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American Institute for Conservation
727 15th Street NW, Suite 500
Washington, DC 20005
info@culturalheritage.org www.culturalheritage.org

IKA YI-HSIA HSIAO

Handle with Care: The Condition Assessment, Treatment, and Care Applied to East Asian Scrolls

BACKGROUND

With growing global interest in East Asian culture, there are increasing requests by scholars and art institutions to view East Asian Scrolls through loans, exhibitions, and in-house research. However, outside of Asia, there are only four museums in North America that have collections rich in East Asian scroll holdings, along with East Asian Conservation Studios: the Smithsonian's National Museum of Asian Art—the Freer Gallery of Art and Arthur M. Sackler Gallery (Freer/Sackler); the Museum of Fine Arts, Boston (MFA Boston); the Metropolitan Museum; and the Cleveland Museum of Art (CMA), where the author currently works.

East Asian scrolls necessitate careful and considered handling due to their complex structure. An East Asian scroll is neither composed of a single layer nor a completed sheet of paper or silk; rather, it can contain multiple layers of silk/paper and paste. A scroll's complicated structure means it could be damaged if displayed, handled, or stored inappropriately. To minimize potential damage, this article introduces East Asian scrolls as cultural objects and then discusses three common aspects of East Asian scroll preservation: conducting condition assessments; performing treatments; and ensuring care through safe display, exhibition, storage, and handling procedures. Since the author's primary responsibilities involve taking care of Chinese paintings, most of the following discussion will focus on objects from China, although the general recommendations will be useful for the care of all East Asian scrolls.

INTRODUCTION TO EAST ASIAN SCROLLS

East Asian scrolls are unique cultural objects in Western countries for three reasons: there are only a small number of East Asian conservation studios in North America; the scrolls themselves are composite objects with a complex structure; and the scrolls as cultural objects have a lengthy history circulating in East Asia and globally.

Because East Asian conservation requires highly specialized training not often taught in Western conservation schools, there are only four East Asian conservation studios among North American museums. All qualified East Asian painting conservators who are currently working in the North American museums have acquired training in Eastern conservation techniques before working in the West. The limited number of specialized facilities means that caring for these objects is the responsibility of a very small number of conservators who have expertise in this field.

East Asian paintings are commonly mounted in four different formats: hanging scrolls, handscrolls, album leaves, and panels. Each format has unique components and requires different techniques. Regardless, there are four criteria that a successful conservator must achieve to mount a good scroll: flatness, flexibility, thinness, and smoothness. For example, Chinese scrolls are created using thin *xuan* paper bound with watered-down paste in specific steps to achieve the thinness to the scroll. For mounting a large scroll, extra layers of xuan paper would be preferred for the final backing instead of using a single sheet of thick paper, which makes the scroll rigid but not flexible. Ideally, a good scroll must be flattened and fixed to a drying board for a whole year. Because the combined silk and paper scroll shrinks and expands while fixed on the drying board throughout the extremes of the changing seasons, the mounted painting is made more resistant to future changes in climate, resulting in fewer undulations. For the final step, a mounted Chinese scroll needs to be burnished with an oval (a smooth stone) and waxed on the back after it is removed from the drying board. This step compresses the multilayers of mounted painting, as well as smooths out the back to make the scroll more compact and easier to roll. With various formats, it adds up more complications when it comes to caring and handling.

In China, there is an adage that goes, "a Chinese scroll mounting plays a more critical role than the artist." Although it exaggeratedly emphasizes the importance of a mounting in

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a Chinese scroll, this saying does emphasize just how essential a mounting is when assessing the entire object. In effect, a successful mounting takes the same effort as the painting by the artist. The first published Chinese mounting book was *Zhuang Huang* written by a 17th-century scholar, Zhou Jiazhou (1582–1658; Zhou and Shang 2012). There are 42 sections describing mounting techniques in this book. Zhou emphasizes the importance of mounting as it would direct the painting's "life" (Du and Du 1993).

Even today, contemporary scroll mounters still follow similar practices that Zhou detailed in his book. The mounting process for a Chinese painting scroll is labor intensive because it takes 20–30 steps to fully remount a painting. A successfully mounted scroll requires both a skilled mounter and appropriate materials. Attempting to remount a scroll without appropriate training or by misusing materials will result in damage.

An East Asian scroll is known for its rolling system. Much like a book, this rolling system is intentionally designed to be interactive, as it requires manipulation to be understood. When the scroll format was brought to the West, its unique rolling nature stood out since its design inherently protected paintings from dust and light exposure, minimized the amount of space used for storage, and decreased the cost of transportation. However, the complexity of the rolling structure and the fragility of its materials make it vulnerable to damages such as creases and tears that might occur during handling. Unlike the more static character of framed art, the primary challenge for these fragile artworks is the frequent rolling and unrolling required to access their interiors. Because East Asian scrolls have problematic conditions that often result in common damages, there is a need for greater awareness of methods of preventive conservation. It is imperative that people who handle these scrolls have a deeper understanding of their structures and how they are made.

Among the four formats of East Asian paintings, the handscroll and hanging scroll are the earliest ones. The handscroll (fig. 1) refers to the form used for books since the Western Han dynasty, China (202 BC–207 AD), whereas the hanging scroll as a pictorial object has been common in China for nearly 2000 years (Du and Du 1993). Du and Du (1993) state that Chinese handscroll format can be traced back to the Han dynasty. A rolled-up bamboo/wood slip was the earliest format before transitioning to a cloth substrate. Culturally, a traditional East Asian book is read from right to left; therefore, a handscroll is unrolled and is read from right to left, whereas in Western objects, the opposite direction prevails. Because of a long history in the development of Eastern culture, hanging scrolls were used with greater regularity from the 10th century through the Song dynasty (960–1297 AD) (Du and Du 1993). For example, an archeological T-shaped banner, a Chinese Western Han (202 BC–207 AD) painting on cloth (fig. 2) was excavated in 1972, found draped over the coffin of Lady Dai (ca. 168–206 BC) at the Mawangdui tomb near Changsha City in Hunan Province, China.

Fig. 1. A CMA handscroll is displayed on a low-angle platform of an enclosed case.

In another example, two painted fragments—*figure with phoenix* fragment (fig. 3) and *figure with dragon* fragment (fig. 4)—were excavated in 1949 and 1973 in Changsha City, Hunan, China. The *figure with dragon* fragment was found to have a pocket along the top edge, indicating there might have been a stick to help it hang. These objects are primary treasures in the Hunan Province Museum in China and are considered by scholars to be the earliest extant hanging scrolls (Lu 1996).

CHINESE HANDSCROLL STRUCTURE AND ITS DETERIORATION

A handscroll is a long, horizontal piece that opens from right to left. It contains several components, including the painting, silk borders, the first tier of silk, the frontispiece, and the end colophons (fig. 5). Colophons are usually inscribed with calligraphy by collectors or officials to praise the artist and the painting. Once the scroll is passed down through the next collector or generation, a new piece of colophon with or without inscription might be added at the end of the colophon when remounting it. Therefore, a handscroll is composed of paper/silk elements with different ages, various texture, and thickness. First, each element is individually lined with paper and paste. This process is called the *first lining*, and the paper used for this first lining is called the *life paper*, indicating the importance of this procedure. Each component is lined, flattened, and straightened before being narrowly joined to one another in a specific sequence, forming a long, horizontal piece. Then, the final backing, which consists of two layers of xuan paper laminated together, is applied to the back of the long, horizontal piece. This process is appropriately called the *final backing*. Because each consecutive lined component is narrowly joined with a thicker paste than the one used on

Fig. 2. The T-shape banner was excavated in 1972 at the Mawangdui tomb, China.

the first lining process, the joins of the final backing must be overlapped in a way that staggers them apart from the joins of the first lining to ensure the greatest strength and stability (fig. 6). This explains why many joins are seen when viewing a handscroll with transmitted light.[1]

Fig. 3. *Figure with phoenix* fragment was excavated in 1949 at the Mawangdui tomb, China.

