

JAPANESE PAPER AND PAPER CONSERVATION

THOMAS F. FREEMAN HONORS COLLEGE

SENIOR THESIS

BY

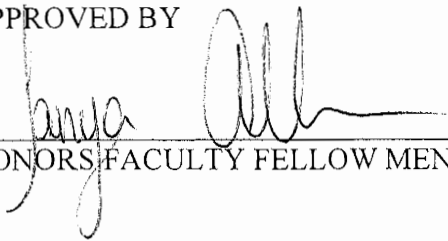
KEI TAKAHASHI

B.A. ART

COLLEGE OF LIBERAL ARTS AND BEHAVIORAL SCIENCES

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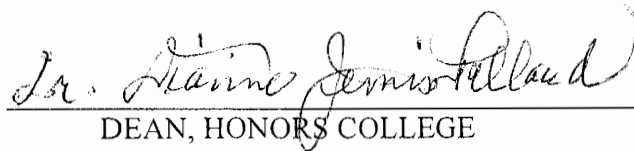
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TEXAS SOUTHERN UNIVERSITY
Thomas F. Freeman Honors College

Abstract

Washi is a Japanese handmade paper which has very long traditions. There are many types of *washi* in Japan but there are three main types of paper which are the *kozo*, *mitsumata*, and *gampi* paper. *Kozo* paper is made of mulberry fibers and the most well-known and has the highest production in Japan. *Mitsumata* and *Gampi* paper are made of tree of daphne fibers but the process of these two papers are different and *Gampi* paper is the highest quality of paper compared to the other two types papers. Before *washi* was created, the handmade paper originally came from China. China made *Mashi*, is a paper made of hemp. Then, the culture of papermaking was exported to Japan and Japanese papermakers created their own style of paper which is the *washi*. At first, Japanese papermakers used hemp, but it is difficult to handle it so during *Heian* period from 794 to 1192, they tried to use mulberry fibers and created *kozo* paper that became the most well-known paper in Japan. After that, papermakers tried to create many types of papers, There are 47 regions in Japan and there are around 35 regions that have their own style and history of papermaking. The process of papermaking takes around 12 steps includes boiling, beating, arranging, squeezing, stretching, and drying and takes a very long time. These processes turns the fibers into sheets of paper. The ingredients of paper is made of three main compounds, cellulose, hemicellulose, and lignin. The main compound is cellulose which is the same organic compound used in cotton and rayon as well. For Japanese paper conservation, one important technique is to make a drying board is called *Karibari* in Japanese and is one of the tools used in the process of mounting Japanese screen and scroll paintings. *Karibari* have a structure similar to folding screens and consists of a wood lattice core covered with seven or eight layers of different types of papers.

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VITA

Born	December 24, 1996, Nagoya, Japan
2015	Stephen F. Austin High School, Sugarland, TX
2019	Bachelor's Degree Texas Southern University, Houston, TX
Major Field	Art

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Chapter I: The History of Japanese Papermaking

Japanese papermaking has a very long history and can be traced back to China. Where it spread to other Asian countries. The handmade paper specifically created in Japan is referred to as *Washi*. *Washi* also has a very long history that mainly has two important periods: the *Heian* period from 794 to 1192 and the *Kamakura* period from 1192 to 1333. Today, *Washi* has elements more similar to the *Kamakura* period than the *Heian* period.

Washi is a very important material for Japanese people because of its traditional and modern value for various occasions. There is a very long history for this cultural tradition. Although *washi* is the term used for all Japanese handmade paper, there are many different types of *washi* that are made using different techniques. Usually when people think of paper, they think of the typical machine-made paper that is used daily. Handmade paper is not for daily use, but more so for special cultural events in Japan. Unfortunately, there are less papermakers producing Japanese traditional *washi* nowadays, most likely due to decrease in demand for *washi*. The overall shift in culture with Japanese people integrating Western culture more into their traditions, celebrating traditional events less, and due to high costs of *washi* all contribute to this situation; nonetheless, it is important for people to protect this tradition. *Washi* is a beautiful part of Japanese culture and can be used to keep future generations tied to their cultural roots.

Before *Washi* was exported from China to Japan, Chinese papermakers created paper using recycled hemp, such as fibers from clothes, and was not prepared to use materials directly from the natural environment. This hemp paper is the very beginning of the history of paper making. Due to hemp papers being expensive, people used hemp paper exclusively for their drawings and special events, not just for daily use. During the period of 317 to 420, Chinese papermakers created papers using bamboo fibers called *Chikushi*. Bamboo papers were cheaper

and easier to make, so people used this paper for more daily use, such as writing and calligraphy. During 618 to 907, Chinese papermakers created *Senshi*, which is a paper used for paintings and calligraphy. This paper usually has a white color and uses different types of fibers. There are different types of *Senshi* with various types of fibers and thickness.

The tradition of paper making was exported from China to Japan around 610. Based on the historical records, the oldest papers in Japan were *Minō* paper and *Chikuzen* paper. Which were used for important documents. Then, during the *Nara* period which was 737 to 774, the papermaking in Japan gradually increased. During this period, papermakers usually made *Mashi* which is paper using hemp fibers, but Japanese papermakers used and created their own style of papermaking different from Chinese papermakers. Another type is *Kokushi* which is a paper made of mulberry fibers, and another name of *Kozo* paper and *Danshi* which is a one type of *Washi* which has wrinkles and could be used for writing, wrapping, and mounting papers. Japanese papermakers created many more types of paper such as dyed paper and gold and silver paper.

During the *Heian* period, especially during 805 to 809, the process of papermaking became more well-known and was common in many different parts of Japan. However, it was more commonly used among the upper-class since Japanese *washi* is expensive. In Kyoto, a region where many of the upper-class people lived during the *Heian* period, papermakers made handmade paper using recycled materials and fibers. Then, papermakers created different types of papers using various materials and techniques, such as dyed paper called *Somekako-shi*. Japanese marble painting paper, called *Suminagashi*, uses *Bokujyu*, or traditional black ink, for traditional calligraphy and paintings. *Karakami* is a type of paper that uses *Gofun* or *Kira*, which are the traditional white ink. This paper is used as decorative papers, often placed on folding

screens and sliding doors. These are very valuable and costly decorative papers, so it is mainly used by the upper-class.

During the *Kamakura* period, local people used Japanese traditional paper for their writing and documentation. Different regions of Japan had different styles of paper as well as different uses for the paper within each region. During this time period, *Suibarashi*, which is a type of *Washi*, was the most well-known and expensive paper so it was more or less exclusively used by the upper-class of this time. People used this paper for their valuable documents and wrapping papers.

Between 1568 and 1600, also known as the *Momoyama*, *Ootakadanshi* became well-known as well as the highest-ranked paper in Japan. This paper contained more rice powder compared to *Suibarashi*. During this time, the culture and process of papermaking became more distinct within regions, so people looked to regions outside their own for specific paper needs. Thus, during the *Edo* period which was from 1603 to 1868, the culture of Japanese handmade paper became more developed.

Different type of paper continued to be developed during the *Meiji* period (1868 to 1912), but the papermaking process from western culture was imported and became more popular since it was easier to make. During the *Taisho* period, which was from 1912 to 1926, Echizen city which is located in the Fukui prefecture, created new types of *Mashi*, which contain a mixture of mulberry fibers and tree of daphne fibers. This paper is used for *Nihonga* which is a Japanese traditional painting that was developed out of this fusion of culture during this period.

