

## Oversized Chinese Posters Conservation Project

Conservation treatment of two oversized Chinese woodblock print posters, “The Boxer War Rebellion Posters,” ca. 1900, from the Wason Collection on East Asia, took place at the Graphics Conservation Laboratory during 2004-05.

Thomas Hahn, curator of the Wason Collection on East Asia, Cornell University from 2001-2006, initiated this conservation project. **Tatyana Petukhova**, senior paper conservator, and **Eliza Spaulding**, former pre-conservation program intern, researched, examined, and treated the posters.

The project was a collaborative venture, and we would like to express our appreciation to John A. Hunt (Cornell Center for Materials Research, CU), Kay S. Obendorf (Department of Textiles and Apparel, CU), Liu Haiyan (Tianjin Academy of Social Sciences, China), Ellan F. Spero (Department of Textiles and Apparel, CU), Okinori Okawa (Kochi Prefectural Paper Technology Center, Japan), Andrew Hare (Freer Gallery of Art & Arthur M. Sackler Gallery), former Cornell University graduate students and laboratory interns Jessica Evans and Emily Sheckels (the Historic Preservation Program, Department of City and Regional Planning, CU), and others for their assistance in the project.

This Web site focuses on the research findings and conservation treatment of “The Boxer War Rebellion Posters,” including an analysis of the posters’ paper and notes on the relevant papermaking and printing methods. This information will serve to highlight the significance of the posters as historical items and as artifacts.



Picture 1 Planar distortions, lacunae (losses), and other problems revealed after preliminary unfolding of the posters. One poster is located on top of the other and the printing ink characters of the poster below are clearly visible through the paper of the above poster.

“The Boxer War Rebellion Posters” are almost identical in form and content. They are large (approximately 7.4 x 4.0 feet, made up of two sheets attached together in the center) and arrived at the lab in a rolled form, indicating that they had been stored in this manner for some time.

The posters represent historic paper artifacts that survived during a complex period in Chinese history, the Boxer Rebellion, which had started in the summer of 1900 and lasted until the early months of 1901. According to Louis Livingston Seaman (a Cornell alumnus and Army surgeon who served in China during that period), similar posters were placarded on the walls in the section of “Tien Tsu occupied by American troops during the Boxer Rebellion by order of General Adna R. Chaffee, commanding officer.” After the allied forces defeated the Chinese in the Battle of Tientsin, they decided to create a temporary

government to rebuild the city. On each poster, statements direct the inhabitants of Tientsin to obey curfew regulations, clean the city of the debris of war, and avoid actions that would engage the foreign police.



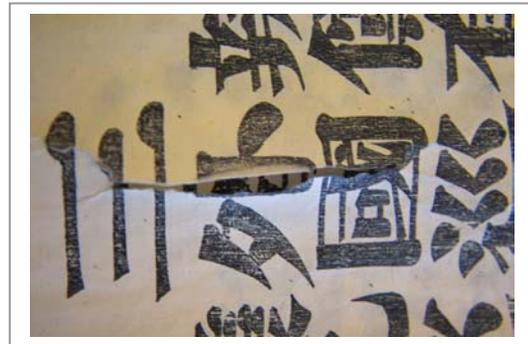
Picture 2 Before treatment  
Bleeding of the printing ink through the paper support  
Verso



Picture 3 Before treatment  
Printing ink splattered on and near the characters' outline  
Recto

### Printing

The characters of the posters were produced from woodblock printing. They do not appear uniform in impression or color saturation, and are crudely executed. On the recto, the three different color (black, pink, and a hybrid of black and pink) characters exhibit bleeding outside the lines of the characters, and, on the verso, much of the printing ink has seeped through the paper. Smudging of ink can be seen throughout the recto. From Ms. Spaulding's conversation (February 10, 2005) with Liu Haiyan, professor at the Tianjin Academy of Social Sciences, and editor of *Urban History Research*, and Thomas Hahn, she learned that the woodblock templates used to create the posters were produced at different shops around Tientsin.



Picture 3, 4  
Structural damage along and within the poster



Lacunae surrounded by tears, folds, and creases

The new methods of printing were not readily accepted by Chinese printmakers and traditional woodblock printing was still more popular at the time when these posters were made. Crude execution of the relief blocks and the printing itself reflects the decline in the craft of woodblock print making, which had almost completely disappeared by the beginning of the 20th century.

The technique of woodblock printing is scarcely documented in early Chinese literature, and only in the second part of the 20th century do articles on the process and materials appear in print. There are many theories on the date of the earliest woodblock printing in China (from the middle of the 6th century to the 9th century C.E.); however, there are no surviving specimens dating earlier than the 8th century C.E. (a scroll was printed during the reign of Empress Wu, 680-704 C.E.).