Fig. 4. *Figure with dragon* fragment was excavated in 1973 at the Mawangdui tomb, China.

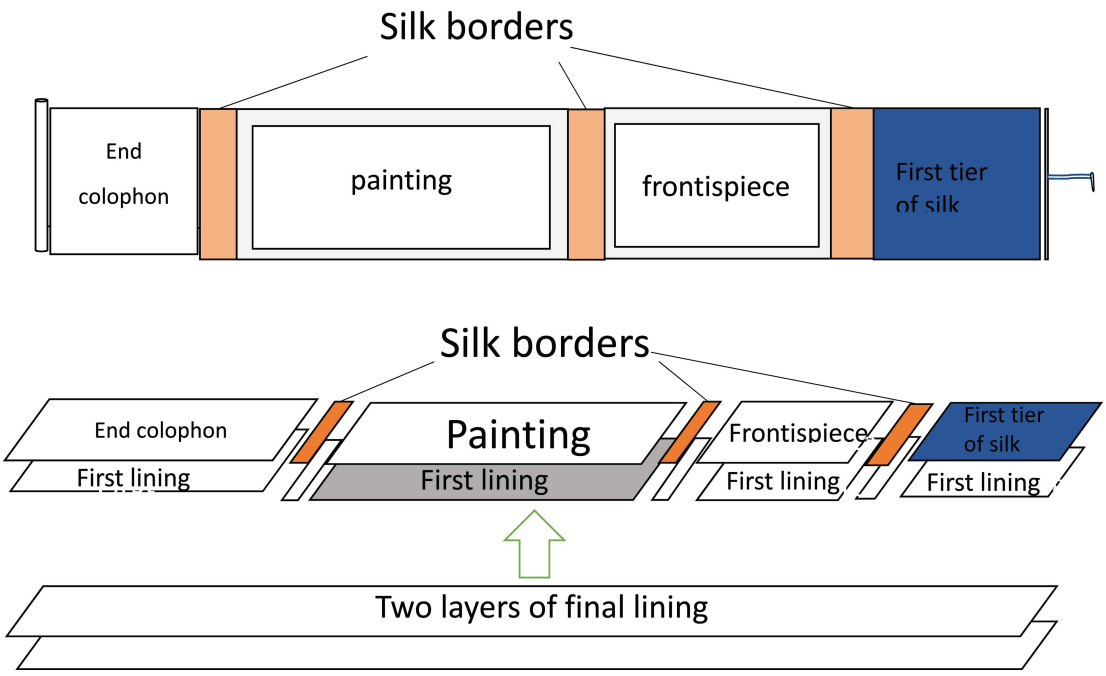

Fig. 5. An illustrated handscroll structure.

When a tear occurs in the joined section of a handscroll, the first lining may still be intact, whereas the two layers of final backing may be torn instead. By understanding the structure of the handscroll, it is thus easier to understand whether or not a tear is less severe (if it occurred in the final backing) or more severe (if located in the substrate). Another common damage that occurs with East Asian scrolls is delamination of layers, which is often seen on the back of scrolls. Therefore, understanding the inherent structure of a scroll will enable the caregiver to ascertain the level of treatment that is required.

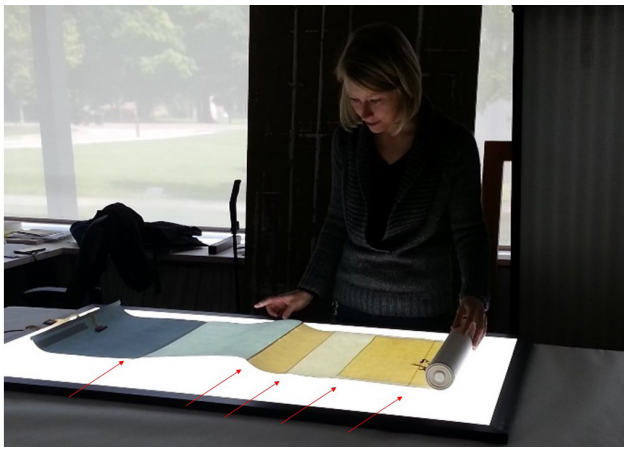

Fig. 6. Viewing a handscroll with transmitted light by Sara Ribbans, the CMA's East Asian painting conservator.

CHINESE HANGING SCROLL STRUCTURE AND ITS DETERIORATION

A hanging scroll is a long vertical piece that hangs on the wall. The overall dimension typically ranges from 6 to 8 ft. in height and 2 to 4 ft. in width. Traditionally, they used to be hung with a bamboo stick containing a metal fork at the top, as seen in the character wearing pink in figure 7. This traditional method is considered risky if one is not familiar with this tool, because the metal fork at the top can become loose over time.

Fig. 7. Hanging a hanging scroll bamboo stick; *The Eighteen Scholars*, painting by Anonymous in the Ming dynasty, China (1368–1644). Taipei Palace Museum, Accession No: 000859-00000.

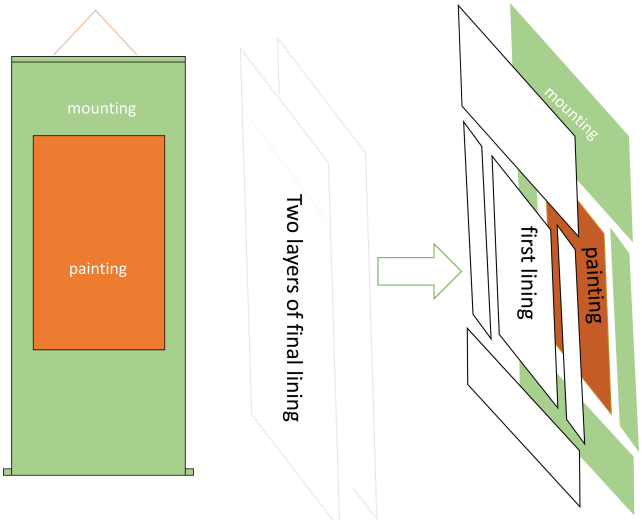

Fig. 8. An illustrated Chinese hanging scroll structure.

Structurally, there are three to five layers mounted on the back of the painting in a hanging scroll. These multiple layers are not continuous and have different dimensions. Figure 8 shows, from the right to left side, the painting with its mounting silk: the first lining layer and the two layers of final backing. Like handscrolls, the painting substrate and the mounting silk of a hanging scroll are lined with their own separate first lining. Then each lined piece is narrowly joined to each other with thicker paste to form a longer piece. Two long sheets of xuan paper are laminated ahead of the final backing process, and then this long, laminated sheet is applied onto the back of the previously joined piece with paste. Uniquely, each process requires different thicknesses of paste. Although delamination can happen with each layer, the most common delamination for Chinese hanging scrolls usually occurs after the first lining and before the final backing.[2]

CONDITION ASSESSMENT

Common deterioration present in scrolls can be divided into physical, chemical, and biological causes. Physical and chemical damages are more frequently seen in scrolls in North America and include substrate/paint lifting, creases, and delamination.

The author uses a system to assess damage through assigning grades from 1 to 5, with 5 being the most severe and 1 being the least (chart 1). Painting damages that are on the left of the chart, including lifting paint and lifting substrate, are the most severe. Creases, tears, and cockling can yield a fair condition designation. Delaminating layers can vary depending on which layers are impacted.

The right side of the chart indicates mounting damages, which can include a loose tying cord, a loose hanging cord, or loose or missing knobs, which are also graded on a scale of 1 to 5. Although these damages can be easily remedied, it is critical that they be noted because the scroll might fall during or after it is installed. Other mounting damages like lifting silk threads or fringes, creases, delamination, or discoloration on the mount are typically less severe and can be treated with remedial methods. However, one damage that cannot be undone and can be quite severe is light damage. Additionally, cosmetic issues such as discoloration and dirt can be difficult to treat and require primarily preventive conservation methods for their preservation.