There is less production of Japanese traditional paper in the 21st century because machine-made papers are more convenient and cheaper, but traditional papermakers continue to make and protect this cultural tradition in Japan. However, the reality is that the papermaking

culture is slowly decreasing little by little because there is less interest for many people. Thus, currently, the main reason the papermaking culture is slowly dying in Japan is the cost, lack of interest, and shift in traditional values. In order to keep this process alive, it is important that the Japanese papermaking culture is adapted to modern times, to encourage the younger generation to value this important aspect of their cultural roots and to want to keep and protect it.

The Paper of Japanese Papermaking

Washi is a well-known traditional paper that is used in many ways including for Japanese paper works, paintings, and calligraphy. Handmade paper and machine-made paper are very different, and people use these papers differently. Machine-made paper is most commonly used due to its convenience and low cost. The use of handmade papers, especially Japanese handmade papers, is limited to traditional and special occasions due to their high cost.

There are mainly three different types of *Washi* in Japan: *Kozo*, *Mitsumata*, and *Gampi* paper. *Kozo* paper is made of natural material from the tree of the mulberry family. It is the most commonly used and has the highest production of handmade paper in Japan. If people find handmade paper in Japan, that is usually *Kozo* paper. The characteristics of *Kozo* paper is the long fibers and the strength of the paper. *Kozo* paper is a very important and well-known paper within Japanese handmade paper. *Mitsumata* paper is made of natural material from the tree of the daphne family. People have been using this paper for thousands of years though, it is more modern compared to other types of Japanese handmade papers. The *Mitsumata* paper was produced mainly during the *Meiji* period, which was from January 25, 1868 to July 30, 1912. While *Mitsumata* paper has luster or shiny fibers, *Gampi* paper has the shiniest fibers of the three. Similar to the *Mitsumata* paper, *Gampi* paper is made from the tree of the daphne family

as well. Since the tree of the daphne family for *Gampi* paper takes a longer time to grow and is difficult for people to cultivate, this paper is the most expensive paper in Japanese traditional handmade paper. Thus, papermakers usually use daphne trees that are grown in the wild. Also, fibers of *Gampi* paper have higher viscosity, or stickiness, so papermakers do not need to use glue for their papermaking process. The fibers of *Gampi* paper have luster, or shiny texture, that creates a semitransparent or translucent paper. This glossy texture and the difficulty of producing it makes *Gampi* paper one of the highest ranked and beautiful paper in Japanese traditional handmade paper.

While *Kozo*, *Mitsumata*, and *Gampi* are the most common papers used, there are other important types of Japanese handmade paper besides those three. *Mashi* uses hemp fibers and is the oldest type of paper in Japan. This paper originally came from China and has longer fibers compared to other types of papers. This paper has a very traditional papermaking process, so it is difficult to continue making this paper and to handle the materials. *Mashi* had the highest production before the *Heian* period, which was from 794 to 1192 but during the *Heian* period, papermakers produced *Kozo* paper more. After that, there were less production of *Mashi*. However, people still use *Mashi* for their special events and paper preservation and mounting. *Kongoshi* are papers that contain more than two different types of fibers, such as a mixture of mulberry fibers and tree of daphne family fibers paper and mulberry fibers and hemp fibers paper and many more. The papers that are made of mixed fibers each have different types of characteristic depending on their fibers, process of papermaking, and the location of papermaking. *Hakusaishi* is a paper made of bamboo fibers that is originally from China and people use this paper for calligraphy.

There are also papers that contain different materials meaning that the paper is made of a mixture of fibers and different materials. *Hoshoshi* is a paper that is a mixture of mulberry fibers and rice powder. This paper was used for valuable documents and expensive painting papers, especially for *Ukiyo-e* painting, which is a type of traditional painting in Japan that was especially popular during the Edo period from 1603 to 1868. *Dorotsuchi-irimaniai-shi* which is a paper that contains tree of daphne fibers and clay. This paper can block out the sunlight and the material prevents it from shrinking. This paper is used as a under paper for folding screens, sliding doors, and drying boards that is used for mounting Japanese works of paper and paintings. *Misugami* is a paper containing a mixture of mulberry fibers and *Gofun*, which is a pure white color ink for Japanese traditional painting. This paper is better used as under paper for traditional Japanese hanging scrolls. *Udagami* is a paper that is made of mulberry fibers and white clay. This paper has a very pure white color and a smooth texture but has a higher viscosity which makes it unique and a strong paper for high heat.

While these papers are the most commonly used throughout Japan, each region has their own style and types of handmade papers made from the same trees that were previously mentioned. The handmade papers are regionally unique due to how the paper is used as well as the traditions of each region. Since each region has different cultures and environment, these factors are important when making the handmade papers.

The Process of Japanese Papermaking

There are the basic procedures of handmade papermaking in Japan:

1. Prepare the natural materials for papermaking.

Usually, the process of papermaking is done within a certain season or time of year depending on the region. For example, *Kozo* and *Mitsumata* papers are made during the winter, so typically from December to February. While, *Gampi* paper is usually made during the month of November.



Figure 1. *Gampi* paper before steaming

<https://setouchifinder.com/tw/wp-content/uploads/sites/4/2017/03/imoto04-790x526.jpg>

2. Steam the materials

The process of steaming the fibers from these trees takes several hours and uses a steaming basket called *Seiro*. Steaming makes it easier to get to the inner bark fibers, which are what is mainly used for papermaking.

3. Peel off bark fibers

The next step is to peel off the inner bark fibers by separating the wooden part from the inner bark fibers.

4. Remove black inner bark fibers

The inner bark fibers usually have black and white fibers. Papermakers usually use the white inner bark fibers for papermaking, so they remove the black fibers using a traditional knife called *Heguri*.

5. Boil white inner bark fibers

Shajyuku is the process of boiling fibers in papermaking. After removing the black inner bark fibers, the white inner bark fibers are washed using room-temperature distilled water then boiled for several hours using alkaline aqueous solution. Papermakers use alkaline aqueous solution because it loosens fibers and helps melt and remove impurities from the fibers. The traditional way involves papermakers making alkaline aqueous solution from lye made of ash from burned tree branches and leaves mixed with water. Previously, papermakers used sodium hydroxide and sodium carbonate for alkaline aqueous solution; however, sodium hydroxide is a very strong alkaline solution which could possibly damage the fibers. Therefore, if the papers are needed for long-term use, sodium hydroxide is not recommended for use. After *shajyuku* is completed, then the fibers are steamed.



Figure 2: *Gampi* paper steaming.

<http://www.awagami.or.jp/iroha/process/images/photo2-1.jpg>

6. Remove the dust

Chiritori is the process of removing dust from the fibers. After the previous step is completed, dust must be removed by placing the fibers in a box of water to soak. This procedure is very important because the white inner bark fibers contain many impurities which could damage the final product. Therefore, they have to clean these white inner bark fibers by hand. This step of the procedure takes the longest time in Japanese papermaking.

7. Beat remaining fibers

Kokai is the process of beating the white inner bark fibers using a thick wooden stick on a table made of stone to loosen the fibers. The longer and stronger the papermakers beat the materials, the more the fibers undergo fibrillation which creates a stronger and better paper product.