For the carving of characters or images in relief, a wooden block was commonly made of pear, catalpa, jujube, or the wood of other fruit trees such as apple or apricot. The wood was carefully chosen, so it had no knots, impurities or other imperfections, and cut into blocks, which then underwent a special

treatment, including soaking in water, drying, oiling of the surface, and polishing. A specially treated thin paper with the drawn design was then placed, image side down, on the surface of the block and a thin layer of rice paste was applied over the paper. The paper was pressed along the surface with a flat, usually palm-fiber brush to better transfer the design to the surface of the block.

After drying, the paper was peeled, revealing a mirror image of the design, which was ready to be carved with tools (a chisel, a cutting knife, and a gouge) similar to the ones that are typically used in the Western relief process. After carving, the design appeared in relief, and the wooden block was then cleaned and washed before inking. All printing materials were arranged in a particular order to make them easily accessible, and with an inking brush that was rounded in shape and made of horsehair, the printer applied water-based ink to the raised design of the block. Immediately after inking, a sheet of paper chosen for printing was laid on top of the block and a traditional circular stuffed pad (similar to the Western *dabber*) was gently moved over the verso of the paper, transferring the image from the block to the recto of the paper. When the printing was completed, the paper was dried and the process repeated as necessary. From one block, approximately fifteen thousand images can be printed without refurbishing of the original block.

Only special liquid inks, produced in the consistency of a paste, made of soot (for making black inks) mixed with glue and wine, were used for printing. It seems that the Chinese fermented the inks for three to four years, a process which assured the inks' resistance to degradation. If newly made ink was applied, it could easily be smudged during printing.

The inks used for printing of "The Boxer War Rebellion Posters" most likely consisted of both, chemically stable, such as traditional black (with carbon as a principal element) ink, and chemically unstable, possibly prepared with dye, ink. For this project the printing inks were not analyzed, so our assumption concerning the inks' composition is based on visual and microscopic examination and water sensitivity tests.

The "best quality" printing red inks traditionally consist of vermilion mixed with red lead, prepared by boiling it in water with an additional mucilaginous root (*Bletilla striata*). Blue inks were produced from indigo, a colorant derived from the leaves of *Indigofera* species; *Polygonum tinctorium* is native to an Asian plant from which the Chinese made blue colorant used in textile and printing inks.

#### Conservation treatment

Prior to conservation treatment, conservators often research the history, materials, and techniques of the artifact. This important process can uncover valuable information that influences the conservator's treatment or preventive care methodology, and sometimes even reveals previously unknown data.

Visual observation and water solubility tests of "The Boxer War Rebellion Posters" media demonstrated that the inks have a tendency to bleed into the paper fibers outside of the characters' line, and therefore the posters were not suitable for aqueous treatment. One of the two posters was damaged significantly and required lining to reinforce the original paper structure. Due to the sensitivity of the inks to water and the impossibility of aqueous treatment prior to lining, several adhesives (e.g., BEVA 371 film, a film of fish gelatin and seaweed mucilage combination, and wheat starch paste) were tested to identify the most suitable adhesive and method for attaching the lining tissue (Tengujo, *Kozo* fiber) to the verso of the poster.



Pictures 5, 7 (on the left and right)  
Preparation for the poster's lining



Picture 6  
Lining, during conservation treatment  
Mylar® placed on top of the Tengujo tissue to prevent moisture evaporation



A small, already loose piece of the paper was divided and tested for various methods of lining with the Tengujo tissue. Properties such as adhesion, flexibility, and appearance were considered, and samples were compared after drying. It was decided that the wheat starch paste was the most suitable adhesive. Before lining, compensation of the lacunae (losses of paper support in this case) and other corrections of the structural damage were made.

Why did the posters survive during the Boxer Rebellion and a century after? One reason is that these particular posters somehow escaped their original purpose of display on the walls of city buildings. Perhaps multiple posters were printed and these were unneeded extras. An additional explanation is the paper's inherent strength and resistance to deterioration.

## Paper

The invention of paper is one of the most significant contributions of ancient Chinese culture to the world's civilization. The earliest specimens of paper made of vegetable fiber were discovered in the 20th century through archeological excavations in various regions of China; these specimens date to the Western Han Dynasty (206 B.C.E.-8 C.E.). The first written record of the invention of *true* paper is dated to 105 C.E., and is attributed to Cai Lun. This paper was made of mulberry and other bark, fishnets, hemp, and rags, plant materials consisting mainly of cellulose. The main raw material of the earliest Chinese paper was hemp (*Cannabis sativa*), and throughout the centuries other materials such as paper mulberry (*Broussonetia papyrifera*), climbing rattan (*Calamus rotang*), mulberry (*Morus alba*), or bamboo (numerous species of *Bambusa*) were popular at certain time periods due to their availability, cost or other reasons. For example, rapidly growing and therefore low cost bamboo (a woody grass) was used as a raw papermaking material from the middle of the Tang Dynasty (618-906 C.E.), when bamboo began to be extensively cultivated.