Chart 1. Common Damages Seen in Scrolls

Painting	Mounting
Lifting paint (5)	Loose tying cord (1-5)
Lifting substrate (5)	Loose hanging cord (1-5)
Creases/tears/cockling (3-4)	Loose knobs or missing knobs (1-5)
Delamination (3-4)	Lifting silk threads/fringes (1-2)
Discoloration (1)	Creases (2-3)
Dirt (1)	Delamination (2-3)
	Discoloration (1)

Note: Damage is graded from 1 to 5, with 5 being the most severe.

The following are a few examples of common damages and simple measures that can be taken to address them:

- *Lifting substrate* (fig. 9): Cover the flaking area with a slightly bigger sheet of rayon paper as a triage method if the scroll needs to be rolled up. Put a note in the scroll box to warn handlers to avoid unrolling until the lifting substrate is secured.
- *Sharp creases* (fig. 10): These can lead to pigment flaking, substrate tears, or cracks; thus, cover these areas with a slightly bigger sheet of rayon paper to roll up the scroll.
- *Silk substrate loss* (fig. 11): Although silk substrate loss might look severe, it is sometimes stable if the old inpainting shows on the first lining. Usually it can easily be determined whether the damage occurred before the object's previous conservation treatment (see fig. 11, left). By contrast, if there is no old inpainting on the first lining, then this might indicate that the flaking occurred after its last conservation treatment (see fig. 11, right). Avoid rolling the scroll until a

Fig. 9. Left: Lifting substrate before treatment. Right: Lifting substrate after treatment.

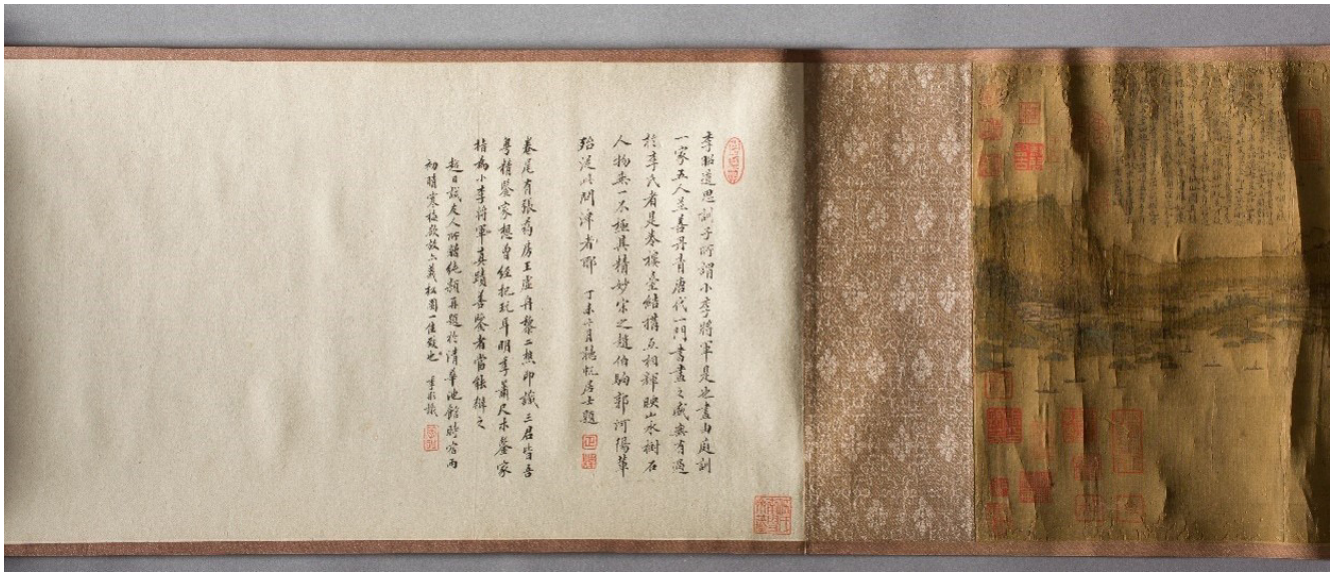

Fig. 10. Sharp creases shown in the right of the handscroll *Waiting for the Moon in the Mid Autumn Festival*, Shi Rui (Chinese, ca. 1400–1470). Cleveland Museum of Art, Accession No: 1973.72.

stabilizing treatment can occur. The substrate on the left is relatively stable compared to the right.

- *Delamination* (fig. 12): This can occur between the final and first layers, the substrate and first lining layers, and the two final layers. Delamination between the two-layered final layer is less severe because this layer is the farthest from the substrate, whereas the delamination between the substrate and the first lining is the most critical. The single layer of the substrate is usually made of a sheet of thin xuan paper or silk, so it is vulnerable to damage without the support of the first layer. Should this delamination occur, it is the most in need of urgent treatment. Restrict handling until treatment.

REMEDIAL MINOR TREATMENT

The following are common damages and proposed treatments:

- The flaking paint layer can be consolidated with a gelatin solution.
- The flaking substrate and delaminating mounting silk joins can be secured with paste.
- Loose mounting threads can be adhered to the fabrics with a mixture of Japanese seaweed solution, *funori* or methylcellulose, and paste. The proportion can vary depending on how weak the mounting silk is.

Fig. 11. Identifying new and old flacking of pigment and substrate: the substrate is relatively stable on the left compared to the right.

Fig. 12. Delamination between layers.

- The final backing delamination can be injected with a thinner paste by a syringe followed by weighting with the "sandwich" method. If extensive delamination is seen on the back of the final layer, inserting paste would cause new stains or stiffness. It would then need a full remounting.
- The tears can be patched with pasted and toned *kozo* paper, which is known for its long fibers and semitransparency. Even though Chinese scrolls are lined with xuan paper, the tears should be patched with a Japanese kozo paper for remedial minor treatment, as xuan paper is lacking strength.
- The delaminated layers can be secured by inserting a pasted Mylar strip as a carrier (fig. 13, left) trimmed in various shapes between layers (see fig. 13, right). Abrading this surface with sandpaper can help to carry more paste.
- Although some Chinese painting conservators use double layers of xuan paper strips to mend the creases on the back of Chinese scrolls, the author adopted long-fibered paper such as Japanese kozo paper to mend creases (fig. 14). The creases need to be reinforced with one or two layers of strips of Japanese kozo paper on the back of the scrolls. The Japanese sheet of kozo paper is first trimmed along the fiber direction, which is positioned perpendicular to the paper chain line with one wider and another one narrower. The wider and narrower trimmed strips are then laminated with paste ahead of time, with the narrower strip on top of the wider strip like steps, and then air-dried. These premade strips reduce moisture and minimize tide lines or undulations on scrolls. Having stepped edges also avoids sharp edges from forming when the scroll is rolled. Using feather-cut edges is not recommended, as the feathered edges absorb more paste and "grab" the paper more aggressively, resulting in undulation and delamination. When all creases are reinforced, humidification with the sandwich method, which, introduced in the next section, is usually executed as a final step to reduce undulation.

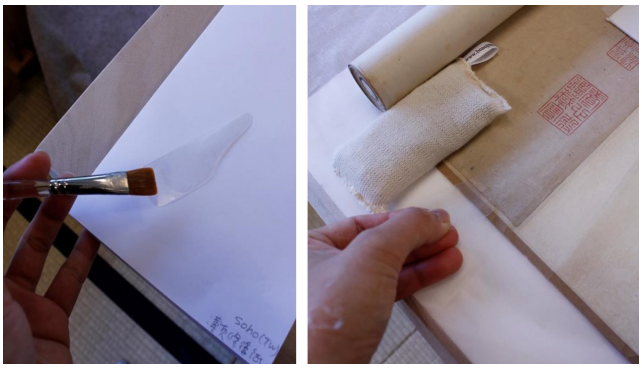

Fig. 13. Inserting paste into the delaminated layer. The picture on the left shows the shaped Mylar was pasted, and the picture on the right shows the pasted Mylar was inserted into the delaminated layer as a carrier.

