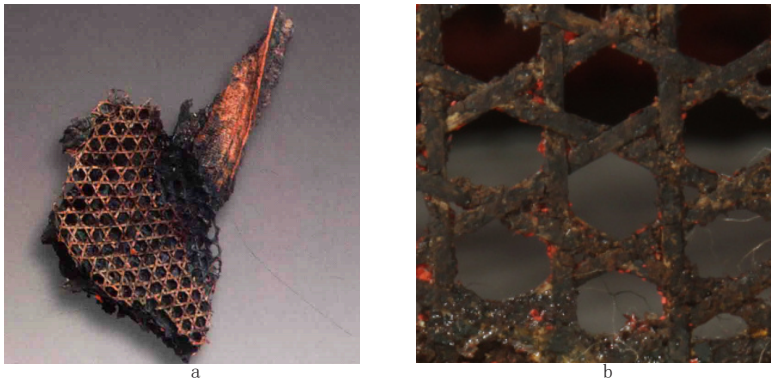


Fig. 2. Woven bamboo body of Pibian in Ming Dynasty (a from an archaeological report of the tomb of Yingjing King, b photo taken by the author at Shandong Provincial Museum)

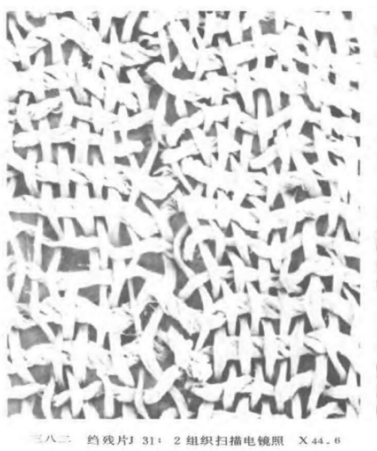


Fig. 3. Crepe on the surface of a pibian of the Ming Dynasty (Electron microscope image source: "Dingling mausoleum")

Their collective conclusion is that the material used to weave the pibian was indeed bamboo thread. For instance, the 2016 archaeological report of the Tomb of Yingjing King documented unearthed pibian fragments displaying "bamboo woven in the middle as the body" [4]. Another archaeological report titled "Tomb of Lu Huang King" [5], published in 2014, states that the pibian of Lu Huang King has a body composed of hexagonal grids woven from bamboo strips. In the archaeological report of the Dingling Mausoleum published in 1990, it was noted that the pibian was woven into a body with a hexagonal grid pattern using fine bamboo thread [6]. In conclusion, after comparing various literature and research reports, it can be inferred that the pibian's body was woven from bamboo fibres which were split into fine strands.

3.2.2. Fabric materials of the Pibian from the Chinese Ming Dynasty

The Collected Statutes of the Ming Dynasty records that the surface of the pibian (a type of hat) worn by the emperor, princes, and dukes was covered with black gauze [7]. Records of missions to Ryukyu show that the Ming emperor bestowed upon the king of Ryukyu "a seven-tasseled Pibian made of black gauze" [8]. Zao Lin Za Zhu records that Ming Emperor Zhu Yijun bestowed upon the king of Japan "a seven-tasseled Pibian made of crepe" [9]. Next, an analysis will be made based on the three above-mentioned ancient texts. First, besides Chinese rulers, foreign monarchs also wore a pibian. This is because during the Ming Dynasty, many small countries around China were vassals of the Ming Dynasty, and their monarchs could receive a pibian bestowed by the Ming emperor. The production of the pibian came from the "Nei Guan Jian," an institution directly under the jurisdiction of the emperor. Therefore, whether it was domestically or internationally, the materials used to make Pibian were the same. Second, the texts mention "black gauze" and "black yarn," with "black", referring to the color. Therefore, "black gauze" and "black yarn" can be interpreted as black-colored woven fabrics. Third, the pibian given to the king of Japan in the texts was made of "crepe", which is a category of gauze fabric that naturally wrinkles and appears uneven. Additionally, the Collected Statutes of the Ming Dynasty also record that the institution responsible for making hats

used "three hundred pieces of wrinkled silk gauze" [10] annually. In summary, the textile covering the surface of the pibian during the Ming Dynasty was "black crepe." Moreover, there is also physical evidence from archaeological excavations. Researchers involved in the excavation of the Dingling mausoleum extracted black fabric fragments from the surface of the pibian and identified the type of fabric by magnifying its tissue structure via an electron microscope. Later, they published the electron microscope images of the fabric in the archaeological report which showed that the black fabric on the surface of the pibian was crepe (Figure 3), consistent with the documentary records.