Figure 3: The kokai process of beating the white inner bark fibers using a thick wooden stick. (<https://pbs.twimg.com/media/CwzEu1fUUAAD1rt.jpg>)

8. Arrange the Paper

Kamisuki is the process of arranging the paper. This is done by putting the materials in a papermaking tool called *Sukibune*, a special tool for arranging paper. The paper is arranged by fully covering it with water and inserting glue called *Neri*. *Nagashisuki* is the process of repeating this layering three times. The first layer is called *Ubumizu* and involves making paper the right shape, and this procedure is repeated three to four times. The second layer is called *Choshi* and involves gently shaking the *Sukibune* to create paper that is the right thickness. This procedure is repeated three to four times as well. The third layer is called *Sutemizu*, and this step involves making the paper cleaner. This step of the procedure is repeated once or twice. After these steps, the layers are placed and piled on top of each other in a special box called *Shito* that correctly molds it into the right shape.



Figure 4: Figure showing the layers are placed and piled on top of each other in a special box called *Shito* that correctly molds it into the right shape.

(http://www.qraud-kochi.jp/img/activity/paper/img_01.jpg)

9. Squeezing Papers

The process of squeezing papers is called *Assaku*, which involves putting pressure on the final product to remove any excess water, so that the final product is dehydrated and dry. This procedure is important because the process of dehydration creates hydrogen bonds that makes the paper itself stronger. During this stage, it is also important to apply the pressure gently to avoid breaking paper layers. Also, if too much pressure is applied on the paper, the paper might break.



Figure 5. The *Assaku*, or the process of squeezing papers.

(<http://samegawa-washi.com/wp-content/uploads/2011/11/17%E5%9C%A7%E6%90%BE%E6%A9%9F1.jpg>)

10. Stretching Papers

After the papers are mostly dried, the next step in the procedure is to stretch the papers. Before the papers are completely dry, papermakers separate the papers one by one. Then, they use a board to place and stretch the papers using traditional brush called *hake*. This brush is also used to eventually dry out the papers. There are traditional and modern ways of stretching papers. The traditional way of stretching papers is called *Itabari* and uses the wetness of the papers to complete this process. It is much easier to put papers on the board while they are still wet. It will take a day to dry out the papers. The modern style of stretching papers is called *Teppanboshi*. A heated board is usually used to help evaporate the water then stretch the wet papers on that board. This stretching paper style makes it quicker to dry out the papers because the board is already heated so it only takes a few minutes. At first, papermakers tried to use a board made of iron for this procedure; however, using iron has the possibility that the paper might acquire foxing which means turning a specific yellowish brown that has small speckles of impurity, dirt, or stain. This is similar to what sometimes happens to paper over time. To avoid this situation, papermakers use a stainless board.

11. Drying the paper

After the procedure of stretching papers is complete, the board with the paper are taken outside to help the drying process.



Figure 6. The drying process.

<http://www.chie-project.jp/img/003/no22/ph31.jpg>

12. Divide papers

After completing all of the previous steps, the process of papermaking is basically completed. However, these papers are all made by hand, so each paper has different thickness and conditions. Papermakers check all the papers and modify them to make sure that they are similar in shape and size. The way the final product will be used determines how the finished paper will be modified in terms of shape and size. Since handmade Japanese papers have different uses, such as for publishing, mounting, and more, each function has specific requirements on how the paper is modified.

Chapter II: Different Kinds of Paper in Each Region

Japan is a small country, but it is divided into forty-seven regions including forty-three prefectures and four regions that are not considered prefectures: Hokkaido, Tokyo, Osaka, and Kyoto. Not all forty-seven regions have their own style of papermaking, but there are at least

around thirty-five different types of papermaking style. The following descriptions highlight the thirty-five different styles from the northern to southern part of Japan.

Hokkaido is a region that is located in the northernmost part of Japan. It is an island and does not have a specific papermaking style. The northern part of Japan called the Tohoku area has six prefectures which are Aomori, Iwate, Miyagi, Akita, Yamagata, and Fukushima prefectures. From the Tohoku area, there are three prefectures which are Iwate, Miyagi, and Fukushima which have their own style of papermaking.

The Iwate prefecture has a *Higashiyama Washi* which is a paper that is made from the mulberry tree, like *Kozo* paper. It also has the natural color and texture of *Kozo*. This paper is typically used for Japanese sliding doors called *Shoji*. *Shoji* is a made of latticed wooden frame pasted with thin white Japanese paper called *Shojigami*, so *Higashiyama Washi* is a good paper to use for a *Shojigami*. *Higashiyama Washi* has been historically used for about 800 years. Iwate prefecture has a famous historical place called Hiraizumi. Around 1100 years ago, the Fujiwara clan ruled Hiraizumi for over 100 years and built the Chusonji temple. Fujiwara encouraged his refugees to make *Higashiyama Washi* for him. In 1942, there were 285 papermakers making *Higashiyama Washi*, but in 1988 there were only 4 papermakers that continue making this product.

The Miyagi prefecture has a *Shiroishi Washi* which is a pure paper made of mulberry called *Kajinoki* fibers. This paper is soft and strong, so it is better used to make woven paper cloth called *Shifu*, paper clothing called *Kamiko*, and stencil dying paper which is a paper used for calligraphy and drawing called *Katazome*. *Shiroishi Washi* has similar characteristics to *Michinokugami* which is a famous traditional Japanese paper made in the *Heian* period which was from 794 to 1192.

The Fukushima prefecture has a *Toonoshi* which is a 100 percent pure unbleached paper using mulberry fibers and is typically made during the winter. The process for making this type of paper is similar to how *Kozo* paper is made. It is a very valuable paper because it uses pure materials, and it takes a long time to make this product. *Toonoshi* is a historical product from the *Eiroku* years which was from 1558 to 1569. During this time, Japanese samurai used this paper for documentation purposes. This paper is very strong and has a beautiful luster or gloss, so it is better to use for art, such as for calligraphy paper, drawing paper, and Japanese style notebook paper called *Shifu*. Some people use this paper as a type of stencil paper called *Katagami*, block print paper, preservation for old recording paper, and *Shojigami*. Thus, this pure handmade mulberry paper could be used in various ways.

The Kanto area, which is located in the northern central part of Japan, has seven regions which are Ibaraki, Tochigi, Gunma, Saitama, Chiba, Tokyo, and Kanagawa. From the Kanto area, there are three prefectures which are Tochigi, Ibaraki, and Saitama prefectures, which each have their own style of papermaking.

The Tochigi prefecture has a *Karasuyama Washi* which is a paper that uses mulberry fibers. This type of paper is unique because it uses natural clear and pure water from the Naka river located near the Nasu mountain in the Tochigi prefecture. The process for making *Karasuyama Washi* is dated back from 1200 years ago. *Karasuyama Washi* is well-known for its strength and elegance, so people use this paper as a *Kaishi*, a tea sweets paper for the Japanese traditional tea ceremony.

The Ibaraki prefecture has a *Nishinouchi Washi* which is a *washi* made of natural pure and clear water from the Kuji river located near the Yamizo mountain. This paper has a history that dates back 1500 years but was highly produced during the *Tokugawa* period which was from

1603 to 1867 and was especially valuable during this time. *Nishinouchi Washi* is better used for *Hanshi*, or calligraphy paper. People also use it for Japanese painting paper, drawing paper, woodblock paper, and paper for preservation.