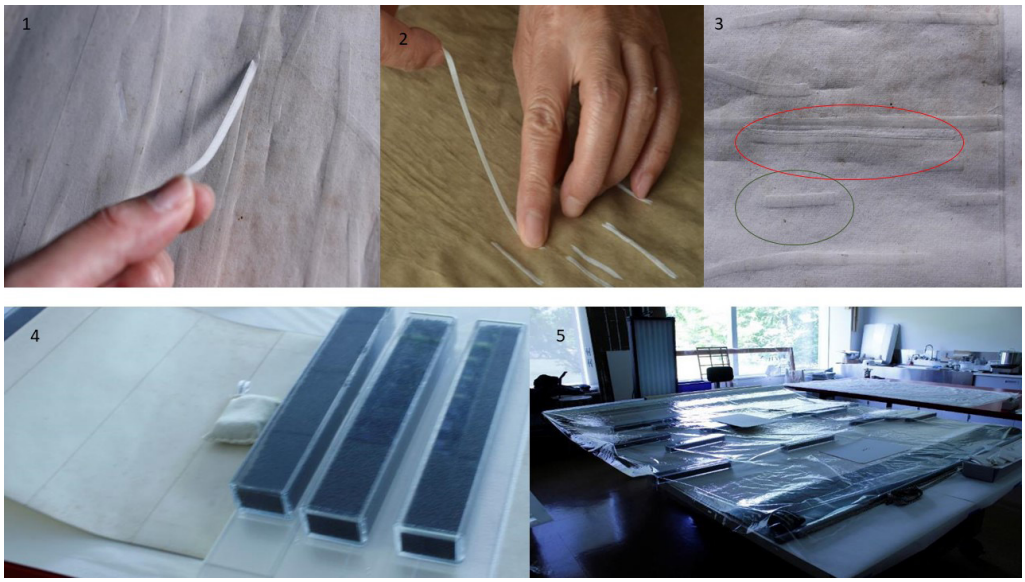

Fig. 14. Reinforcing strips application. (1) Twist off the prelaminated strip to be a bit longer than the length of the crease. (2) Paste and lay down the strip along the direction of the crease. (3) The upper circle shows the dried strip using the stepping technique, and the lower circle shows the old strip with two laminated xuan paper strips without the stepping technique. (4) Immediately insert the rayon paper and blot on the top of the treated areas along with weights. (5) Because the process can take more time in relation to the extensiveness of creasing, do it on a big table from one direction with raking light to avoid missing any areas.

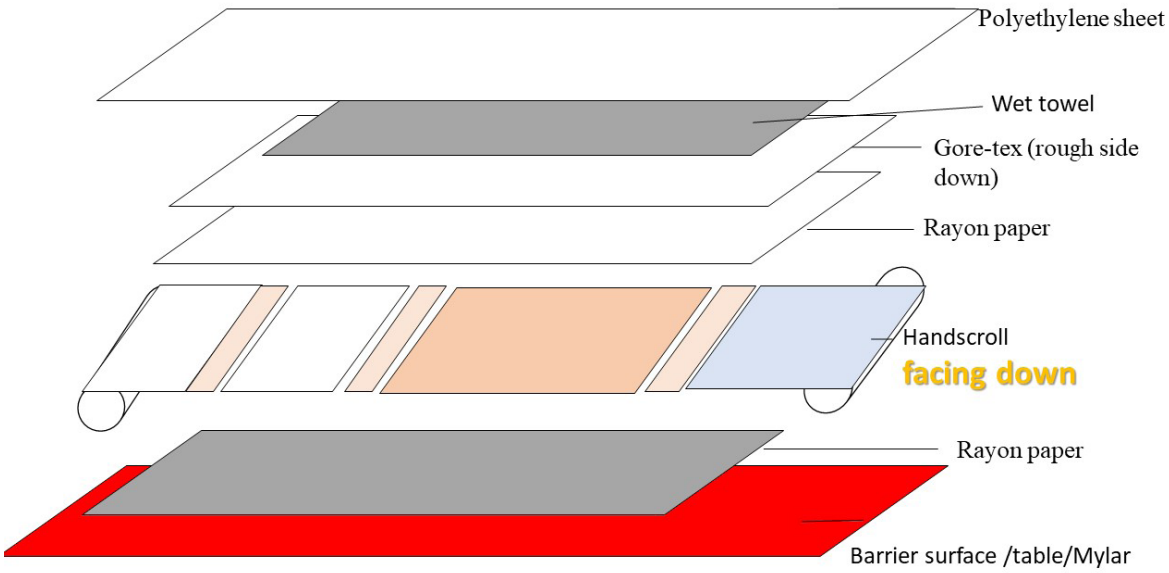

Fig. 15. The illustrated sandwich method for humidifying.

- After applying the paste on the substrate or gelatin on the paint layer, the layers of a scroll begin to expand and shrink as the treated areas move between wet and dry. The treated areas would not be as flat as before treatment, so humidification with the sandwich method, done in sections, can be executed after all components have been made secure (fig. 15). Because the scroll is a complex structure, the timing of moisture introduction is critical, and every scroll absorbs moisture differently. Some scrolls have wax on the back due to the traditional method of burnishing the back with stone and wax. The waxy surface will prolong the humidifying process. Some areas absorb moisture efficiently, whereas other areas do not. Stubborn areas need to be humidified beforehand. For instance, the reinforcement strips on the top of the final backing are more resistant to moisture, so those areas need more moisture. A small amount of water can be introduced with a small brush on the strips, not around them. Please note that the sandwich technique is not as efficient if the undulation is severe.

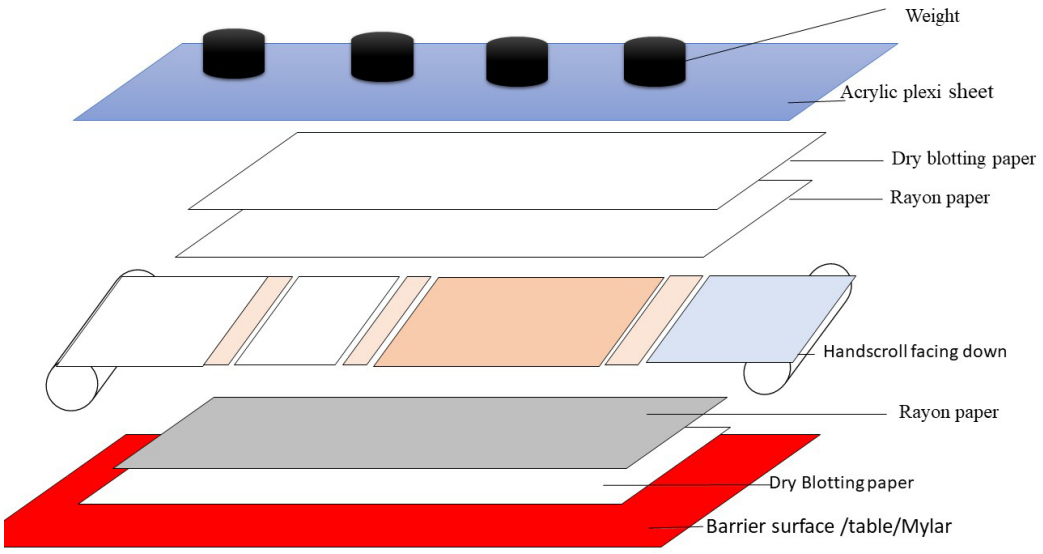

Fig. 16. The illustrated sandwich method for flattening.

