

Mastering Mounting



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Making Mulberry Paper

As a follow-up to a number of articles on traditional hinging techniques published in *PFM*, this month we will explore how these hinging papers are made in Asia. Not long ago I visited the small papermaking village of Shiqiao outside of Guizhou in southwestern China. The villagers were friendly and welcoming as we wandered through town, observing the entire hands-on process of traditional papermaking from stripped bark to dried finished sheets.

Short History of Asian Paper

The papers used for conservation hinging have a long and fascinating history, spanning centuries of time and many countries. There are four basic historic periods of Chinese papermaking: Early Period (206

BC–220 AD); Development Period (265–581); Leap Period (618–1279); and Peak Period (1271–1911). The Chinese are credited with the invention of paper by Ts'ai Lin in 105 AD, who developed a process of using old ropes and fish nets that were beaten into a pulp then made into sheets. Silk had been the preferred medium for writing up to that point, during the Early Period. The paper industry flourished, and during the Development Period paper finally surpassed silk and

bamboo as the preferred medium for painting and calligraphy.

Though the papermaking technology was a guarded Chinese secret for centuries, by 600 AD it had traveled to Korea and Japan. The Arabs adopted the technology and soon replaced the making of papyrus with papermaking. It continued to spread along the silk trade routes to India between 800–900 AD during the Leap Period, when paper was finally being produced to meet the needs of artists. In the Peak Period during the Ming Dynasty, the making of fine art paper reached its height. During the era of Shuen-De (1426–1436), paper fibers were being made from the Qin-tan tree and Sa-Tan rice straw, which became highly valued for painting and calligraphy.

Chinese Papers

Chinese papers currently used for calligraphy and painted on around the world are still handmade at small villages such as Shiqiao. Entire villages participate in the



Photo 1: The paper mulberry grows wild in the countryside of China. The tree (lower right corner) is regularly stripped of portions of its bark for paper-making.



Photo 2: Strips of mulberry bark are harvested from the trees and the layers are divided into outer black bark, middle green bark, and inner white fibers. The photo shows the middle green strips and white fibers.

papermaking process, and all the produced sheets are often sold to one or two exclusive buyers. Though Chinese papers are made dominantly from bark fibers, other common fibers include rice, bamboo, and kapok. These other fibers are often added to expand upon the properties of the basic paper fibers by adding strength, weight, or texture. Papers that create more interesting textures are frequently made from linen and hemp.

The most famous and prized paper from China comes from the Anhui Province and is called Xuan. Commonly known in the West as rice paper, Xuan paper is made of the bark of the *Wingceltis* plant (*Pteroceltis tatarinowii*) mixed with rice straw. It comes from Jingxian County in Anhui Province and is considered to be the king of papers, lasting 1,000 years. It is as white as alabaster, strong, and does not let colors bleed—which makes it perfect for painting and calligraphy but not so perfect for hinging.

Japanese Washi Papers

The Japanese name for traditional handmade paper is washi or kozo. These are made of fibers from the stems of kozo, gampi, hemp, and mitsumata plants. All produce different and varying degrees of strength, durability, texture, opacity, color, and weight. The strongest papers are the ones with the longest fibers.

Kozo (mulberry) bark accounts for 90 percent of all washi paper made in Japan. Kozo is a deciduous shrub that grows to a height of three to five meters with stems 10cm across. There are three layers to the fibers: outer black bark, a secondary layer of green bark, and the innermost white fiber layer. The fibers are about 10mm long and are very strong. The raw fiber must be soaked or

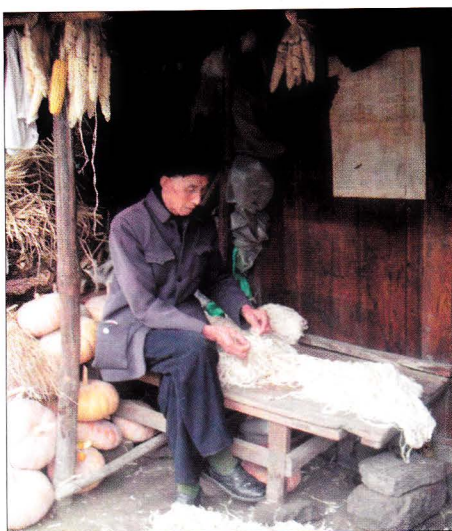


Photo 3: The bark fibers must be sorted by hand to prevent any of the outer black bark from contaminating the purity of the white inner fibers.

