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Cover Page Footnote

Many scholars have contributed to the information conveyed in this article. I especially thank Laure Dussubieux for analyzing the chemical composition of the glass bead; Alison Carter for comparing the composition to beads in her Cardamom Mountain database; and Fan Changshen and Zhou Di Ren for facilitating my 2006 visit to the Zhou Family Museum in Jiujiang. Other generous contributors include Jamey Allen, Christopher Buckley, Kajetan Fiedorowicz-Bittner, Karlis Karklins, Simon Kwan, James Lankton, Wu Yi Shuan, Barbara Steinhart, Yang Jing, and Marilee Wood. I also thank Jeff Keller for his endless patience and excellent translations from the Chinese. Carrie Iverson beautifully computer-rendered the octagon-diamond technique from my hand-drawn diagrams. Finally, I thank the private collector who lent the comb for study.

A BEADED HAIR COMB OF THE EARLY MING DYNASTY

Valerie Hector

This article describes an unprovenanced artifact: a 700-year-old beaded hair comb probably entombed with a woman who died between 1405 and 1446 during China's early Ming dynasty. It is intended to establish basic facts and stimulate further research. The comb may be the first intact example of mainland Chinese beadwork to undergo radiocarbon dating as well as laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) analysis. The lead-potash (Pb-K) composition of the comb's glass coil beads resembles that of coil beads recovered from jar burials of the 15th-17th centuries in Cambodia's Cardamom Mountains. Thus, the comb links glass coil beads ostensibly made for use within China to coil beads exported to Southeast Asia.

INTRODUCTION

In a previous publication, I noted that beadwork has been produced in China since at least the early first millennium BCE (Hector 2013:42-43). Beadwork was also exported from China (Hector 2016). I have also discussed two impressive pieces of beadwork ascribed to the Ming dynasty (1368-1644): a calligraphic panel and a multi-part lantern (Hector 2017: Figures 1-5). Ming emperors wore bead-tasseled crowns (Yang Xiaoneng 2006: Figure 1), while empresses wore elaborate phoenix crowns or *feng guan* embellished with pearls and pearl-bead tassels (Gao Chunming 2001: Figure 478; Hong Kong Heritage Museum 2002: Figure 80). Paintings of the era memorialize the variety of beading techniques used to create these delicate arrays (Figure 1).

Beaded hair combs such as the one featured in this article have not fared as well (Figure 2). Measuring 11.5 cm wide x 5.3 cm high x 1.4 cm thick, the comb assumes the semicircular shape common to many ancient Chinese combs known as *shu*. Depending upon prevailing fashions, women wore one or more *shu* in their hair (Hong Kong Heritage Museum 2002: Figures 47, 50, 57). Modern-day experts have never seen fully beaded examples nor examples having glass beads (Simon Kwan, Yang Jing, Wu Yi Shuan 2021: pers. comm.). A cursory search of the Chinese internet yielded no new insights (Jeff Keller 2021: pers. comm.).



Figure 1. Anonymous portrait of Ren Xiao Wen (1362-1407), consort of the third Ming Emperor Yongle (r. 1402-1424) and, from 1402-1407, third empress of the Ming dynasty; painted between the 15th and 17th century (courtesy of Palace Museum, Beijing).

In this article, we begin to write the biography of this beaded hair comb, one of many hair ornaments produced in China over the last 6000 years (Yang Jing 2006). The comb was probably entombed with a woman who died between 1405 and 1446 during China's early Ming dynasty. Who she was, where she lived, and what else her tomb contained, we do not know; properly excavated tombs of the era may give a sense. Yet, she must have belonged to a family of means sufficient to acquire such a comb from a shop,



Figure 2. Beaded Chinese hair comb, ca. 1405-1455; 11.5 cm long (private collection) (photo: Ekaterina Shvedova).

artisan, or itinerant merchant (*see* Clunas 2007: Figure 30). Alternatively, the comb might have been a gift or a family heirloom. In any case, the comb was deemed special enough to accompany the woman into the afterlife.

While objective details may be surmised, subjective details elude us. Scholars have long agreed that objects may express or transform their owner's personal or social identity (Thomas 2021). What the comb meant to the woman and how others viewed her possession of it, we will never know. For instance, did she prefer glass to pearl or gemstone beads, or vice-versa? Possibly, glass beads were more novel or affordable. Many are the questions we cannot answer. Thus, we move on to other concerns.