- Once the humidification process is completed, the wet towel is removed, and two dry blotting papers are quickly inserted on the top and bottom. A sheet of Plexi and weights are then applied to the top (fig. 16). Change the blotting paper as needed. Because the scroll is long, this process can be repeated with different sections. The moisturized section should be ended at the joined sections to prevent undulation. Two or three people are recommended because this process should be conducted as fast as possible to avoid shrinking. Because the Chinese scrolls are relatively large, larger sizes of blotting paper can be butt-joined lying down.[3]

CARING FOR THE SCROLLS

Museums like the CMA encourage the public to access their collections. With more access to the collection, instituting a handling policy will ensure that damage is limited. Such a policy should prohibit pens or mechanical pencils from being used near the scrolls when they are unrolled. In the case of mechanical pencils, the graphite might break off, land on the surface of the scroll, and consequently be rolled up, causing abrasive smears or even holes. Readers will find excellent suggestions in developing a policy by consulting "Guidelines for the Care of East Asian Paintings, Display, Storage and Handling" written in 2006 by Andrew Hare, supervisory conservator in the East Asian Painting Conservation Studio of the Department of Conservation and Scientific Research at the Freer/Sackler.

Although museums such as the Freer/Sackler have been offering annual workshops to teach museum staff how to properly handle East Asian Scrolls, the need for sustained and holistic training continues. Because conservators cannot always be on call for requests by scholars to handle scrolls, one of the most effective preventive methods for handling is the use of support pillows that can be custom made at different sizes. The method of making these pillows and the effectiveness of their use in creating a gentler rolling procedure must be demonstrated to those who handle scrolls. In the case of an exhibition, the handling team should receive specialized training in how to handle these objects (fig. 17).

The following are additional handling guidelines for examination, display, storing, and training curators and art handlers:

- Chinese handscrolls have a hard object as a fastener for the scroll. It is called a *toggle* and is usually made with jade (fig. 18), ivory, bone, or wood. By contrast, Japanese scrolls usually have a cord on one end to tie the scroll without a fastener (fig. 19, left). To unroll a Chinese handscroll, the fastener/toggle can be covered with a tissue, which will prevent damage to the handscroll while rolling (see fig. 19, right).

Fig. 17. Training the art handler at the CMA, Tony Cisneros.

- To prevent the handscroll from squeezing while unrolling, a support pillow with a slot can be used (fig. 20). Put the fastener into the slot of the pillow and then roll it together with the handscroll (fig. 21).
- Rolling up a handscroll is more challenging than unrolling. Because the edges of the handscroll are thinner and more fragile, rolling it tidily and tightly is difficult. A couple

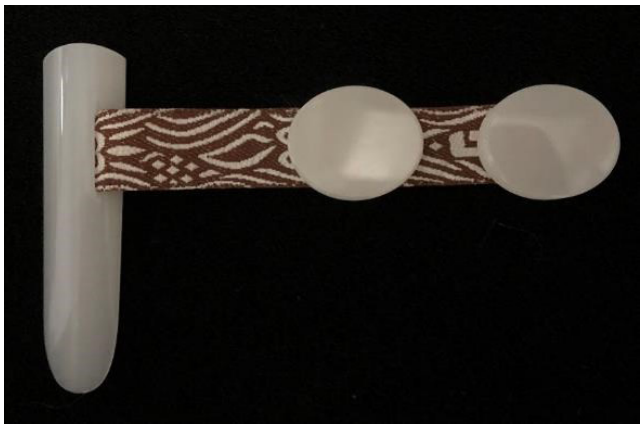

Fig. 18. A jade toggle and a pair of the "bottom roller ends" of the Chinese handscroll.

Fig. 19. Handscroll tying cords. The Japanese one is on the left, and the Chinese one is on the right.

of circles should be rolled up first, then two sides of the handscroll should be gently pressed by placing two hands on both sides simultaneously to keep the sides tidy. Roll up the scroll sectionally until the handscroll is fully rolled up from left to right. If the handscroll's "bottom roller ends" (see appendix 1) is missing, it will be difficult to roll the handscroll tidily (fig. 22).

- For displaying a handscroll on a flat platform/case, some museums prefer angled surfaces for viewing comfort. If the platform is not flat, a 30° angle is acceptable with a stopper to prevent the scrolls from sliding down. The ends of the bottom roller in Chinese handscrolls are flat, and thus supports can be made to keep the scroll from sliding down (fig. 23, right). By contrast, the knobs of a Japanese handscroll stick out, and thus two pins can be installed to secure the scroll (see fig. 23, left).
- When handling a hanging scroll, determine if the scroll can be hung. A loosened knob is sometimes missed while condition checking. Check that all components are secured as well.
- If it cannot be hung due to the torn hanging cords or loosening "copper eyelets" from the "hanging stave" (see appendix 2), the scroll should be unrolled on a big steady table with a sheet of white acid-free paper on top. The white sheet helps with spotting new flaking. A restricted note can be put in the storing box with the handling instruction.

Fig. 20. A customized support pillow is used in unrolling a handscroll.

Fig. 21. The handscroll pillow slot.

Fig. 22. A handscroll is missing a "bottom end."

Fig. 24. Only hold the bottom roller with hands, leaving space away from the roller. Japanese painting conservator, Philip Meredith, demonstrates handling a hanging scroll at the MFA Boston.

- When unrolling and rolling scrolls, clean hands are preferred instead of gloves because of the need to have a sensory experience of the scroll to understand its condition.
- If the hanging scroll can be hung on a wall, spot weak points first, and determine the best locations for handling. The weak areas of an ancient hanging scroll usually are located along the edges and at the fabric near the hanging stave. After hanging the scroll with a hanging cable on a wall, one should unroll with only fingers, leaving out some space from the wall and the bottom roller (fig. 24). Avoid touching the roller with palms, as sweat and oil from the palms can easily transfer to the scroll.
- When displaying a large hanging scroll, use three hanging points to hang (fig. 25, right) and a set of J-hooks at the bottom for additional support. The fixed hooks can be distracting since they stand out. After toning the J-hooks with paint, they become almost invisible to the audience (see fig. 25, left). Many museums already hang scrolls with J-hook supports. Yet these J-hooks must be fixed to the back wall or board. The backboards might be damaged and leave a hole behind, which makes reuse difficult without repairing the holes. At the CMA, the hanging scroll backboard is a layer of fabric on a wooden structure, with no solid back to affix the J-hooks. The CMA's mount maker, Philp Brutz (2020), designed a set of two hooks on the sides of the scroll that connect to hanging cables (fig. 26). The scrolls are secured by the hanging cable at the top and the J-hooks at the bottom using the same hanging cables. This balances the weight between them. These J-hooks are reusable because they can be detached from the hanging cable.
- If the hanging scroll is too long or the exhibition space has a low ceiling, an upper roller support is required for hanging (fig. 27). The original design was borrowed from the MFA Boston and then modified by Philip Brutz (2020) to further strengthen it. If the tying cord is too torn to use as a hanging mechanism, this upper roller system can be applied to unroll the scroll and hang on a wall for photograph or examination (fig. 28).
- Since the diameter of the rolled scroll on the bottom is narrower than on top, creases are more likely to occur in this area. For this reason, increasing the diameter

Fig. 23. Provide stoppers from shifting. The Japanese handscroll is on the left, whereas the Chinese one is on the right.

Fig. 25. Left: J-hooks with toning paint. Right: There are three hanging points at the top.

Fig. 26. Left: Metal supporting J-hooks. Right: The J-hooks are behind the hanging scroll.

Fig. 27. A detailed picture of upper roller support for a hanging scroll.

Fig. 28. An upper roller support is useful when examining a hanging scroll on a wall viewing with transmitted light.

Fig. 29. A customized support is recommended to increase the diameter of the bottom roller of a hanging scroll. On the left, a scroll is inserted with a tunnel-shaped Zoneform tube that is wrapped with a stockinette. On the right, a scroll is inserted with an acid-free paper tube with a slot that is attached with a sheet of paper for carrying the bottom roller.