The interior of the pibian of the Ming Dynasty had a layer of red fabric as lining. Although no related records were mentioned in the literature, its traces can be found in the excavated Ming Dynasty pibian artifacts. For example, the interior of the pibian of Lu Huang King preserved in the Shandong Provincial Museum possesses a large amount of red residue (Figure 4a). Researchers of the Dingling mausoleum also found remnants of red fabric inside Emperor Zhu Yijun's pibian, extracted a sample of the red fabric, and then analyzed its tissue structure using an electron microscope (Figure 4b). The conclusion was that the red fabric inside the pibian was silk.

3.2.3. Metal and gems used as materials in making the Chinese Ming Pibian

Currently, one Pibian of a Ming Dynasty emperor and three Pibians of princes (including fragments) have been unearthed in China. According to the Collected Statutes of the Ming Dynasty, the top of the emperor's Pibian has five-colored jade stones embedded in every seam [11]. The gold ridge, Guan Wu (near the forehead), hairpin holes, and tassel fastening areas in the seams are all decorated with gold. The hairpin is made of jade. The top of the princes' Pibian has nine seams, and the hairpin is made of gold, while other parts are the same as on the emperor's Pibian. Under the



Fig. 4. Electron microscopic image of red residue and silk fabric inside a pibian (photo taken by the author at Shandong Provincial Museum, b from "Dingling mausoleum")

Name	Test part	Component test result %		
		Gold	Silver	Copper
Hairpin button	Large	86.65	11.48	1.87
	Medium	84.92	13.15	1.94
	Medium	86.69	11.59	1.72
Hairpin	Tail of hairpin	86.00	12.08	1.92
	Head of hairpin	87.16	10.62	2.22
	Body of hairpin	90.34	8.29	1.37
Square decorative frame	Short side	87.00	11.26	1.74
	Long side	86.92	11.24	1.84
Gold thread in the seam	Surface layer	86.59	11.46	1.97

Table 2. Components of pibian's metal components (Source: China University of Geosciences)

Name	Color	Shape	Number (piece)	Diameter (cm)	Aperture (cm)	Expert conclusion
Black bead	Gray black	Round-bead type	18	0.6-0.7	0.1	Nephrite (dark jade)
Red bead	Maroon	Round-bead type	33	0.6-0.7	0.1	Amber
White bead	Gray white	Round-bead type	40	0.6-0.7	0.1	Nephrite (light greenish white jade)
Green bead	Gray green	Round-bead type	35	0.6-0.7	0.1	Nephrite (gray jade)

Table 3. Determinative table of jade stones on the pibian from the Liangzhuang Tomb (Source: China University of Geosciences)

constraints of the law, the materials used to decorate a pibian must be based on the Collected Statutes of the Ming Dynasty. Material samples from the golden decorative components on Liangzhuang King's Pibian were extracted and showed that (Table 2) the gold content of all the

metal components on the pibian is above 80%, with an average of about 86%. According to the Chinese gold grading standard (GB11887-89), a gold content of 83.320% or higher belongs to 21K gold. Conclusion: The golden decorative components on the pibian of the Ming

Dynasty were made of gold, which is consistent with the documentary records.

In addition to gold, gemstones are also important materials for decorating a pibian. The Dingling mausoleum records that the pibian of Emperor Shenzong had four colors of jade stones - red, white, green, and black - as well as a string of pearls. The Tomb of Yingjing King records that the pibian of the tomb owner had remnants of deep green jade beads, light green jade beads, blue-white jade beads, and amber beads. The Tomb of Lu Huang King records that the pibian of the tomb owner had coral beads, jade beads, and agate beads. Due to the extreme fragility of the excavated Ming Dynasty pibian, the author was unable to confirm the materials of the beads by directly extracting samples. However, in 2004, archaeologists excavating the Tomb of Liangzhuang King submitted a sample of gemstones from the pibian to the Gemstone Testing Center of China University of Geosciences. The test results are shown in Table 3.