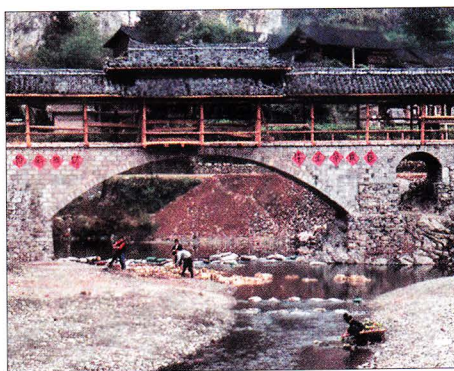


Photo 4: Once sorted, the fibers are soaked in the river for three to seven days to soften them for making into pulp.



Photo 5: The antiquated looking grinder is made entirely of stone. Softened fibers are placed upper left into the hand grinder that pulverizes and breaks down the fibers into pulp mash. The mash runs around the top end of the downhill trough to the lower right corner where excess water runs into the river and the pulp is harvested for carrying to the vats.

cooked, and the black bark (Chiri) and green bark layer must be removed by hand, which produces a pale yellow paper. Chinese Kozo is less expensive than either Thai or Japanese Kozo but is similar in strength and coloring.

Japanese Gampi (*Wikstroemia diplomorpha*) is considered the most refined of Japanese paper fibers. It grows in warm mountainous areas of Japan, stands one to two meters tall, and produces a somewhat translucent, strong sheet with a silky sheen and warm greenish-yellow natural hue. Philippine Gampi fiber is a little more coarse because of growing conditions and produces a crisp off-white/tan sheet with the same lustrous sheen. Unlike Kozo, Gampi cannot be cultivated, making it a rare and expensive fiber.

Mitsumata (*Edgeworthia chrysantha*) is a bush that originated in China and grows one to two meters high. The fibers have only been used in papermaking since 1614. At 4mm, the fibers are much shorter than those of the Kozo, making it a little weaker in tensile strength, but they have insect repelling qualities. It produces a pink/pale tan paper with soft, smooth, lustrous surface.

Chinese Mulberry Plants

There are two species of mulberry plant whose bark is harvested for papermaking: paper mulberry (Photo 1) and white mulberry. Paper mulberry (*Broussonetia papyrifera*) is a common tree in gardens and on temple grounds because of its broad, spreading branches. In East Asia, the inner

bark is used for paper (as was noted by Marco Polo), while in Polynesia the outer bark is used to produce tapa paper, also known as bark cloth. The white mulberry (*Morus alba*) is a shrub or tree with pithy stems and

soft leaves often grown on mulberry plantations. The Chinese are very efficient and leave little to waste. The leaves are grown to feed silkworms, the fruit may be eaten, and the bark is used in papermaking.

Paper Molds

The "four treasures of the study" in China are the brush, ink stick, ink stone, and paper. For handmade Asian papers, molds are made of bamboo bars with a mesh or screen secured on all sides. Pulverized plant fibers are mixed with water and then passed through the screen as it is lifted from the vat. This leaves a deposit of evenly floated fibers that is compressed and dried to become a thin sheet of paper. This sheet is even throughout with no visible paper design and is called a "wove" mold. There are also paper molds that have been reinforced by a series of crossed thin strips for additional support and design. These are made using long, soft, strong fibers like silk, flax, or horse hair. This creates a fine line pattern in the completed paper and is called a "laid" mold.

Chinese Papermaking Pulp Preparation

Strips of mulberry bark are harvested from the trees, and the layers are divided into outer black bark, middle green bark, and inner white fibers (Photo 2). All the strips must be sorted by hand to segregate these three layers and to prevent any black bark from contaminating the purity of the white inner fibers (Photo 3).

Once sorted, the fibers are soaked in the river for three days to help dissolve such water soluble elements as starch and tannins and to soften them for



Photo 6: Baskets are loaded with crushed, drained pulp for transport to the larger blending vats.



Photo 7: Wet pulp is placed in baskets that are balanced at either end of a flat wood pole meant to be carried across the shoulders, while one hand is freed for a wave and a smile. The drying ears of corn top center are the signs of a bountiful harvest this year.



Photo 8: The pulp is blended into the stone vat stirring to evenly distribute all the pulp in preparation for making paper sheets.



Photos 9A and 9B: The first shallow dip forms the face of the new sheet. It is dipped and all the water is allowed to sift through the screen. The second dip screen enters the vat back to front allowing excess water to flood off the front end as it is lifted from the vat.

making into pulp (Photo 4). Once the fibers are soaked, a stone grinder is used to pulverize and break down the fibers into a pulp mash (Photo 5). The mash is manually squeezed, with excess water running back into the river and the pulp is harvested for carrying to the vats (Photo 6). The traditional method of weight carrying is routinely practiced in all small working villages. Baskets of wet pulp are balanced at either end of a flat wooden pole carried across one or two shoulders for transport (Photo 7). The pulp is then mixed into the large stone water vats to make the paper slurry (Photo 8). It is mixed with a large stick until thoroughly blended and all pulp appears to be evenly suspended in the water.