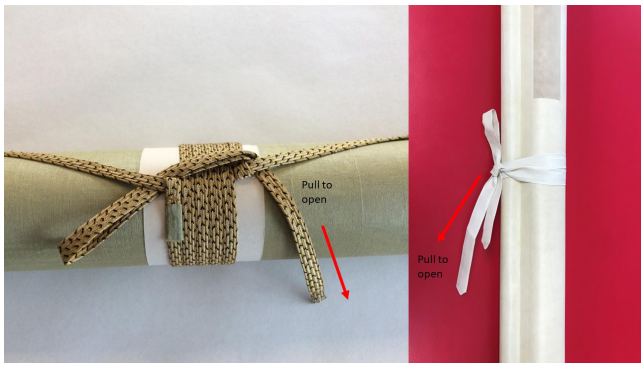

Fig. 30. Left: The Japanese hanging scroll tying cord. Right: The Chinese variation. The red arrows show where to pull to open the tie.

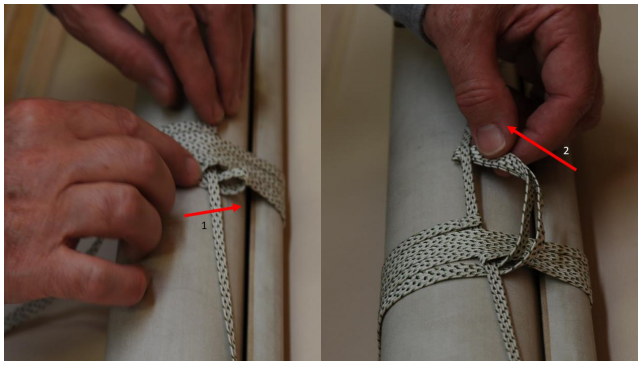

Fig. 31. The tucking sequence for a Japanese tying cord.

when rolling up the scroll should minimize creases. To prevent creases through increasing the diameter of the scrolls, the bottom roller of an oversized Chinese hanging scroll can be inserted into a modern customized support that is made of an acid-free paper tube or

Fig. 32. Paper slip on a handscroll.

Zoneform to shape the tunnel, then wrapped with a stockinette (fig. 29).

- Tying and untying Chinese hanging scrolls is different from that of their Japanese counterparts. Chinese hanging scrolls, as depicted in the right side of figure 30, have two ends to form a bowtie. The red arrows show where to pull open the tie. There is only one end for the Japanese tying cord. After several circles, the cord needs to be tucked in (fig. 31).
- The cover silk of a scroll will be naturally abraded over time by the tying cord. Placing a slip of long fiber paper around the scrolls where the tying ribbons are fastened will protect the cover silk (fig. 32). Some East Asian museums prefer wooden Paulownia boxes to store scrolls, whereas an acid-free box and muslin fabric wrapper are often used in North American museums due to materials accessibility and budget concerns.
- Finally, training for handling must be made available to museum staff to reinforce and refresh their knowledge of these issues. In this way, new discussions regarding sustainability can continue on a yearly basis.

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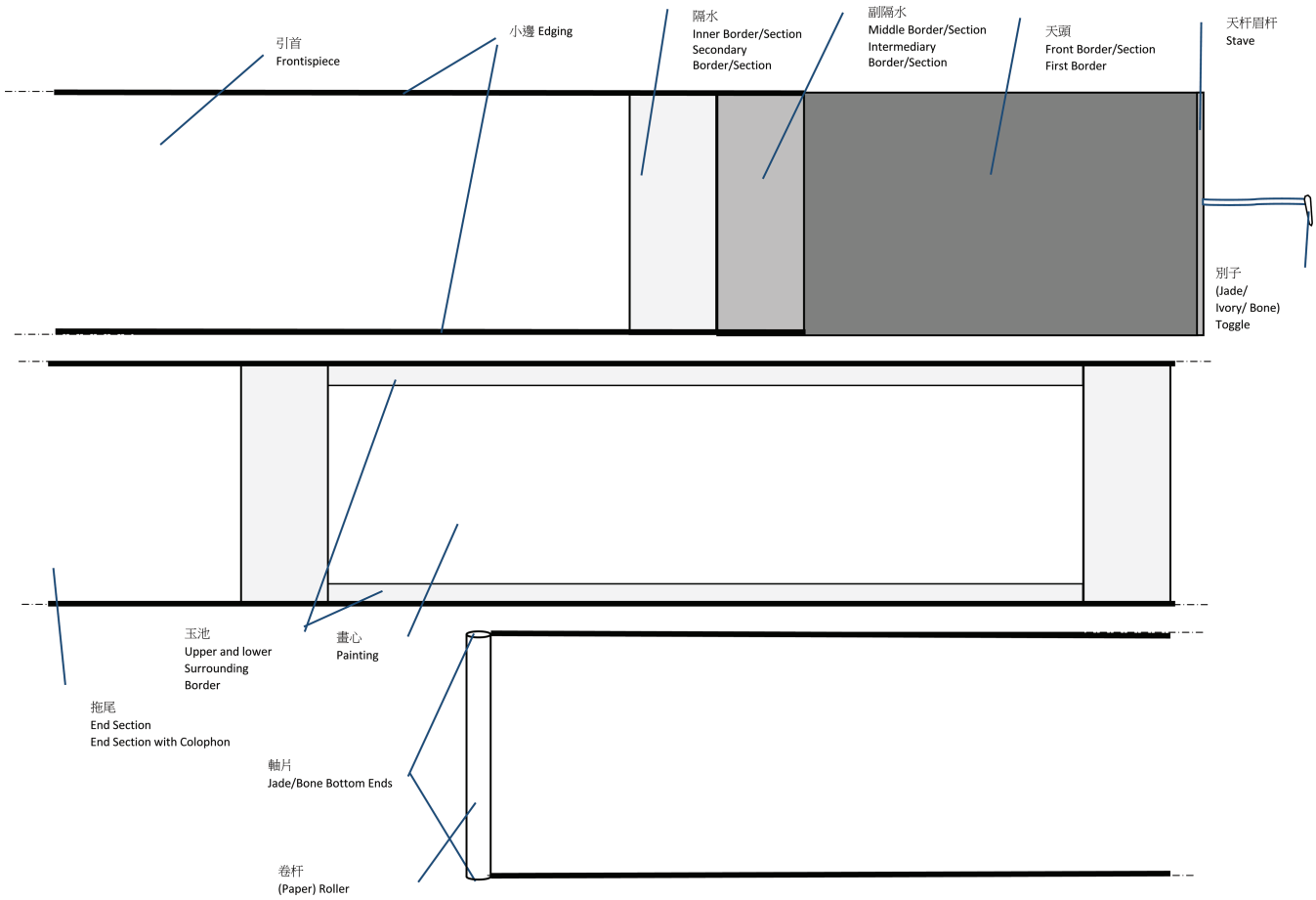
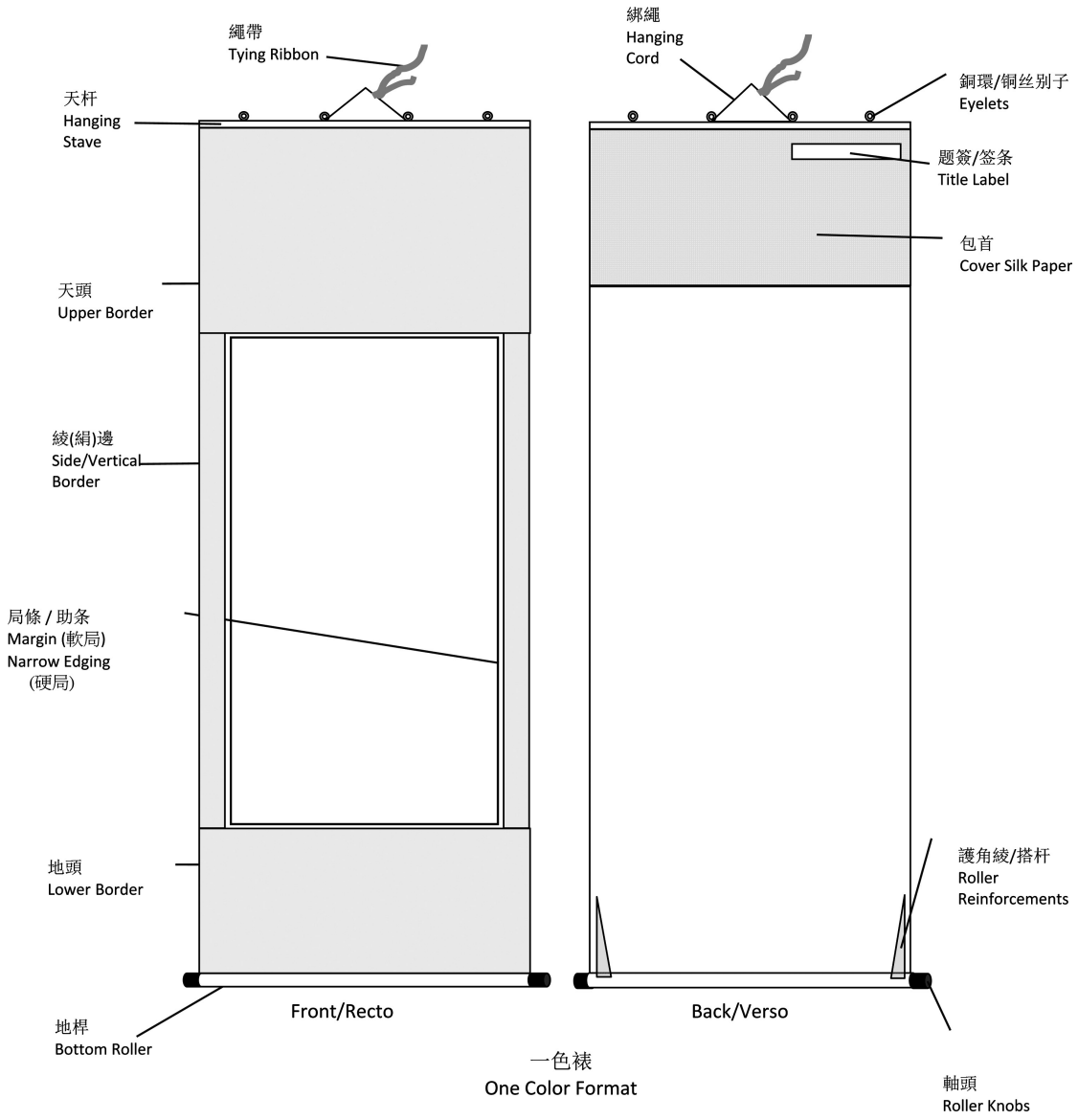
APPENDIX