THE COMB'S BIOGRAPHY

Kajetan Fiedorowicz-Bittner, a collector of hair combs based in Australia, purchased the beaded comb discussed here in China during the late 1980s along with a comparable example (Kajetan Fiedorowicz-Bittner 2021: pers. comm.). No provenance was available. Like many ancient Chinese artifacts, the combs may have been looted from a tomb. The extent of looting in China is well documented (Branigan 2012). By one estimate, between 1998 and 2003, some 220,000 Chinese tombs were robbed (chineseantiques.co.uk 2015) despite the Chinese government's long-standing laws to the contrary (Rong Chai and Hao Li 2019). Looting cannot be condoned, but looted artifacts merit research.

In its 14 June 2011 auction, Mossgreen Auctions of Melbourne, Australia, offered both beaded combs for sale in its online catalogue. Neither sold. After the auction, Mossgreen sold the beaded comb featured in the present article to its current owner, a private collector. The collector was disturbed to discover short strands of black human hair and small vegetal roots attached to the back of the comb, an indication of probable looting.

Fiedorowicz-Bittner (n.d.a) provides a photo of the beaded comb along with a second example which he

also dates to the Liao dynasty (907-1125). Apparently, both combs are also reproduced in another manuscript by Fiedorowicz-Bittner (n.d.b) (Barbara Steinhardt 2021: pers. comm.).

While Fiedorowicz-Bittner (n.d.a-b) associates the combs with the Liao dynasty's nomadic Khitan people who for centuries roamed across what is now eastern Inner Mongolia, scholar and collector Simon Kwan (2021: pers. comm.) disagrees, noting the Khitan or "Liao people did not have the habit of wearing combs because they were nomadic in origin." Kwan's observation notwithstanding, the Liao dynasty produced at least one spectacular example of beadwork: a model house, 100 cm tall, densely encrusted with "pearls, jade, rock crystal, amber, and coral beads" united in a variety of techniques (Hansen 2011: Figure 3). The house was discovered in the upper repository of the North Pagoda in Chaoyang, a city in China's coastal northeast Liaoning province (Hansen 2011). Moreover, beaded earrings, necklaces, amulets, and other items recovered from the tomb of Princess Chen (d. ca. 1018) prove that Liao royalty did possess small personal ornaments. That some of these were imported from afar is another matter (Hansen 2011:41).

In order to possibly date the comb, radiocarbon tests were performed on samples of the hair by the University of Arizona's AMS Laboratory in April of 2021. This produced a calibrated date range of 1405-1446 with a 95% probability (Cruz 2021). Thus, the woman who was buried with the beaded comb likely lived in the late 14th or early 15th century, though the beaded comb itself could be older. Thus, Fiedorowicz-Bittner's Liao dynasty attribution might be plausible. Unfortunately, sampling the wood for radiocarbon dating would damage the comb's appearance and possibly its structural integrity.

RELATED EXAMPLES

In China, plain, semicircular wooden hair combs are common archaeological finds in tombs of various centuries (Yang Jing 2006:68-9; Zhou Di Ren, Zhou Yang, and Yang Ming 1992:7, Figure 5). For example, in 2019, an intact tomb dating to the Yuan dynasty (1206-1368) was discovered in Changzhou, a city in southern Jiangsu province. A well-preserved lacquer coffin held items including five combs of wood and two of bamboo (Xinhua 2019). For more than a thousand years, Changzhou has been a locus of comb manufacture, and the city hosts a small comb museum that apparently does not have a website (Jeff Keller 2021: pers. comm.).

As noted above, combs decorated with beads are rare. Several wooden combs with spines sparingly studded with

pearls serve as precedents. They were recovered from a set of tombs dating to the 12th-13th centuries of the Song dynasty (960-1279) in east-central China's Jiangsu province (Yang Jing 2006:68, Figure 40). Exactly how the pearls were attached to the wood is unclear; they may have been inlaid.

THE COMB COMPONENTS

The wood used to make the comb has not been identified. Christopher Buckley (2021: pers. comm.) observes that “for making the tines of a comb,” the wood “would have to be something fine-grained” such as “boxwood” or bamboo (Yang Jing 2006:68-69).