3.3. Main structure of the Chinese Ming pibian

Through the field research on the nine-stitched pibian in the Shandong Museum, the main structure of pibian was analyzed. The study found that the body of the pibian was made using three different angled hexagonal grids, which were distributed in different parts of the pibian. The front of the pibian was woven at an angle, shown in (Table 4-a), to form a narrow rectangle that fits the head circumference of the tomb owner, and then formed into a circular ring, which was sewn together with thread at the connection. The weaving on both sides of the pibian followed the pattern shown in (Table 4-b), with the edges of two sides as cross-sections without any other bamboo skins connecting them. Initially, the bamboo weaving path in the middle part of the cap top was the same as the bamboo weaving path in the cap's front, but as the bamboo filaments moved towards the sides, the weaving angle shifted continuously due to the fluctuation and contraction of the weaving area.

Finally, the bamboo filaments gathered at the edge in the state shown in (Table 4-c), with the edge as the cross-section without any other bamboo filaments connecting them.

Through the woven paths, it can be observed that the structure of the pibian's

body was composed of four mesh-like structures, namely a complete cap top, a rectangular cap front, and two lateral sides, as shown in Figure 5. Therefore, it can be concluded that the mesh-like structures of the pibian's body were firstly woven into different modules and then combined to form a complete body.

To achieve an impartial reconstruction of the pibian's structure, we created a digital model utilising Lu Huang King's specifications. These include a cap height of 20.5 cm, a cap diameter of 17.8 cm, a cap mouth circumference of 55.90 cm, a maximum top width of the cap of 19.5 cm, and a bamboo thread width of 0.1 cm. The preform comprises hexagonal grids made of bamboo thread, with a 0.7 cm gap between corners and a 0.5 cm distance across the flats. See Figure 6 for definitive illustrations.

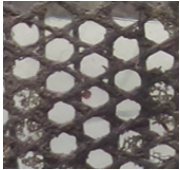

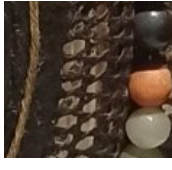
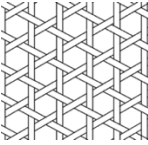
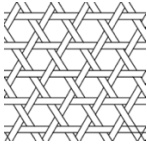
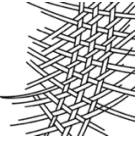
Number	a	b	c
Material object image			
Texture image			
Module	Frontal	Left and right sides	Cap top's lateral edge

Table 4. Different modules woven with bamboo filament in the pibian

3.4. Production process of the Chinese Ming pibian

As there is no literature documenting the process of creating the Ming pibian, this study utilised a combination of visiting skilled craftsmen and examining the material objects of the Ming pibian preserved at the Shandong Museum. The subsequent section presents the authors' analysis of the creation process.

- i. Making a bamboo preform with bamboo thread: Bamboo threads of moderate thickness and a width of 0.1 cm were selected for crosswise weaving into hexagonal grids measuring 0.7 cm across corners and 0.5 cm across flats (Figure 7). The bamboo threads were then woven into an ascending number of grids according to the size of the wooden model serving as the base. The grids were then divided into four sections, with the cap top constituting the first part, and the cap's front forming the second. The third and fourth elements were the two sides. Once weaving was completed, the four pieces