The Saitama prefecture has an *Ogawa Washi* which can be traced back to the eighth century. During the seventeenth century, the *Tokugawa* government was established, and people used this paper for daily use, such as publication of books. This paper continues to be used to this day.

The Chubu area, which is located in central Japan, has nine prefectures which are Niigata, Toyama, Ishikawa, Fukui, Yamanashi, Nagano, Gifu, Shizuoka, and Aichi prefectures. From the Chubu area, there are eight prefectures that have their own style of papermaking: Yamanashi, Shizuoka, Niigata, Toyama, Ishikawa, Fukui, Nagano, and Gifu prefectures.

The Yamanashi prefecture has a *Nishijima Washi* which is made of a mixture of natural materials and recycled papers. Its composition is similar to that of *Mitsumata* paper, which contains the tree of daphne fibers and bamboo and straw. This paper is dated back from 450 years ago and was well-known as the type of paper used by Lord Shingen Takeda for calligraphy paper. This paper is very delicate, so it ideally used for calligraphy.

The Shizuoka prefecture has *Suruga Hanshi* or *Shuzenjishi*, and *Suruga Yunogami*. *Suruga Hanshi* is made of a mixture of mulberry and daphne fibers, so this paper has a similar composition with all three well-known Japanese papers: *Kozo*, *Mitsumata*, and *Gampi* papers. The Shizuoka prefecture is a place that is well-known for producing traditional Japanese tea, so there are also many traditional papermaking areas. *Suruga Hanshi* can be traced back to the Nara period which was from 710 to 794, and this paper is produced in the western part of the Shizuoka prefecture.

The Niigata prefecture has an *Echigo Washi* which is a paper made of mulberry fibers and is similar to *Kozo* paper. It is better to use this paper as *Shojigami*, printmaking paper, and dyed paper. Some of the *Echigo Washi* uses natural dyes, such as from vegetables. Due to the high-quality of this paper, it is considered a very strong type of paper and has basic characteristic of washi. *Echigo Washi* has been used since the Nara period which was from 710 to 794, and it is made in Echigo and Sado, which are islands in the Niigata prefecture. The area that *Echigo Washi* is made is known for its heavy snowfall during the winter, so papermakers prepare mulberry fibers during the summer and actually make the paper during the winter. However, papermakers dry the paper during March because there is more sunlight.

The Toyama prefecture has an *Etchu Washi* which is a paper that is 100 percent made of mulberry fiber, and it is better to use as an interior design paper such as *Shojigami* and lantern paper. It is also better to use as calligraphy and drawing paper. This paper also has a better production of colorful dyed paper. From the historical background of *Etchu Washi*, people used this paper previously as wrapping paper for medicine, however, it is now mainly used in the architectural field.

The Ishikawa prefecture especially in Kanazawa city is a very traditional place and they are well-known for gold foil paper. *Kaga Washi* is a paper used for formal events which include *Goryoshi*, a type of formal event in the Ishikawa prefecture. *Kaga Washi* can trace its roots back to the *Edo* period which was from 1603 to 1867. This type of paper is typically made of silver and gold foils and used as wrapping papers. There are different types of *Kaga Washi* in different cities at the Ishikawa prefecture. In Wasjima Islands, *Gosenshi* is produced, which is a type of *Kaga Washi* that includes bamboo and cryptomeria fibers. In Kitagawa-cho, there is a type of *Kaga Washi* that is a mixture of daphne tree fibers and clay, similar to *Gampi* paper. Fukutama-

cho produces a colorful paper using daphne tree fibers and clay, also similar to *Gampi* paper. Torigie-mura produces a type of Kaga Washi that is 100 percent made of pure mulberry fibers.

The Fukui prefecture has *Echizen Washi* and *Wakasa Washi*. *Echizen Washi* is a paper that is traced back to the *Nara* period which was from 710 to 794. During the process of this papermaking, papermakers used the female Ginkgo tree boards when drying *Echizen Washi* to help create a fine and beautiful texture. This paper is ideal to use as *Fusumagami* which is a sliding panels paper and *Hoshoshi* is a wrapping paper for special gifts. *Wakasa Washi* is a paper made of a mixture of mulberry fibers and daphne fibers, which is similar to *Kozo* paper and *Mitsumata* paper. This paper is mostly used as base paper for umbrellas. Papermakers created this paper as both white paper and dyed. The different types of dyed papers include *Shibori*, or tie dying, *Bokashigami*, or color gradation, and *Yuzen*, or stencil dying. Currently, there are seven papermakers and two dyers that are producing *Wakasa Washi*.

The Nagano prefecture has an *Uchiyama Washi* which is a paper made of 100 percent pure mulberry fibers which is similar to *Kozo* paper. This paper has a characteristic of *Yuki Zarashi* which is a technique of snow bleaching. In the Nagano prefecture, there are heavy snow fall during winter, so papermakers prepare the natural mulberry fibers during the summer and make papers during the winter. This paper is best used as *Shojigami*.

The Gifu prefecture has a *Mino Washi* which is a paper that is made of *Mino* fibers, a fiber that could be found in areas of the Gifu prefecture. Traditionally, Gifu prefecture is a very important place for papermaking because the Kiso mountain in the region connects to other prefectures and helped to develop and spread papermaking skills as well as exchanging fibers with other prefectures. *Mino Washi* is a very high-quality paper compared to other Japanese handmade paper. It has a beautiful rectangular shape and smooth surface. Currently, there are

forty papermakers producing *Mino Washi*, and they are specifically producing for art paper, craft paper, *Katagami*, and mounting paper.

The Kinki area, which is located next to the Chubu area, has seven regions: Mie, Shiga, Kyoto, Osaka, Hyogo, Nara, and Wakayama prefectures. Within the Kinki area, the four regions, which of Kyoto, Shiga, Hyogo, and Nara, each has their own style of papermaking.

Kyoto has *Kurodani Washi* and *Tango Washi*. *Kurodani Washi* is a paper made of mulberry fibers, and this fiber is grown in the mountains of Tamba and Tango. The mountains have clear spring water which makes the mulberry fiber stronger and makes *Kurodani Washi* stronger as well. This paper has a tradition that dates back 800 years and is still continues today. *Tango Washi* is a paper, made of mulberry fibers which are carefully bleached in the mist of the Isuzu river, which is located in the mountain. The steaming process makes *Tango Washi* a very high-quality paper. The paper typically comes in a variety of colors by using vegetable dyes, so it is used often as craft paper. *Tango Washi* has a tradition dating back to the early 1900's. At that time, there were 200 papermakers, but currently, there are only two papermakers producing this fine paper.

The Shiga prefecture produces *Ohmi Naruko Washi* which is a paper that uses fibers from the tree of daphne family and is similar to *Gampi* paper. Papermakers use the fibers found in the local mountain. Like *Gampi Washi* and *Mitsumqta*, *Ohmi Naruko Washi* uses daphne fibers, however, the quality is much more similar to *Gampi* paper, which is the best quality of Japanese paper. Therefore, *Ohmi Naruko Washi* is considered very high-quality paper due to its strength, elegance, delicacy, and soft texture. This paper is especially suited to use as drawing paper and paper for preservation purposes. The history of *Ohmi Naruko Washi* is unique in that local people in the Shiga prefecture paid their taxes using this paper materials in the past. During the

Meiji and *Taisho* periods from 1821 to 1831, local residents produced gold and silver paper for *Nishijin* textile in Kyoto. Currently, papermakers in Shiga prefecture also produce a wide variety of papers including mulberry fibers papers and color dyed paper.