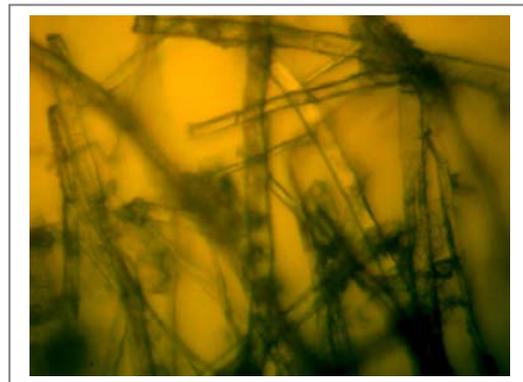
For making paper, the raw plant material, such as bark, straw, grass or rag, is macerated and undergoes other various processes such as beating, washing, and sizing. Clean processed fibers are suspended in water and then scooped (or poured) in a sieve-like screen (mould), which allows the water to escape, depositing a paper pulp of the entangled fibers at the bottom. When dried, this matted fibrous substance becomes the paper.



Picture (8) of the Wing Elm Tree with the seed-pod, courtesy of Akinori Okawa (Kochi Prefectural Paper Technology Center, Japan). The picture was taken by Mr. Okawa during his recent trip to China.

“The Boxer War Rebellion Posters” paper support is made of the Seitan paper fiber, raw material of which is bark of the Wing Elm Tree. The name *Wing Elm* is given due to the *wing* shape resemblance of the seed-pod.

The Seitan paper fiber, also called Quin-tan (*Pteroceltis tatarinowii maxim/Celtis sinensis*) is a *bast*, resilient to deterioration, fiber. This fiber has rounded polygonal nodes, a quite thick cell wall, and a lumen. The fiber cell's ends have a square shape. A paper made from the pulp rich in cellulose fiber, such as Seitan, is generally inherently strong and could better withstand dramatic environmental conditions.



Picture (9) is a photomicrograph of “The Boxer War Rebellion Posters” paper fiber.

A micro-sample of the fiber removed from the damaged area of the poster's verso and was observed under the BX51 Olympus microscope (The Textile and Apparel Department, CU) in a plane-polarized light with 40X magnification. It was analyzed at the Freer Gallery of Art & Arthur M. Sackler Gallery (East Asian Paper Fiber Identification Workshop with Mr. Akinori Okawa, November, 2005) and stain tested with the Dyeing Solution C. The stained fiber appeared light reddish purple to grayish purple. The fiber was identified as Seitan with a small amount of Kozo (*Broussonetia Kazinoki*) fiber.

The mould is the principal tool for making paper by hand, and throughout the centuries it has changed very little. There are two principal types of moulds: floating and dipping. The floating or woven mould was probably the earliest type used by the ancient Chinese. Fiber suspended in water is poured into this mould, which is made of the woven screen or cloth fastened to a wooden frame. The matted paper fiber has to be dried directly on the screen, since it is impossible to remove the wet matted substance from the woven cloth without damaging it; therefore only one sheet of paper can be made each time. The paper pattern produced by this process resembles a woven fabric (“wove”).

The dipping or laid mould was developed later. With this type of mould, macerated fibers are scooped up by dipping the mould into the vat. The development of this mould was an important advancement in the papermaking process, since many sheets of paper can be produced without any damage to the wet matted pulp. A flexible removable screen, made of slender bamboo strips, often finely crafted and treated with lacquer, was used in conjunction with the base of the mould. The base of the mould resembles a wooden tray with thick bamboo strips spaced at the bottom to help the water escape. The screen was easily removed from the mould base when the paper pulp was ready to be placed on a smooth board, without interleaving with a felt, as is traditionally done in Western papermaking. The term for the pattern of paper produced on this type of screen is “laid.”

The dimensions and quality of papers made in China vary dramatically. There are two principal categories of Chinese paper made by hand. *Xuan zhi* is a fine quality paper made of bast fibers such as paper mulberry and Quin-tan (*Pteroceltis tatarinowii maxim/Celtis sinensis*), good quality bamboo, or a combination of bamboo and bast fiber. *Cao zhi* (“grass paper”) is made of rice, wheat straw, hemp, lesser quality bamboo, or paper with imperfections. The *Cao zhi* type of paper is used for utilitarian purposes such as insulation, sanitary purposes, and wrapping. *Xuan zhi* paper is used for calligraphy, painting, and writing. It is quite extraordinary that sheets of Chinese paper made on a dipping mould could have such large dimensions as “The Boxer War Rebellion Posters” paper, with a single sheet of approximately 4 x 4 feet.