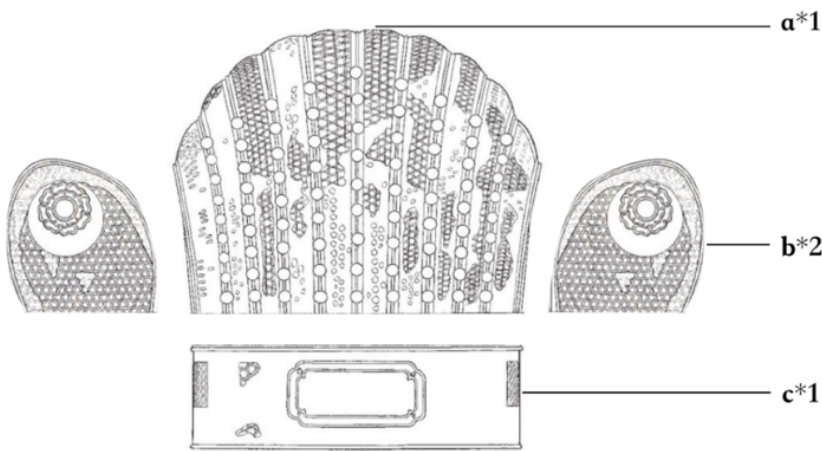


Fig. 5. Plan sketch of the pibian's main body composition (Picture from the archaeological report of the tomb of Lu Huang King)

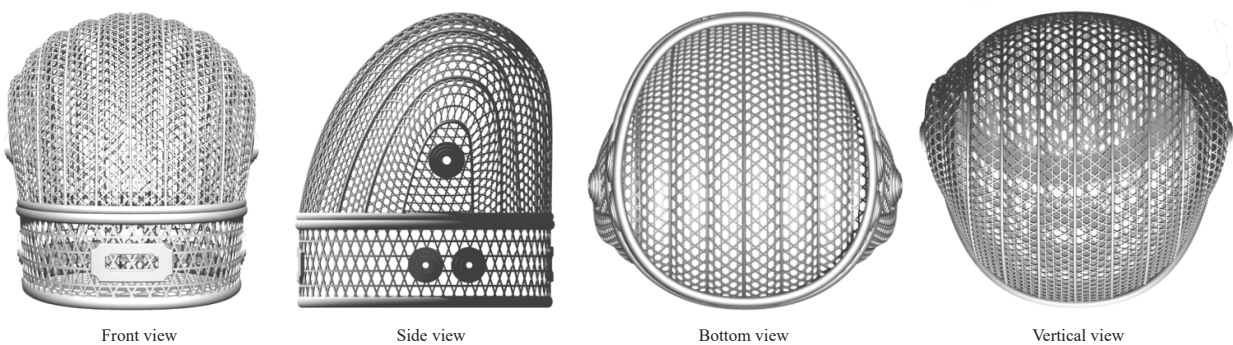


Fig. 6. Multi-view illustration of the 3D Model of Lu Huang King's pibian (made by the author)

were intertwined using silk threads. Afterwards, the exterior and interior of the bamboo preform were coated with raw lacquer to strengthen the textural structure.

- ii. Fabric seaming. Inside the cap preform made of bamboo filament, a piece of red silk of the same size as the cap was seamed to serve as the pibian's lining. The surface of the cap preform made of bamboo filament was first sewn with a flax layer, and then covered with three layers of black yarn so that the four layers of materials could bind the preform made of bamboo filament tightly. Thus, a complete main body structure came into being.
- iii. Gold ridge making. Step 1, gold foil was pasted on the smooth hide surface to form material of gold-foil-stamped hide, which is specific to China; step 2, the hide stamped with gold foil was cut into strips of 0.5 cm width, and then the bamboo strips were twisted spirally until they were completely wrapped (Figure 8); step

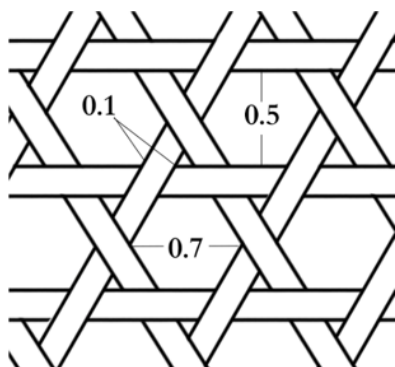


Fig. 7. Textural structure drawing of bamboo-filament woven cap top preform

3, the gold ridges were placed inside the pibian's seams, and bound to the preform made of bamboo filament using silk threads at regular intervals to finish the fixation (Figure 8).