The Hyogo prefecture have *Sugihara-gami* and *Nashioshi*. *Sugihara-gami* which is a paper made of local mulberry fibers and natural water from the deep valley in Hyogo prefecture. This paper has a long tradition that began in the *Nara* period from 710 to 794. During the *Muromachi* period, which was from 1336 to 1573, *Sugihara-gami* became well-known paper for the type of paper samurais used as writing papers. However, at the end of the *Taisho* period which was 1926, production of *Sugihara-gami* had stopped, but recently papermakers began producing *Sugihara* paper again. *Nashioshi* is a paper that contains clay in it. The process of making this paper uses a very special technique and specific materials to the region, so papermakers could not make this paper in other locations. This paper is very high-quality paper, so it is excellent to use for preservation. *Nashioahi* has been traditionally used for about 400 years.

The Nara prefecture has a *Yoshino-gami* which is a paper made of mulberry fibers. The paper is extremely thin and has a soft texture. Mulberry fibers for *Yoshino-gami* naturally contain white clay from the mountains of Yoshino. This paper is better to use as calligraphy paper, filter paper for lacquer, and is the best paper for the process of Japanese papers and paintings mounting. Currently, there are 16 papermakers producing *Yoshino-gami*.

Chugoku area is located in the southwestern area of Japan and has five prefectures: Tottori, Shimane, Okayama, Hiroshima, and Yamaguchi. In Chugoku area, all the prefectures have their own style of papermaking. For example, Okayama prefecture is an area that produces *Kinpaku Aishi*, which is a gold foil interleaf paper, and *Bitchu Washi*, which is a paper that is a

mixture of *Kozo*, *Mitsumata*, and *Gampi* papers, Hiroshima prefecture has *Ohtake Washi* which is made by mulberry fibers similar to *Kozo* paper, and Yamaguchi prefecture has *Tokuchi Washi* which is made of mulberry fibers similar to *Kozo* paper as well. These three prefectures have their own traditional way of papermaking, but they produce less when compared to other prefectures. The other two prefectures in the Chugoku area are Tottori and Shimane prefectures and they have more production of paper.

The Tottori prefecture has an *Inshu Washi*, which is a paper made of a mixture of mulberry fibers and tree of daphne fibers. This paper is better used for calligraphy paper and dyed paper because it shows better representation of light and shade that the ink has. This paper has a tradition spans 1000 years. During the Edo and Meiji period, people used *Inshu Washi* more for daily use, such as writing paper and *Shojigami*, but after World War II, this type of paper was used more for calligraphy.

The Shimane prefecture has *Izumo Washi* and *Sekishu Washi* or *Sekishu Hanshi*. *Izumo Washi* is a mixture of tree of daphne fibers and mulberry fibers, but it contains more tree of daphne fibers. Papermakers are very careful to select natural fibers for this paper. *Izumo Washi* is well-known as a type of craft paper and dyed paper. This paper dates back to the *Heian* period. *Sekishu Washi* is a paper made of natural mulberry fibers. A couple of unique techniques are used to make this paper. One is that when it is boiled, a layer of the bark from the tree kept intact, and the other is that it is beaten uniformly during the appropriate stage to help make stronger fibers. The main materials for this paper are mulberry fibers but papermakers sometimes use tree of daphne fibers. This paper has a tradition that dates back from the *Nara* period and best used as mounting paper, which will be further described in Chapter V.

The Shikoku area is located in southwestern islands of Japan, and there are four different prefectures: Tokushima, Kagawa, Ehime, and Kochi. In Shikoku area, there are much more production of papermaking compared to other areas in Japan. Since Shikoku area is an island, there is an abundant source of high-quality water and natural materials which means that it is an ideal location for papermaking. From the Shikoku area, there are three prefectures which are Ehime, Kochi, and Tokushima and each has their own style of papermaking and higher production.

In the Ehime prefecture, there are different types of papermaking style. In the Kawano area, there are 17 papermakers that are producing *Mozo Hanshi* and *Kairyo-shi*. In the Tooyo area, there are also 17 papermakers that are producing *Hoshoshi* and *Danshi* and in the Nomura-cho area, they are producing *Senka-shi*. These papers are slightly different, but their common qualities are that these papers are better to use as calligraphy paper and use similar fibers that are all found in the Ehime prefecture. There are a variety of natural fibers found in this prefecture including mulberry fibers, tree of daphne fibers, and many more.

In the Kochi prefecture, there are also different types of papermaking styles which are similar to the Ehime prefecture. There is a younger population in the Kochi area compared to other prefectures who want to become papermakers. It is important to have the resources available so that they can learn and keep this tradition alive.

The Tokushima prefecture is well-known for dyed paper and craft paper that are used especially for decoration. In this area, papermakers focus more on how to make this tradition of papermaking and style of paper more modern compared to other prefectures. As mentioned previously, overall, the Shikoku area has the highest production of papermaking and it attracts younger generations to the profession which is important to keep this industry going.

The Kyushu area is located in the southern area of Japan, and has seven prefectures: Fukuoka, Saga, Oita, Miyazaki, Kumamoto, Nagasaki, and Kagoshima. In the Kyushu area, there are different types of papermaking style and techniques, but the history of papermaking is pretty new when compared to other prefectures. The beginning of papermaking in Kyushu area was during the *Meiji* period and the highest production was during the Showa period. Also, during these periods, Kyushu exported some of their papers to China and Korea because Kyushu was geographically located closer to them. However, there are only 30 papermakers producing their *Washi* nowadays.

In the Fukuoka prefecture, there are *Yame* or *Chikugo Washi*. This paper is made of long mulberry fibers from the Yame area in Fukuoka, and papermakers use their own technique that creates strong and elegant paper. This paper can be used in many ways such as mounting, painting, writing, printmaking, and craft.

In the Saga prefecture, there are *Nao Washi* and *Jubashi Washi*. *Nao Washi* is used for Japanese architectural lantern paper and currently, there are only three papermakers producing this paper. *Jubashi Washi* is a paper that is used for lantern paper as well and can be used as mounting paper and calligraphy paper. Currently, there are only five papermakers producing this paper.

In the Oita prefecture, there are *Yayoe Washi*. This paper can be used for *Shojigami*, or umbrella paper. In Miyagi prefecture, there are *Hokita Washi* that is a paper made of a combination of machine-made and handmade paper which is unique. In Kumamoto prefecture, there are *Miyaji Washi* and it can be used as paper for *Shojigami*. In Kagoshima prefecture, there are *Gamoo Washi* and it is a paper used mainly for *Shojigami* and mounting paper. Currently, this paper became more developed and can be used for writing and painting paper.

In the Okinawa prefecture, which is an island located in the southern area of Japan, there are *Ryukyu* paper, which is a paper that contains tree of green daphne fiber which has similar characteristic with *Gampi* paper. Since Okinawa prefecture is an island, it has high quality of water for papermaking. This paper is good to use as dyed paper.

In summary, overall, there is a higher production of papermaking in the countryside or smaller cities of Japan than in any other area of the country. Big cities in Japan such as Tokyo, Osaka, Nagoya, and Kanagawa do not have their own traditional papermaking, but besides them, almost every other city has their own style of papermaking and each paper is different and unique. However, these handmade papers are very traditional and costly, so some local places are finding it difficult to continue making their own paper especially since less and less people are doing these types of jobs. It is very unfortunate, but this will be a continued trend throughout time until very few people are left in this field. In the future, young people should learn more about this culture and hopefully keep this beautiful tradition alive for as long as possible.