Picture 10, 11, 12

This stock of freshly made *Xuan zhi* papers was brought by Thomas Hahn from his spring 2006 trip to China.

The text printed on the paper’s edges describes the paper as *gin pi* made in Anhui Xiaoning Province. *Gin pi* is one of the three grades of *Xuan* paper and it’s traditionally made of pure or fine bark of blue sandalwood fiber (Fei Wen Tsai, 21). This kind of paper is used for calligraphy, painting, and conservation (repair and backing) of works of art on paper and paintings.

After each sheet of paper is checked for imperfections, the stock is covered with an inferior wrapping paper and a quality control stamp is printed on it near the corner (central picture, the stamp on the right). The stamp on the right picture represents the province of China, in this case, Anhui Xiaoning, where the paper was manufactured.

Paper of the “Boxer War Rebellion Posters” was made of Seitan fiber, also called Quin-tan (*Pteroceltis tatarinowii maxim/Celtis sinensis*), a fiber of the Elm family tree. A small amount of Kozo (*Broussonetia Kazinoki*) fiber was also present in the analyzed sample. The paper is hand-made, with a visible dipping mould pattern and brush stroke impressions from the drying process. The posters’ losses could not be filled with paper fiber consistent with the original, since at the time of conservation, it was impossible to obtain the appropriate Chinese paper. Instead, a Japanese Kozo fiber paper, similar to the original paper in thickness, texture, and appearance, was chosen for infills. The infill paper was colored so it was slightly lighter than the tone of the original paper. Yasha fushi (cones) were used to produce an aqueous dyeing solution. Yasha is a natural colorant prepared from the yasha cones of the alder tree. Alder is a

common name for deciduous trees (or shrubs) of the genus *Alnus* of the *Betulaceae* family; alder trees grow profusely in Japan. Bark and cones of the tree are used in dyeing and tanning process. Yasha fushi contain *pyrogallol* tannins that are chemically relatively stable and don't require mordanting (fixing a dye in or on a substance by forming an insoluble compound) to increase the colorfastness of the substrate.



Picture 13

The small loose piece of the poster's paper was examined while transilluminated on the light table.

The 'laid' paper is made on a dipping mould with quite uneven fiber distribution. The lacking color 'laid' lines are produced by impression of the thin bamboo strips of the mould screen into the wet paper pulp.

One side of the paper holds brush stroke impressions; this side was brushed to attach the paper to the smooth board/metal plate during the drying process. The smooth side of the paper is the recto.

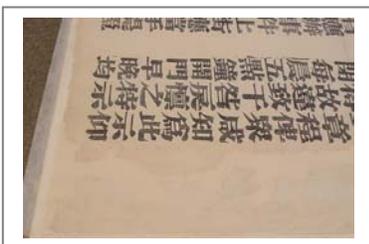
### Preventive care/storage

When conservation treatment of "The Boxer War Rebellion Posters" was completed, storage tubes for both posters were designed, and made at the Graphics Conservation Laboratory. The tubes were made of 100% cotton fiber, rigid blotting paper, reinforced inside with several circular inserts, made of a museum 4 ply board. Each tube's diameter is approximately 10 inches, and the tubes provide an adequate support for the posters during storage. One poster was sandwiched between two sheets of Hollitex® and rolled on the tube. MicroChamber® board stoppers, covered with Japanese *Kozo* fiber paper, were made, and they were attached with a 3M double-sided tape to the opposite short sides (near the drop-front flap) of the box to ensure the security of the tube. The tube containing the poster was placed inside of a custom-made, chemically stable drop-front box (made by The Hollinger Corporation). Some special modifications to improve handling of the poster also were made (Mylar® strips inserted in the perforated areas at the top middle of the shorter side, and the folded Mylar® strip inserted at the lower part of the Hollitex® sheets). The images and the text of the posters will be electronically available to scholars and students, and the storage method and materials will ensure preservation of these historic artifacts into the future.



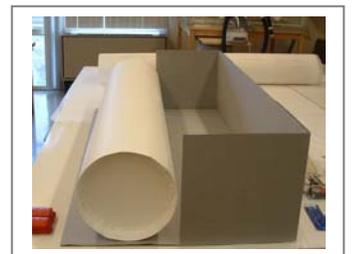
Picture 14

Before conservation treatment, detail



Picture 15

After conservation treatment, detail



Picture 16

Agnieszka Helman-Wazny, Nicholas Copernicus University, Poland, (a short-term intern at the Graphics Conservation Laboratory) smiling at the end of the posters' storage project.

Picture 17

The poster, protected with sheets of Hollitex® is rolled on the tube, and placed in the drop-front storage box.

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