- iv. Jade bead fixation. When the pibian was excavated from Lu Huang King's tomb, all the jade beads had been shed, and the materials inside the bead hole had all gone due to years of erosion, which to some extent indicated that the wires used to thread and fix the jade beads were of organic matter, among which the most probable was silk thread. From the current condition, what kind of technique was used to fix the jade beads on the pibian remains unknown but through a literature search, clues related to the technique of jade bead fixation were discovered. The registry cited in the *Research on Sino-Ryuku Trade in Ming and Qing Dynasties* states that the emperors of the Ming dynasty bestowed pibians upon the kings of Ryuku and mentioned “七旒皂纱皮弁冠一顶”(a seven-tasseled pibian with black yarn)^[12]. “旒”(pronounced as liú, means tassel) is a string of jade beads threaded with silk thread, featuring knots beside both sides of the jade beads to maintain a fixed distance every two of them and avoid displacement (Figure 9). The next step was to fix the strings to the pibian's seams. From the registry in “Tong Dian” that on a pibian, “Jade beads are added to the ridges”^[13], it can be inferred that the strings and the ridges were tied together in the way shown in Figure 10.

- v. Assembly of accessories. The pibian's principal accessories included two rectangular gold decorative frames, four gold lacing buttons and two gold hairpin buttons. They were all perforated so that the reeving silk threads could be fixed directly to their corresponding places.

The analysis shows that the pibian of the Ming dynasty demonstrated superior artisanship with its minute and complicated workmanship and sophisticated applied technology. Rare materials like gold and jade were used as ornaments on its surface, which embodied the wealth and luxury, as well as the pursuit of an extravagant material life by the imperial family of the Ming dynasty.

4. Analysis of the social functions of the Chinese pibian

The main function of the Ming pibian was to identify the wearer's social sphere, which was manifested through the structure and decoration of the pibian, embodying a concentrated reflection of the centralization of authority and class status in the Ming Dynasty.

4.1. Embodiment of status hierarchy through the number and color of jade beads

The pibian of the Ming dynasty distinguished the status of its wearer through the color and quantity of jade

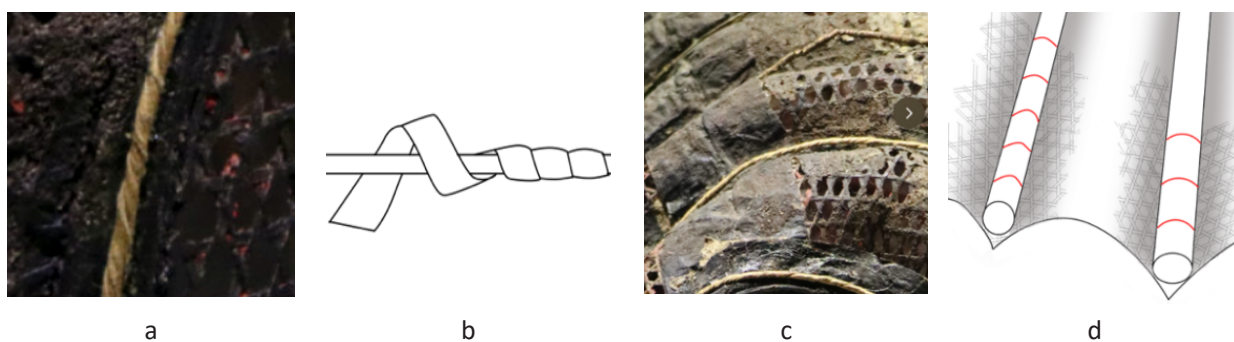


Fig. 8. Making and fixing method of gold ridges (a. real picture of a gold ridge, b. schematic diagram of making gold ridge, c. fixing state of gold ridges, d. fixing method of gold ridges; a c photos taken by the author in Shandong Museum, b, d drawn by the author)