Fiedorowicz-Bittner (n.d.a) suggests that silk thread was used to connect the beads on the comb. After seeing a detail image, Christopher Buckley (2021: pers. comm.) concluded that a bast fiber thread such as ramie or hemp is more likely, with hemp being the most probable.

All of the glass beads on the comb are opaque blue, highly irregular in size and shape, and formed by the winding or coiling method common in China for centuries (*see* Francis 2002:76-78, Plate 16). Ranging from 3.5 mm in diameter by 3 mm in length to 1.5 mm in diameter by 1.0 mm in length, most of the beads on the top and front of the comb have relatively smooth surfaces (Figure 3). Periodically, seemingly at random, a bead with visible coils appears. Beads with visible coils are far more numerous on the back of the comb, especially at the center (by “back,” I mean the side to which human hair was attached). Averaging 2-3 pronounced coils, the back beads range in size from 2 mm by 2.5 mm to 1.5 mm by 1.5 mm (Figure 4). Their relatively smaller sizes might have helped effect a tapering strategy that shaped the panel to the curve of the comb, something only an experienced artisan could have done. That more visibly coiled beads proliferate on the back of the comb might indicate an aesthetic preference for smooth beads.

Using laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS), Laure Dussubieux of Chicago's Field Museum analyzed one of the comb's beads, finding



Figure 3. The beads on the front of the comb (photo: Ekaterina Shvedova).



Figure 4. The beads on the back of the comb (photo: Ekaterina Shvedova).

it to be high in silica ($\text{SiO}_2=58.34\%$), lead ($\text{PbO}=14.1\%$), and potash ($\text{K}_2\text{O}=14.9\%$), with copper as the likely coloring agent ($\text{CuO}=2.46\%$) (Dussubieux 2020: pers. comm.). Thus, the bead belongs in the silica-lead-potash (Si-Pb-K) compositional group; in China, lead-potash glasses appear to have been made from about the 6th century to the Ming dynasty (Fuxi 2009).

After preparing a 3D scatterplot following a principal components analysis (Figure 5), Alison Carter concluded that the bead analyzed by Dussubieux is most compositionally analogous to Chinese lead-potash glass coil beads recovered from jar burial sites of the 15th-17th centuries in Cambodia's Cardamom Mountains (Carter and Beavan 2014; Fuxi 2009). The beads on the comb are, however, lower in lead

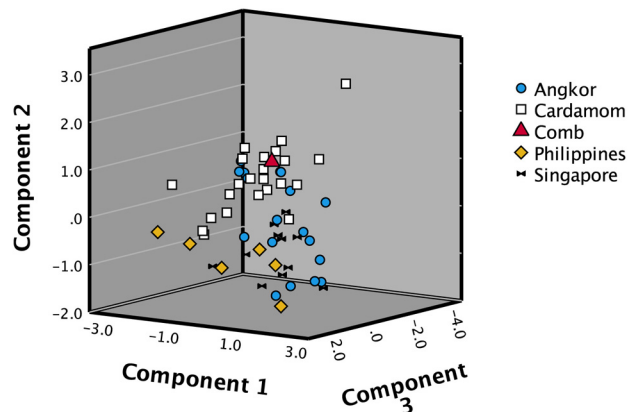


Figure 5. 3D scatterplot showing the first three components of a principal components analysis (66% of the total variation) comparing the bead from the comb with comparative datasets from the Cardamom Mountains, Cambodia (Carter, Dussubieux, Beavan 2016); Angkor Thom, Cambodia (Carter et al. 2019); Fort Canning, Singapore (Borrell 2010; Dussubieux 2010), and unpublished data from the Philippines provided by Laure Dussubieux (graphic: Alison Carter).

and smaller in size than the Cardamom Mountain finds (Alison Carter 2021: pers. comm.). The smaller size of the comb beads is consistent with Peter Francis' observation that from the 12th through 15th centuries, Chinese coil beads tended to average 3 mm or less in diameter whereas in the 16th century, their size increased (Carter, Dussubieux, and Beavan 2016:406, citing Francis 2002).

Assuming the beaded comb was indeed made in China, we may conclude that in the mid-2nd millennium, Chinese glass coil beads made for indigenous use were in some cases compositionally similar to beads produced for export. After additional examples are found, research may proceed (Alison Carter, Laure Dussubieux 2021: pers. comm.).