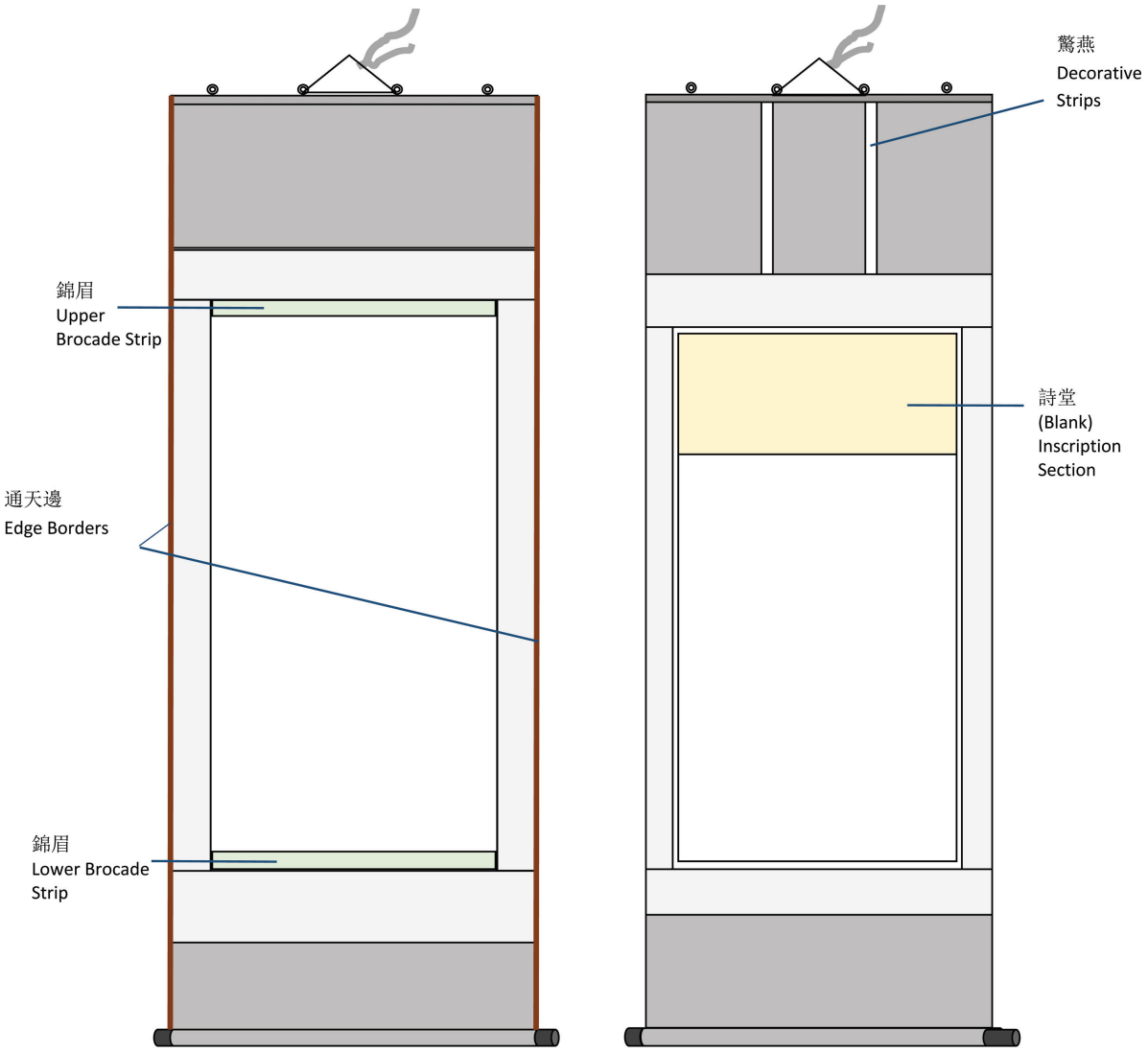
All terminologies in the appendixes are defined and translated by the team of Hsin-Chen Tsai, Grace Jan, Melody Chen, Qian He, Zhizhao Lv, Jiangxiang Zhou, and the author with supervision by the East Asian painting conservators at the Museum of Fine Arts, Boston and the Freer and Sackler galleries.