Chapter III: Introduction of Japanese Art Incorporating Handmade Paper

During the internship experience at the East Asian art conservation studio at the Metropolitan Museum of Art in New York City, in the summer of 2019, they had the *Tale of Genji* exhibition on display which introduces Japanese works of art related to the *Tale of Genji*. *Tale of Genji* is a Japanese full-length long story written by Shikibu Murasaki, a female novelist during the *Heian* period. This story was written in 1008. *The Tale of Genji* is about the relationship between the main character, Genji and the many women in his life that he was always surrounded by. Genji was very beautiful and the son of the emperor during this period. There are 54 stories put together in *The Tale of Genji* and there are three main chapters. The first chapter is about how Genji lived and had many relationships with many women during his younger ages from 1 years old to 39 years old. The second chapter is about how Genji lived and had many relationships with many women during his older ages from 39 years old to 52 years old, which was the age at which Genji died. The third chapter is about the stories of many other people that surrounded Genji and takes place the years after he died.

Japanese two-dimensional works of art are usually made by paper or silk. There were numbers of works of art using Japanese traditional papers in various periods. In Japanese two-dimensional works of art, there are mainly two ways that works of paper are mounted and displayed in museums which are hanging scrolls and folding screens. *Kakemono* or *Hyogu* is a traditional frame for a piece of painting or calligraphy using decorative papers and silks. Folding screens called *Byobu* is a traditional joined panel for paintings and calligraphy. The details about hanging scroll and folding screens are described later. In the *Tale of Genji* exhibition, they displayed historical and contemporary works of art which were from the *Heian* period which was from 794 to 1185 to the *Heisei* period which was from January 8, 1989 to April 30, 2019.

Here are the examples of Japanese works of paper from different periods from the *Tale of Genji* exhibition at the Met.



Figure 7. Examples of Japanese works of paper from different periods from the *Tale of Genji* exhibition at the Met.

https://www.metmuseum.org/art/collection/search/78458?&exhibitionId=%7ba26bd196-381b-4ddd-b007-ad6a1ff64b4b%7d&oid=78458&pkuids=563&pg=0&rpp=20&pos=6&ft=*&offset=20)

This calligraphy was written by Fujiwara no Yukinari, who was a calligrapher focused on Japanese style calligraphy called *Wayo* calligraphy. This calligraphy was written during the *Heian* period which was from 794 to 1185. This calligraphy is basically a Chinese style calligraphy because Fujiwara no Yukinari used Chinese poetry for this calligraphy. Bai Juyi who

was a famous poet during Tang dynasty in China which was from 618 to 907. This calligraphy is titled “Autobiography of a Master of Drunken Poetry Recitation” so this calligraphy poetry is about how Bai Juyi’s master continues to love and enjoy drinking wine and writing and reading poetry as he gets older. This work of calligraphy is connected to *Tale of Genji* because Bai Juyi has a very popular poem titled “The Song of Everlasting Sorrow” which is the story of ill-fated love affairs which a similar subject to the story of *Tale of Genji*. This calligraphy is made of ink on paper, so the paper used *Washi* from the *Heian* period and the ink is called *Sumi*, which is a Japanese traditional black ink for writing and painting. This calligraphy is mounted on a hanging scroll and is shown above as the picture on the right.



Figure 8. Imperial Visitation for the Ceremonial Horserace of 1024 (Komakurabe gyōkō emaki)13th–early 14th century.

https://www.metmuseum.org/art/collection/search/720544?&exhibitionId=%7ba26bd196-381b-4ddd-b007-ad6a1ff64b4b%7d&oid=720544&pkgids=563&pg=0&rpp=20&pos=16&ft=* &offset=20

The next example is titled “Imperial Visitation for the Ceremonial Horserace of 1024” which is a painting created during the *Kamakura* period which was from 1185 to 1333. This painting was mounted as a handscroll called *Emaki* and used ink, colors, and gold on paper. This painting shows the celebration of the Empress Shoshi and the Fujiwara family, who was an

upper-class family during this period. This piece is titled *A Tale of Flowering Fortune* which is the contemporary story that Murasaki Shikibu wrote about Lady Akazone Emon and Fujiwara no Michinaga. This painting highlights the season of autumn and the relationships between the Fujiwara family and the people around them.



Figure 9. The folding screen titled *Fan Paintings of The Tale of Genji*

https://www.metmuseum.org/art/collection/search/757433?&exhibitionId=%7ba26bd196-381b-4ddd-b007-ad6a1ff64b4b%7d&oid=757433&pkuids=563&pg=0&rpp=20&pos=42&ft=* &offset=20

This folding screen is titled *Fan Paintings of The Tale of Genji*. This folding screen paintings were created during *Muromachi* period which was from 1392 to 1573. Each fan tells the story from *The Tale of Genji*. The folding screens are the paired, so this work of painting tells stories by seasonal orders. The first folding screen focuses on spring and summer and the second folding screen focuses on autumn and winter. This painting is very neat, delicate, and fragile and uses many color inks such as gold, *Gofun* which is a white ink and *Ryokusho* which is a green

ink and many more. It is very surprising that these colors are still connected and stick to the paper even though this painting was created almost 500 years ago. However, when this folding screen is seen up close, it is clear that it is difficult for *Ryokusho* to stay connected with the paper because *Ryokusho* contains less stickiness compared to other Japanese traditional inks, so some green parts of this painting are fading away. However, these folding screens are beautiful and very important works of art that represent and tell the story about *The Tale of Genji*.



Figure 10. The *Ukiyo-e* printmaking, a form of Japanese traditional human figure abstract printmaking.

https://www.metmuseum.org/art/collection/search/789146?&exhibitionId=%7ba26bd196-381b-4ddd-b007-ad6a1ff64b4b%7d&oid=789146&pkuids=563&pg=0&rpp=20&pos=103&ft=* &offset=20

This *Ukiyo-e* printmaking is a form of Japanese traditional human figure abstract printmaking. The work is titled *Yugao: Yazama's Wife Orie, from the series Scenes amid Genji Clouds Matched with Ukiyo-e Pictures*. This painting was created during *Edo* period which was from 1615 to 1868 and this specific printmaking was created from 1845 to 1846 by Utagawa Kuniyoshi, who is a very well-known *Ukiyo-e* artist during this period. Utagawa Kuniyoshi's works of art were usually focused on *Ukiyo-e* prints with human and animals, especially women and cats, that were put together in one work of print. In this *Ukiyo-e* printmaking, the main woman named Yugao, who was one of the women that had a relationship with Genji when he was seventeen years old and was during the first chapter of *The Tale of Genji*. Yugao was a very beautiful, ephemeral, and honest person, so Genji had fallen deeply in love with her but she was killed by another woman because of jealousy.