Pulling a Sheet

The first shallow dip into the water is done to flood the surface of the screen to form the front of the paper sheet. Excess pulp is allowed to flow over the edge of the mold. A second, deeper dip is made by dipping with the back end of the screen into the slurry first, allowing water to flow freely over the edges of the mold (Photo 9A and 9B). The handles of the mold are then dropped to the sides and the center screen is inverted onto a pile of moist, previously pulled sheets, carefully aligning them so as not to trap air between the sheets. The screen is then gently lifted, beginning with the edge closest to the papermaker, to leave the new sheet on the moist stack (Photo 10). The pile of paper sheets is allowed to set and drain overnight, then pressed gently for another half day to remove a third of the original moisture.



Photo 10: After placing the newly pulled sheet of paper from the vat, it is inverted to a pile of previously made sheets. The screen is then gently lifted to leave the new sheet on the moist stack.

Drying

Pressed sheets are removed one by one from the pile by gently peeling them apart while they are still lightly moist (Photo 11).

Papers vary in thickness from one to three plies based on the needs of the user. This ply variation is created when the final sheets are peeled apart from the pressing rack for final drying.

Separated sheets are adhered to a

smooth, heated stone wall to dry with a stiff 12" wide palm bristle brush used to remove all air beneath (Photo 12).

Paper Quality

The quality of Chinese papers is judged by appearance and feel. The paper should have a clean, fresh, white appearance—though never as white as chemically bleached papers. When a sheet is shaken, it should have a soft sound rather than a harsh crackling sound. One side will always be smoother than the other, which is the side pressed against the stone or board to dry. The smooth side is generally the side that is written or painted on.

Colored papers are made by adding natural dyes to the pulp slurry before pulling the sheets. Oddly enough, though dyes are routinely very light fugitive, these colors turn out to be very lightfast—perhaps due to some effect of the river water. Heavyweight dyed Kozo crinkle paper in assorted colors were being made in bulk along with the natural mulberry sheets during my visit (Photo 13).

Since the entire village works at making paper, there are about 10 papermaking vats set up in open air workshops alongside many private homes of the papermakers. These homes all have mud floors, no running water, no plumbing, no electricity, and are often only one or two rooms for an entire family. But the work they do all has consistent thickness and is clean and beautiful.

Papers for Hinging

So how do you select the correct weight and type of these papers for your hinges? It's important to remember that the hinge should

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Photo 11: Pressed sheets are removed one by one from the pile by gently peeling them apart while lightly moist. Papers vary in thickness as in one, two and three ply thus catering to the needs of the user. Photo 12: Separated sheets are adhered to a smooth, heated stone wall to dry and using a stiff 12" wide palm bristle brush to remove all air beneath. Sheets may be one-, two-, or three-ply thick depending upon the request of the buyer

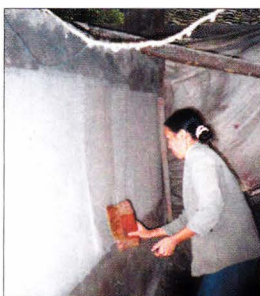


Photo 13: Heavyweight dyed Kozo crinkle paper in assorted colors are stacked and readied for the buyer from Hong Kong to inspect, purchase, and ship.

always be the weakest link, allowing it to tear before the artwork. The strength of Kozo papers are favored for hinging and backing over the higher priced Gampi or shorter fibers of Mitsumata papers. Japanese papers are favored over Thai or Chinese papers for strength, but Chinese sheets are more affordable.

In any event, if mulberry (koko) papers are indeed what you are looking for, test the sheet before using it for hinges. It needs to be strong, long fibered, and heavy enough to support and still light enough to fail if necessary to save the art. Just be aware that some inexpensive student-quality sheets are not strong, have short fibers, and all but dissolve when wet.

Good hinging! ■

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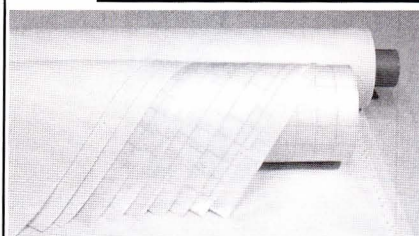
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