Appendix 1

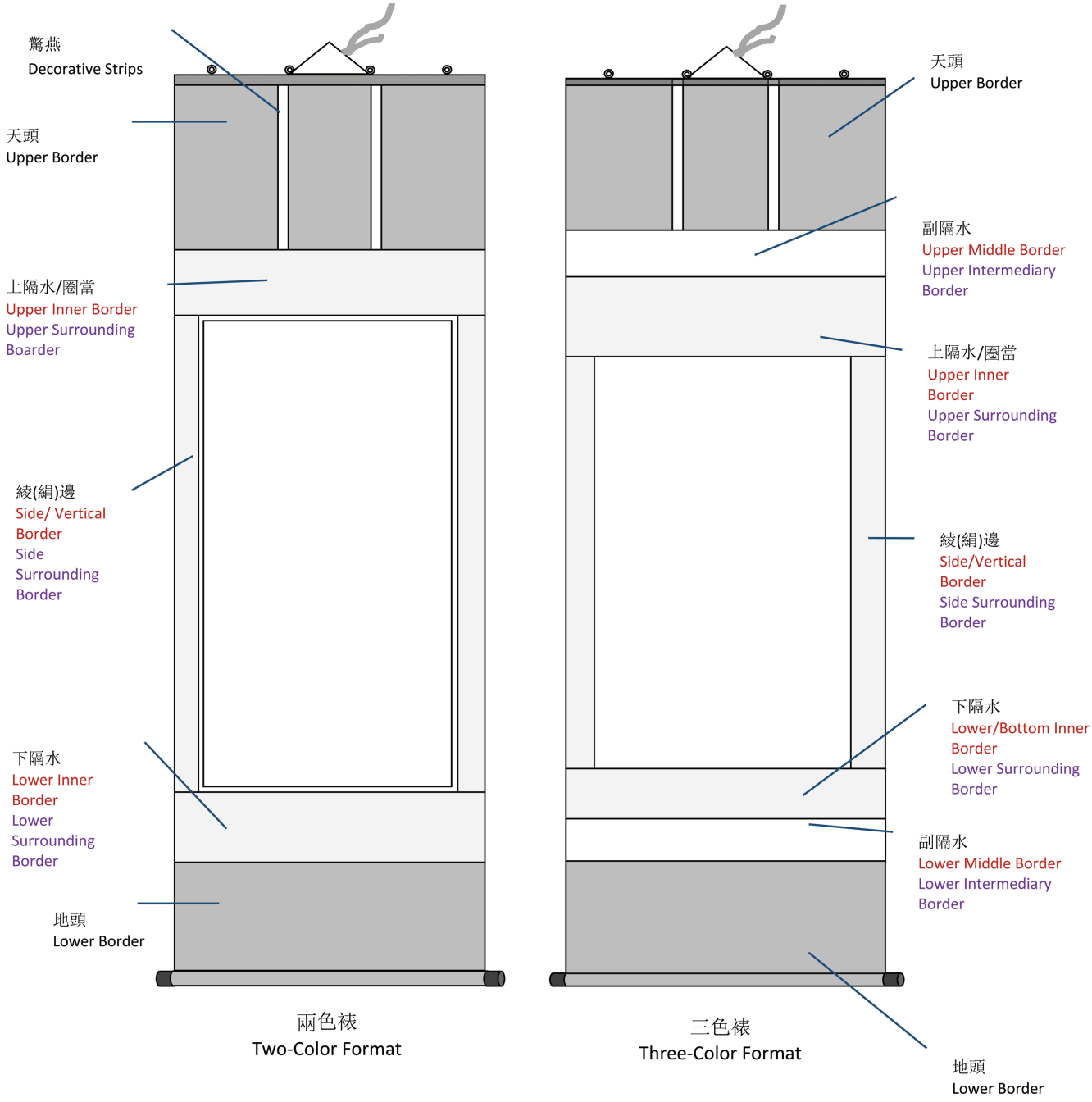

引首
Frontispiece
小邊 Edging
隔水
Inner Border/Section
Secondary
Border/Section
副隔水
Middle Border/Section
Intermediary
Border/Section
天頭
Front Border/Section
First Border
天杆眉杆
Stave
別子
(Jade/
Ivory/ Bone)
Toggle
玉池
Upper and lower
Surrounding
Border
畫心
Painting
拖尾
End Section
End Section with Colophon
軸片
Jade/Bone Bottom Ends
卷杆
(Paper) Roller

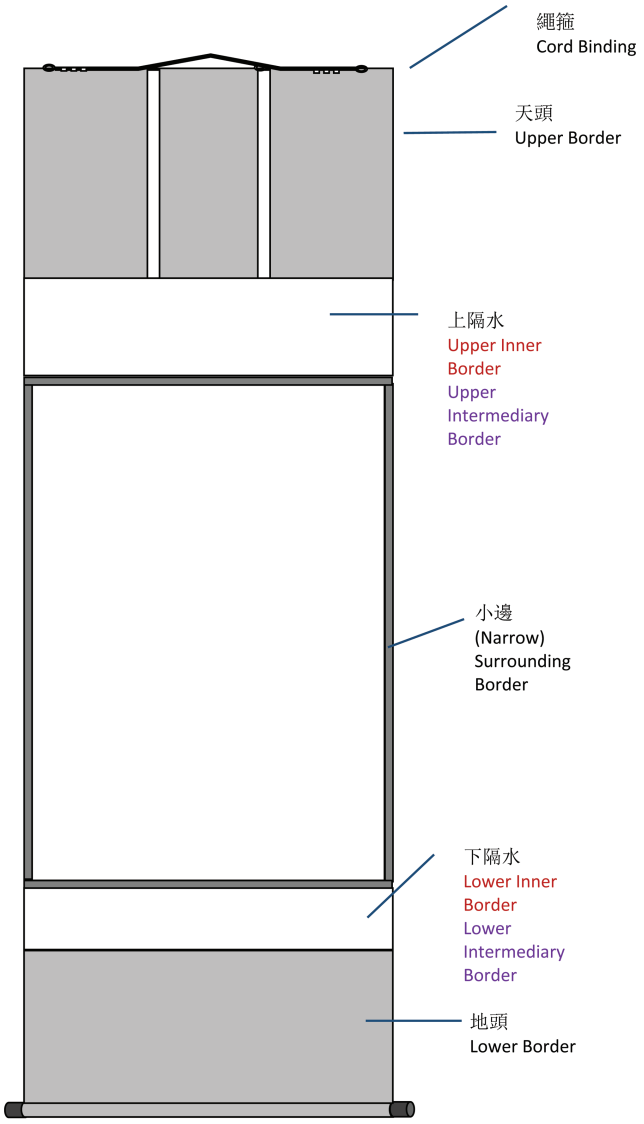
Appendix 2


繩帶
Tying Ribbon
天杆
Hanging
Stave
天頭
Upper Border
綾(絹)邊
Side/Vertical
Border
局條 / 助条
Margin (軟局)
Narrow Edging
(硬局)
地頭
Lower Border
地桿
Bottom Roller
Front/Recto
綁繩
Hanging
Cord
銅環/铜丝别子
Eyelets
題簽/签条
Title Label
包首
Cover Silk Paper
護角綾/搭杆
Roller
Reinforcements
Back/Verso
軸頭
Roller Knobs
一色裱
One Color Format



兩色裱
Two-Color Format


驚燕
Decorative Strips
天頭
Upper Border
上隔水/圈當
Upper Inner Border
Upper Surrounding
Boarder
綾(絹)邊
Side/ Vertical
Border
Side
Surrounding
Border
下隔水
Lower Inner
Border
Lower
Surrounding
Border
地頭
Lower Border
兩色裱
Two-Color Format
天頭
Upper Border
副隔水
Upper Middle Border
Upper Intermediary
Border
上隔水/圈當
Upper Inner
Border
Upper Surrounding
Border
綾(絹)邊
Side/Vertical
Border
Side Surrounding
Border
下隔水
Lower/Bottom Inner
Border
Lower Surrounding
Border
副隔水
Lower Middle Border
Lower Intermediary
Border
地頭
Lower Border
三色裱
Three-Color Format



宣和裝
Xuan He–style format

NOTES

1. Japanese handscroll has fewer joins when viewing under transmitted light because the final backing step for a Japanese handscroll is in a different sequence.

2. The final backing process for Japanese hanging scrolls uses different materials and techniques such as aged paste, kozo paper (misu and uda paper), and brushes. Therefore, the delamination mentioned applies to Chinese hanging scrolls only.

3. The sandwich method technique, followed by remedial minor treatment for scrolls, has been commonly practiced by Xiangmei Gu, the senior Chinese painting conservator, of the Smithsonian's National Museum of Asian Art—the Freer Gallery of Art and Arthur M. Sackler Gallery.

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IKA YI-HSIA HSIAO
Associate Conservator of Chinese Paintings
Cleveland Museum of Art
Cleveland, OH
yhsiao@clevelandart.org