Figure 11. Work of art titled *Genji with the young Murasaki*.

https://www.metmuseum.org/art/collection/search/789232?&exhibitionId=%7ba26bd196-381b-4ddd-b007-ad6a1ff64b4b%7d&oid=789232&pkgids=563&pg=0&rpp=20&pos=127&ft=* &offset=20

This work of art is titled *Genji with the young Murasaki*, who bears an uncanny resemblance to Fujitsubo and to whom he has developed an overpowering attraction, from the manga series *The Tale of Genji: Dreams at Dawn 1990*. This painting was painted by Yamato Waki, who is a Japanese comic book writer, and she wrote the comic books of *The Tale of Genji: Fleeting Dreams* which strongly connected with this painting. This is a very modern style of painting which was created during the *Heisei* period which was from 1989 to 2019. This is a matted painting with ink and color on paper. This painting represented Genji and Fujitsubo who is a fictional character Tale of Genji.

Chapter IV: Ingredients of Japanese Paper

Japanese handmade paper is all made from plant fibers. For the papermaking process, papermakers usually use the inner bark fibers including for the following types of papers: *Kozo*, *Mitsumata*, *Gampi*, and *Asa*. Japanese handmade papers are composed of three main compounds: cellulose, hemicellulose, and lignin. Cellulose is an organic compound that has the chemical formula $C_6H_{10}O_5$. This material is the main organic compound of paper in general, and it is also the main material of cotton and rayon. The fiber of papers is made of cellulose molecules, and the process through which they are assembled together is called fibrillation. This step helps create the basic shape of the paper itself. The quality of the paper depends on the thickness of the fibrillation and the direction to which the cellulose molecules align, the ideal being parallel. Hemicellulose is an organic compound with the chemical formula $C_5H_{10}O_5$. This organic compound is similar to cellulose, but it is lighter weight which helps create stickiness during the papermaking process of *Kokai*. Lignin is an organic compound with the chemical formula $C_9H_{10}O_2$. This compound has a more complex composition compared to the other two organic compounds. Handmade papers are usually made from fibers; however, some are made from wood pulp. The composition of these materials differ in that wood pulp contains much more lignin than fiber. This difference in composition affects the physical property of the paper. For example, lignin makes it easier to change the surface color of the product, so papers made of wood pulp typically turn yellow faster with age than papers made of fibers.

Papers are made of mainly cellulose molecules assembled together to create microfibril. Then the microfibrils bond with hemicellulose and lignin to build up the main fibers. The composition ratio of these three compounds differ across types of inner bark fiber.

Papers also contain some additive such as paper strengthening agent, dye, paint, filler, and sizing agent, as well as impurities. Human errors and unexpected events during the papermaking process, such as a bug getting into the materials, lead to impurities. Typically, higher quality papers contain minimal impurities due to the carefulness of handling them throughout the process. While cheaper quality papers contain more impurities in comparison. For Japanese papers, papermakers try to use less additive to make more natural papers, but some places use additive, such as rice powder, for traditional reasons.

Hydrogen bonds are very important for the papermaking process. Papermakers prepare loosen fibers to make it easier to shape the final product so that materials become a sheet of paper. Paper needs strength to keep the shape of the paper itself so papermakers need special glue to stick the fibers and additive together. Hydrogen bonds contribute to the strength of the paper. Pure fibers are often used to make paper, they contain higher concentrations of cellulose. These celluloses has hydroxyl groups which aids in forming hydrogen bonds which contributes to the strength of the paper. As mentioned previously, papermakers use inner bark fibers from the trees as the main materials in papers specifically due to its soft texture. Since these fibers contain more cellulose, they are stronger due to the hydrogen bonds formed.

Each region has different traditions in terms of the composition of the paper. Some use solely fibers while other regions use recycled material from textile in addition to fibers. Papermakers may also use additional materials including as rice powder, clay, white clay, traditional Japanese white ink called *Gofun*, and more. These additional materials can affect the physical property of the paper including its strength, thickness, and texture based on the type of material.

Neri is a glue for papermaking, and it is a very important material for the process of papermaking. Papermakers mold the shape of the paper through a process called *Kamisuki*, *Neri* is an important material in this step. It makes fibers easier to stick together, and creates unequal surface of paper. However, when papermakers insert *Neri*, it helps the material stick together, and helps create a smoother and clean surface for the final product. Also, when papermakers squeeze the papers to help remove any water or help mold the final shape, they put large numbers of paper together to squeeze them. Without *Neri*, it is easier for the papers to stick together but *Neri* is used during this process, it can help avoid the groups of papers from sticking together and make them easier to divide one by one. *Neri* is made of a type of flower called *Abelmoschus Manihot* or *Tororoaoi* in Japanese. It is a flower from the group Malvaceae *Abelmoschus*, and they contain sticky liquid that is used as *Neri* during the papermaking process. However, during the summer, the texture of *Tororoaoi* changes and becomes less sticky. Due to this change during warmer seasons, papermakers use a flower called *Hydrangea paniculate* or *Noriutsugi* in Japanese. This is a flower that belongs in the group of hydrangeas, and they also contain sticky liquid that can be used for *Neri*. However, since *Noriutsugi* has a very stable stickiness level, it makes it more difficult to use and the process takes longer. Therefore, the type of flower used for *Neri* depends on the temperature and season the paper is made. Papermakers also use a man-made *Neri* called Polyacrylamide (PAM) which has the chemical formula $(C_3H_5NO)_n$. This is a new type of *Neri*, so it is not a natural material as used by past papermakers. However, it has very pure, safe, and it is environmentally friendly, so this *Neri* does not have a negative effect on the papermaking process.

Chapter V: How Conservators Use Japanese Paper

Usually, Japanese two-dimensional works of art were made of silk or paper and Japanese artists used Japanese traditional handmade papers for their works of paper and paintings. These traditional works of art are very fragile, so it is always important to keep and save those traditional art as longer as possible. Thus, there are many ways to protect those traditional works of paper. As mentioned previously, the two main mounting styles are screens and scrolls.

Kakejiku is a scroll used to protect Japanese works of papers and paintings. *Kakejiku* is usually used for smaller works of art. It uses several types of Japanese silks and papers, and contains sticks called *Jiku* which is used to roll up works of papers and paintings. *Kakejiku* can also be used to display works of art since it can be hung and when they want to store these specific works of art, they can be rolled up to be kept safe.

From the internship experience in the East Asian Art Conservation studio at the Metropolitan Museum of Art in the summer of 2019, the main project was to make six big drying boards for Japanese paper conservators. Drying board is called *Karibari* in Japanese and is one of the tools used in the process of mounting Japanese screen and scroll paintings. *Karibari* have a structure similar to folding screens and consist of wood lattice core covered with seven or eight layers of different types of papers. In order to make drying boards, there are many techniques and materials involved, so it is the best way to develop basic hands-on skills used in the mounting of Japanese paintings.

Wheat starch paste is a very important material for the construction of drying boards. This paste is simply made of wheat starch and water. Conservators cook the starch and water mixture over high heat and stir the paste for around thirty to forty minutes. After making the

wheat starch paste, they strain the paste and then add water as needed to change the thickness according to the project requirements.



Figure 12. Picture showing how conservators use Japanese paper.

Before Conservators started making drying boards, they had to sort, cut, and prepare the papers. They used a Japanese traditional knife with a round blade called *Marubocho* to cut the various papers square as much as possible. For some layers of the drying board, the square sheets of paper have to be joined from end to end to form rolls. A thin line of paste is applied with a brush along one edge of a stack of papers. Then another sheet of paper is placed on top of the thin line of paste. Paste is then placed thinly along the opposite edge of the newly placed paper, and this process is repeated until all of the paper is used. It is always important to join papers to avoid wasting papers. Conservators used different types of brushes depending on the thickness of the paste. Bamboo spatulas called *Takebera* are one of the tools used to help make the paper and paste stick together well.