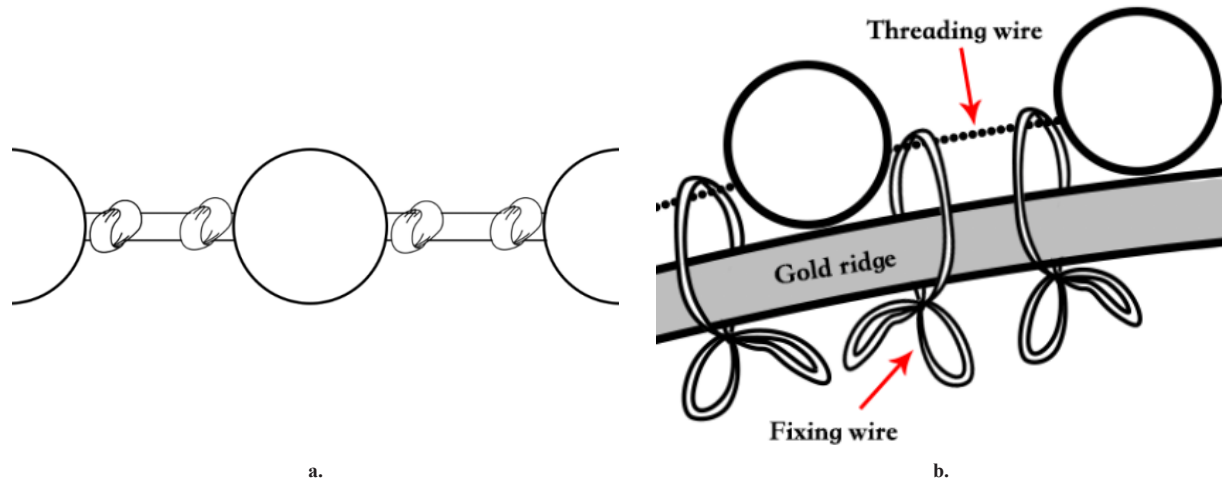


Fig. 9. Production and fixing method of tassels (a. Making of "liú", b. Fixation of jade beads, drawn by the author)

beads. As registered in the *Ming Dynasty History. Hierarchy of Carriages and Costumes*, in a pibian for emperors, each seam was fixed with twelve jade beads comprising five colors, while in a pibian for princes, each seam was fixed with nine jade beads comprising five colors. As was the case in the pibian for princes; in that for princes' sons, eight jade beads comprising three colors were used in each seam, while prefecture princes wore nine jade beads with five colors.

Since the pibian of the Ming dynasty preserved at the Shandong Museum was of the prince level, according to the literature, each seam on it should be fixed with nine jade beads comprising five colors. The material object shows that this Pibian comprises five colors: red, white, cyan, yellow and black, and on each concave seam, there are nine jade beads, which observes the legal provisions of the Ming dynasty.

4.2. Manifestation of wearer's status through quantity of seams on the pibian

The concave seams on the top of the pibian were an important way of indicating the status of the wearer. According to the Code of the Great Ming Dynasty, the pibian should have twelve seams on the front and back for emperors, nine seams for crown princes and princes, eight seams for princes' heirs apparent, and

seven seams for prefectural princes^[14]. Identifying the social status of the wearer by the "seam" was not an original creation of the Ming dynasty. As recorded in an ancient book from the Jin Dynasty (265-420), "Emperors are entitled to twelve seams, dukes, marquesses and earls - to seven seams, viscounts and barons - to five seams, senior ministers - to four seams, and ministers - to three seams"^[15]. Thus, the Ming pibian duplicated the function of identifying people by "seam" that was characteristic of the Jin pibian. In addition, the practice of reinforcing the seams of the pibian with gold ridges, which had originated in the Sui Dynasty (581-618), was continued in the Ming dynasty. On the one hand, the gold ridge inlay could enhance the artistic aesthetics of the pibian; while on the other hand, it could emphasise the presence of "seams", making them more conspicuous and thus reinforcing their hierarchical identification effect. In a word, the application of seams and gold ridges to the pibian served as a means by which the emperors of the Ming dynasty consolidated autocratic rule and strengthened the ranking system.