THE BEADWORK TECHNIQUE

The beading technique creates a distinctive pattern of octagons and diamonds (Figure 6). While the beads forming each octagon are internally connected with a ring of thread, the beads forming each diamond are connected not to one another but to four adjacent octagons. Beadworkers might call such techniques “angle weaves;” mathematicians might call the patterns they produce “periodic polygonal tilings of the plane” (Fisher and Mellor 2012:141).

Such an octagon-diamond pattern could have been produced with a netting technique entailing a single thread or a plaiting technique entailing two or more working thread ends (*see* Hector 2016:68 ff.). The former makes the most

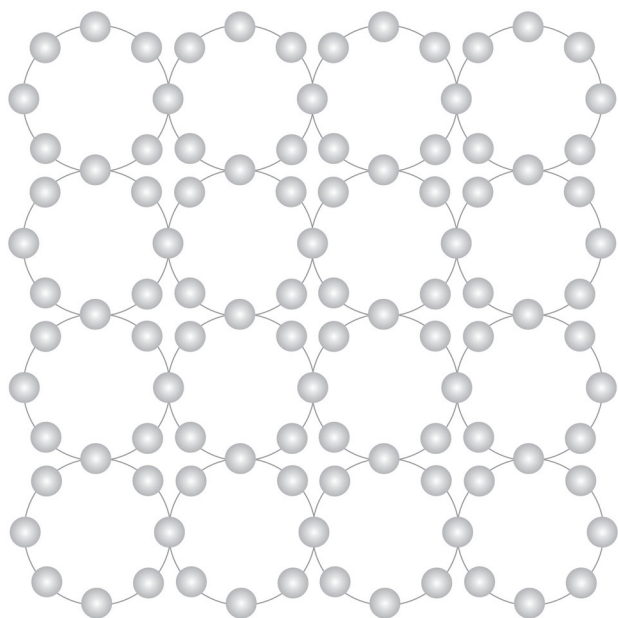


Figure 6. The octagon-diamond bead netting or plaiting technique (graphic: Carrie Iverson).

sense in that manipulating a single thread is generally faster and easier than manipulating multiple threads. The neat finishing of the beaded panel's edges supports this hypothesis. If the beads had been plaited, thread stubs would likely be present. The panel of beadwork might have been created first, then attached to the comb, or partially worked and finished over the comb. Long stitches secure the beaded panel to the comb.

Simon Kwan (2021: pers. comm.) has suggested that the comb's makers might have intended the beadwork to simulate the decorative effect of hand-forged gold bosses on other, more costly, wooden combs of the era (Gao Chunming 2001: Figures 128-129; Kwan and Sun Ji 2003:391-393). Yang Jing (2021: pers. comm.) notes that “wooden combs of the same shape with gold pieces and precious stones inlaid on their backs are common in ancient China from the Song to the Ming.”

There is one earlier precedent for the octagon-diamond beading technique, also involving a hair ornament, a small beaded scent bag that once dangled from a U-shaped metal hair stick or *chai* (Zhou Di Ren, Zhou Yang, and Yang Ming 1992:6, Figure 3) (Figure 7). Such an ensemble would have been known as a *buyao* or hair ornament with movable parts to catch the eye or the light. The *buyao* was one of the many items recovered from a woman's tomb unearthed in southeast China's Jiangxi province and dating to the end of the late Southern Song dynasty (1127-1279). The scent bag was enclosed in a net or plait of tiny seed pearls united in an octagon-diamond pattern (pers. obs.)¹ (Figure 8). Probably first invented in China, such an octagon-diamond beading technique might have resonated with the affinity for geometric pattern that motivated wooden window lattice designs, where octagons were sometimes combined with diamonds (Dye 2013:53 ff). The woman who owned the *buyao* went to her tomb wearing a wide pearl-beadwork band in her hair, still visible on her mummy (Zhou Di Ren, Zhou Yang, and Yang Ming 1992:1, Figures 2-3). The technique used to create the hairband is difficult to discern but might be an open diamond-patterned net or plait (pers. obs.; *see* Hector 2016: Figures 2, 5). Three plain wooden hair combs or *shu* were also found in the woman's tomb, all semicircular in shape (*see* Zhou Di Ren, Zhou Yang, and Yang Ming 1992:7, Figure 5). It is possible that the scent bag and hair band are the earliest intact published examples of Chinese hair ornaments incorporating bead netting or plaiting.