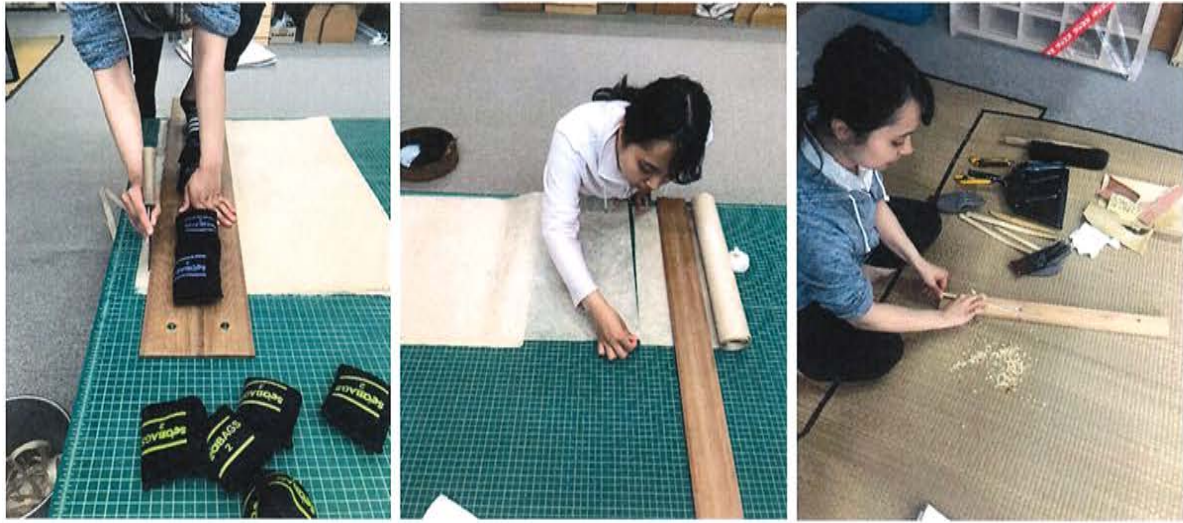


Figure 13. Pictures showing how conservators use cedar wood panels and seven different types of papers.

In this project, Conservators used cedar wood panels and seven different types of papers with eight layers total. They used cedar wood for the core of the drying board because it is lightweight and strong and has a low resin content. Before placing the first layer of papers, they covered the cedar wood panel with a thick layer of wheat starch paste. Conservators used a squeezing brush called *Shigokibake* to cover the whole cedar wood panel.



Figure 14. The drying board called *Honeshibari*.

After the paste is completely dried out, conservators start the first layer of the drying board called *Honeshibari*. They used rough and strong handmade paper from Tibet and used thick paste and a squeezing brush as well. Since drying boards are a work tool, they made use of paper supplies in the studio that cannot be used in mounting works of art.



Figure 15. The second layer of the drying board called *Dobaru*.

The second layer of the drying board is called *Dobari*. Conservators used the paper that contains clay in it because usually wood has a lower pH and clay has a higher pH to make an equal balance of the drying board itself. They also used thick paste for the corner lines of paper and used thin paste for the inside of the paper. They used the squeezing brush again for the thick paste and used paste brush called *Noribake* for the thin paste.



Figure 16. The third layer of the drying board called *Minokake*.

The third layer of the drying board is called *Minokake*. Conservators used machine-made thin paper called *Sekishu-shi* and placed the papers one on top of another in floating layers. These layers resemble ancient Japanese straw rain capes of the same name. They used thick paste only for the edges of the paper.



Figure 17. The fourth layer called *Minoshibari*

The fourth layer is called *Minoshibari*. Conservators used a rough and thin handmade paper from Tibet which was different from the Tibetan papers used for the first layer. They used thick paste for the corner lines of the paper and thin paste for the inside of the paper.



Figure 18. The fifth layer called *Shitauke*.

The fifth layer is called *Shitauke* one of the two top floating layers. These function as floating layers and expand and contract with changes in temperature and humidity. Conservators

used Japanese *Mino* paper, which is one type of *Washi*, a Japanese handmade paper made from *Kozo* or a mulberry fiber. Large sheets were cut into smaller rectangular sheets and applied with a thin line of thick paste only around the edges of each paper.



Figure 19. The sixth layer called *Uwauke*.

The sixth layer is called *Uwauke*. Conservators used the same type of paper as with the *Shitauke* layer. However, they trim the paper with a different technique called *Kuisaki*, where they tear off the paper by hand to make a soft, feathered edge. The sheets are applied so the finished surface is in a brick-like pattern with soft edges on the surface. This makes a smooth surface for the surface of the drying board. Conservators used thin and thick paste on the edges for this layer.

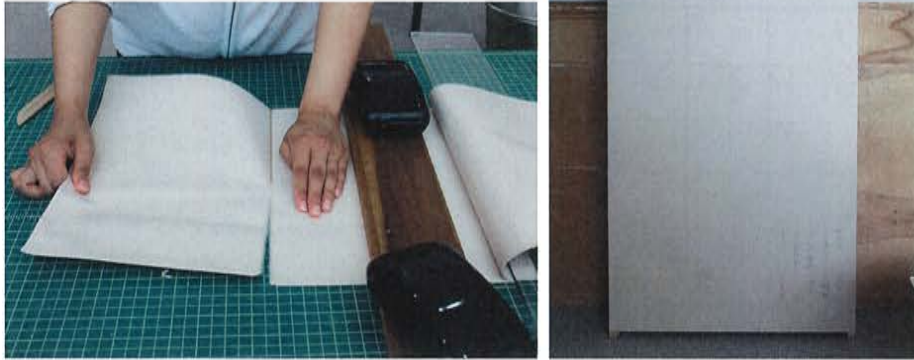


Figure 20. The seventh layer called *Ukeshibari*.

The seventh layer is called *Ukeshibari*. Conservators used very thin *Kuisaki* or feather cut paper from Korea and were placed on bigger sheets than the fifth and sixth layers. They used thin paste as well during this step.



Figure 21. The eighth layer called *Betabari; Harikomi*.

The eighth layer is called *Betabari; Harikomi*. Conservators used *Shibugami*, which is a thick and strong *Kozo* paper that is treated with *Kakeshibu*, a solution made from persimmon tannin which makes the surface water-proof. The papers were trimmed with the *Marubocho* and applied with thick paste for the outer edges and thin paste for the inside portion of the paper.



Figure 22. Applying thick paste for the outer edges and thin paste for the inside portion of the paper.

Outside the East Asian conservation studio, conservators went to the storage room and galleries to conduct condition examinations of works of art deinstalled from the *Tale of Genji* exhibition and in preparation for the installation of the exhibition *Kyoto: Capital of Imagination*. Conservators saw many rare and important works up close and learned what damages each work had sustained and discussed how to treat them. They used an LED flashlight to find cracks and creases. It is always important to use light because it aids in finding damages more easily. It is also important to understand the loan process for works of art in special exhibition. Conservators have to be really careful about the loaned works of art because they are responsible for damages

during the renting period, since these works of art are in the care of the museum while it is borrowed. Conservators also have to read and write conservation reports for works of art.



Figure 23. Conservators unpacking and handling loaned works of art.

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