4.3. Reflection of status hierarchy through the Pibian's materials

The materials used for the hairpin on a pibian was one of the pieces of evidence defining the wearer's status. According to the ancient books of the Ming dynasty,

emperors wore jade hairpins, while crown princes and their heirs apparent, as well as prefecture princes used gold hairpins^[16]. With the excavation of jade hairpins on the pibian for Emperor Wanli from the Ding Mausoleum, Beijing, and that of gold hairpins on the pibian from the tombs of three princes: Lu Huang King, Liang Zhuang King and Ying Jing King, the material objects and the literature corroborated each other. As early as in the Pre-Qin Period (before 221 B.C.), utensil materials had served as marks to identify hierarchy. For example, in the Zhou dynasty, console tables were classified into five levels according to their materials. It was mentioned in the ancient books of the Zhou dynasty that "a Sijiyuan (an official position) is in charge of console tables made of five materials, meanwhile he is also in charge of recording the names of types, as well as distinguishing their functions and places to be put in"^[17]. People used console tables made of different materials according to their social status: jade console tables for Sons of the Heavenly King, console tables carved with patterns for dukes, console tables painted with red lacquer for senior ministers, console tables painted with black lacquer for ministers, and unpainted console tables for funerals. These regulations were too harsh to be violated by anyone in an assumed capacity. Although the materials of a large quantity of utensils were bound with the ritual system in the Zhou dynasty, no definite hierarchy had come into being yet; both the sons of the heavenly

king and ministers wore jade hairpins without any difference in material. In the Tang dynasty, with the material used for the pibian's hairpin becoming the mark to distinguish the wearer's status, a law stipulated that for emperors, the pibian's hairpins should be made of jade as an observance of the Zhou rituals, and simultaneously a new system was derived which required crown princes to wear hairpins made of rhinoceros horn and ministers to use ivory hairpins. In the Ming dynasty, the feature of status representation by utensil material, which had been carried in the ancient rites, was absorbed and innovated, and a provision eventually came into being that emperors should wear jade hairpins and imperial clan members wholly used gold hairpins.

5. Conclusion

The research materials included in this article mainly come from a museum's collection of artifacts, ancient books of the Ming Dynasty, and archaeological reports. Methods such as material object analysis, literature research, and comparative analysis were used to conduct a detailed study on the shape, material, craftsmanship, and social function of the pibian in China's Ming

Dynasty. The main conclusions are as follows: Firstly, from the perspective of the pibian's history, the pibian of China's Ming Dynasty was in the last stage of the pibian's development, following the etiquette value and decorative features descended from ancient times, and incorporating the aesthetic preference and ritual regulations of that dynasty, being the essence of China's pibians of all ages. Secondly, from the perspective of the material of the pibian, all pibians of the Ming Dynasty unearthed in China were made of almost identical materials, namely the inner layer was made of bamboo silk with red silk pasted, while the outer layer was covered with black crepe, decorated with jade and gold. There are two reasons for this phenomenon: First, the materials for making a pibian were written into the legal code of the Ming Dynasty. The rulers restricted and unified the types of materials with the authority of the law, forming a fixed pattern. Moreover, the right to issue, make, and repair a pibian was held solely by the emperor. The production and maintenance of a pibian for other wearers had to be done through the emperor's "Nei Guan Jian", hence other wearers, except the emperor, had no right to intervene, ensuring the uniformity of the pibian's materials. Thirdly, from

the perspective of the pibian's structure, based on the weaving path and direction of bamboo skins and sewing traces, the author determined that the body of the pibian was woven in modules and then assembled into a whole. The original appearance of the body of the pibian was restored through three-dimensional images. Fourthly, from the perspective of the social function of the pibian, the use of a pibian in the Ming Dynasty was limited to members of the royal family because it was a symbol to them. Moreover, the material of the pibian's hairpin, the color of the jade, and the number of gold ridges and seams could be used to mark the wearer's identity, projecting the harsh hierarchy in China's ancient society. The study on China's pibian, not only provides important technical support and theoretical guidance to the restoration of ancient Chinese caps, but offers essential inspiration and reference for the innovative design of the international cap industry as well.

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