The octagon-diamond beading technique continued into the Qing dynasty (1644-1911), forming part of a heavily beaded canopy above a bejeweled lapis-lazuli statue of the Buddha in the Forbidden City collection (Xu Qixian 2004:



Figure 7. Two-part hair ornament or *buyao* from a woman's tomb dating to 1279 in China's Jiangxi province (courtesy of Zhou Family Museum, Jiujiang, Jiangxi).

Figure 182). The technique was also in use in China in the early 21st century (pers. obs.).

CONCLUSION

The foregoing paragraphs invite several conclusions. First, a great deal remains to be learned about mainland Chinese beadwork. By the first half of the 15th century, however, small glass coil beads were being used to embellish small personal objects such as the comb. Coil beads might have been used on larger objects as well. Second, that the comb's beads belong to the lead-potash group links them to lead-potash coil beads exported to Southeast Asia. Third, in China, beading techniques persisted from century to century. Dating to at least 1279 of the late Southern Song dynasty, the octagon-diamond technique recurs in the Ming dynasty, the Qing dynasty, and present-day China. Fourth, the complexity of the octagon-diamond technique as well as techniques on other pieces ascribed to the Ming dynasty reveals that beadwork was well advanced by that time, if not the earlier late Southern Song or Liao dynasties.



Figure 8. The scent bag of the hair ornament showing seed-pearl beads forming an octagon-diamond net or plait (courtesy of Zhou Family Museum, Jiujiang, Jiangxi).

Institutions permitting, scholars might analyze the chemical compositions of the glass beads assumed to be Chinese in the calligraphic panel and multipart lantern mentioned above. Results might yield additional information about glass recipes used in China during the Ming dynasty.

Chinese beaded ornaments for the hair and head also offer new vistas of research for scholars of glass beads and beadwork. Published examples of Qing dynasty imperial beaded hair ornaments hint at considerable riches, but pearls and gemstones tend to outnumber glass beads (*see* Li Yuhua et al. 1992; National Palace Museum 1986; Yuan Hongqi 2006). Vernacular beaded hair combs, though largely unpublished, hold far more potential (*pers. obs.*). For a start, scientific study of 20th-century examples might reveal the variety of glass recipes used in a single century as well as bead sizes and shapes. Further, some of the bead sizes and shapes might correlate with early 20th-century Chinese glass bead nomenclature (Hector 2013:66, no. 13). Finally, the presence on some examples of what appear to be European glass beads bespeaks global connections in material and visual culture as well as commerce and trade.² It might also be productive to search Chinese literary and pictorial records as well as global museum holdings. Surely more beaded Chinese hair combs exist. If so, I hope to find them.

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Many scholars have contributed to the information conveyed in this article. I especially thank Laure Dussubieux for analyzing the chemical composition of the glass bead; Alison Carter for comparing the composition to beads in her Cardamom Mountain database; and Fan Changshen and Zhou Di Ren for facilitating my 2006 visit to the Zhou Family Museum in Jiujiang. Other generous contributors include Jamey Allen, Christopher Buckley, Kajetan Fiedorowicz-Bittner, Karlis Karklins, Simon Kwan, James Lankton, Wu Yi Shiuian, Barbara Steinhart, Yang Jing, and Marilee Wood. I also thank Jeff Keller for his endless patience and excellent translations from the Chinese. Carrie Iverson beautifully computer-rendered the octagon-diamond technique from my hand-drawn diagrams. Finally, I thank the private collector who lent the comb for study.

ENDNOTES

1. The scent bag's beading technique has twice been misdrawn as a diamond grid (*see* Gao 2001: Figure 266; Zhou Di Ren, Zhou Yang, and Yang Ming 1992:15, Figure 23).
2. For vernacular hair ornaments that likely include Chinese glass beads, glass cabochons, and possibly glass pearls, *see* the ca. 1901 hair ornaments housed at the American Museum

of Natural History (AMNH) as cat. nos. 70/2397, 70/2398 a, b. The AMNH offers a searchable online database for its anthropology collections. For hair ornaments that include beads resembling the hollow glass beads shown in Neuwirth (1994: Plates 315-316) plus other hollow beads, *see* the ca. 1900 hair ornaments housed at the AMNH as cat. nos. 70/1574 a, b; 70/1579-80; 70/1581 a, b; 70/1582.

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