ASIAN ART
connections

CURRICULUM RESOURCE

What is Conservation

WHAT DO MOST PEOPLE SEE when they visit this museum? The objects, of course! Behind the scenes—equipped with microscopes, badger- and goat-hair brushes, and a closet filled with silk fabric—is a group of conservators dedicated to preserving, restoring, and researching those objects. At the Freer Gallery of Art and Arthur M. Sackler Gallery, the Department of Conservation and Scientific Research cares for a collection of approximately 26,000 objects. These works represent a wide variety of materials, cultures, and time periods: from a three-thousand-year-old Chinese jade plaque to delicate paper leaves from a sixteenth-century Persian album, from a fifteenth-century Japanese unglazed stoneware jar to a nineteenth-century oil painting by American artist James McNeill Whistler.

Among the works in this extensive and diverse collection are approximately six thousand paintings from the East Asian countries of China, Japan, and Korea. In 1932, nine years after opening to the public, the Freer Gallery hired Japanese restorers, thus setting the foundation for what is now the East Asian Painting Conservation Studio—one of the few laboratories in this country dedicated to the conservation of East Asian paintings by traditional methods. Four full-time staff members—assisted by interns and fellows—care for, repair, and remount Chinese, Japanese, and Korean paintings.

In this issue, as we retrace the path of a fourteenth-century Japanese hanging scroll on its journey through the East Asian Painting Conservation Studio, we will explore the science and art behind this specialized work.

Smithsonian
Freer Gallery of Art and
Arthur M. Sackler Gallery

The Conservation of a Japanese Painting

by Elizabeth Benskin, Educator for School and Teacher Programs, and Victoria Dawson

Persimmon juice, calcium carbonate, and insect wax? Quartz beads, seaweed gel, and silk? Welcome to the East Asian Painting Conservation Studio at the Freer and Sackler galleries. Years of training and great patience, keen attention to detail, and the ability to make sound scientific judgments while remaining sensitive to aesthetic concerns are all part of the job of an art conservator.

Hanging scrolls such as *The Deity of Kasuga Wakamiya Shrine* are a format of East Asian painting that originated in China in the seventh to eighth century. Created on paper or silk, the painting is backed with several layers of paper and bordered in front with silk fabric. When not displayed, the scrolls are rolled up and stored, safe from light damage, insects, and dirt, but also at risk for creases and cracks from rolling.

In 1965, in keeping with the standards of the time, museum conservators remounted *The Deity of Kasuga Wakaymiya Shrine* scroll on a flat panel. The practice of remounting Japanese hanging scrolls on wooden lattice panels developed in the nineteenth century when Western collectors and museums began acquiring Japanese paintings. Such a format was thought to enhance the preservation of the artwork by reducing the wear and tear of rolling and unrolling the painting. It also accommodated art handlers, who were accustomed to working with Western paintings. Now, however, the wisdom of remounting hanging scrolls on panels is debated. For one thing, wood resin can discolor the mounted painting. Maintaining historical and aesthetic authenticity has been another concern. In the case of *The Deity of Kasuga Wakamiya Shrine,* it was determined that it was best to return the painting to the traditional scroll format.

In 2001, after thirty-six years, this painting underwent conservation to restore its original format as a hanging scroll and to repair areas of damage.

The Process

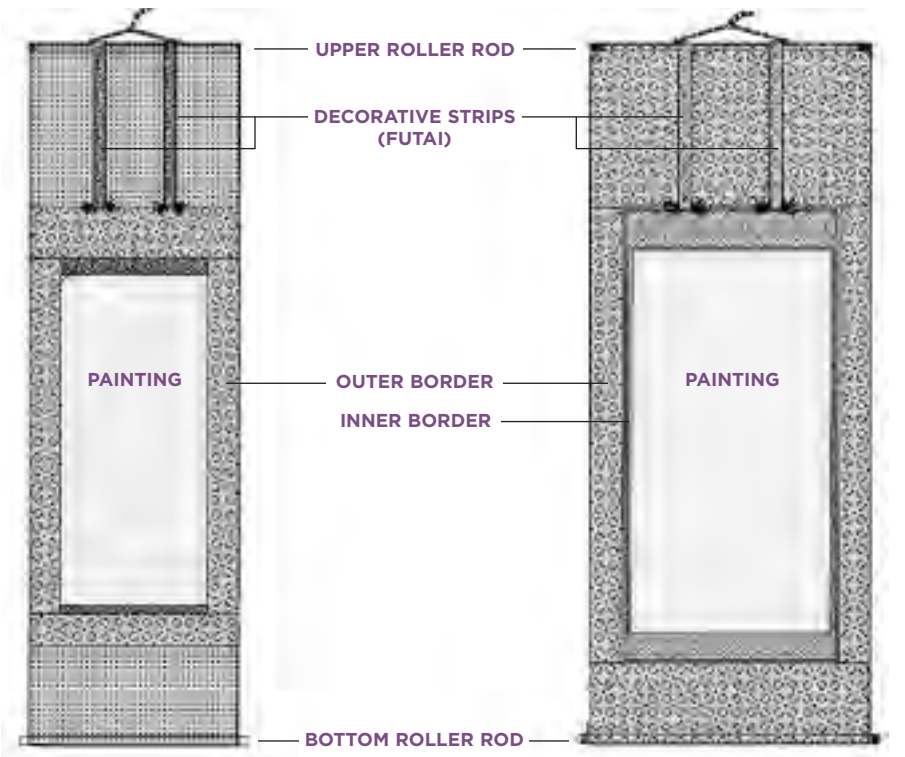
1. DISASSEMBLING

The first step in the conservation of *The Deity of Kasuga Wakamiya Shrine* began simply—with filtered water. To release the painting from its wooden panel, conservators moistened it with water and then lifted the artwork off the panel and detached the silk borders.

Next, the painting, face up, went through a process called "pigment consolidation." A solution of animal skin glue was brushed onto areas where the pigment was unstable. How had the conservators determined where the pigment was unstable? In one case, the white pigment around the deity's feet had become powdery—the result of the original animal skin glue mixed in the pigments breaking down and losing its binding ability.

To protect the painting during the process of remounting, it was "faced," or covered, on the front with rayon paper that had been treated with seaweed gel, a light adhesive. From there, the painting was placed, face down, on a clear acrylic sheet that was then attached to a light table. By projecting light through a painting, conservators can determine what repairs the artwork requires.

Conservators concluded that the first layer of backing paper, next to the silk of the actual painting, was embedded with pigment from the painting. To preserve the pigment, they decided to reattach, rather than replace, the first layer of backing paper, thus preserving the original image.



THREE-TIER MOUNTING (FIG. 1)

TRADITIONAL BUDDHIST MOUNTING (FIG. 2)

2. REPAIRING

This was not the first time the painting had been repaired. Some time earlier, silk patches had been used to fill holes on the silk, but the result was less than ideal. On the backside, the patches overlapped with the silk of the painting, creating an uneven surface and some darkening around the repaired areas. The conservators removed the old patches and, to correct those earlier repair efforts, they prepared new patches. These patches were made from irradiated silk—silk treated with radiation to age it artificially. The patches were then toned to a color slightly lighter than the original silk and applied to the back of the painting. The conservators carefully used tweezers to remove any extraneous material around the patch.

3. REMOUNTING

Replacing the layers of backing paper is one of the most critical aspects of remounting a silk scroll painting. When conservators reattached the first backing layer to *The Deity of Kasuga Wakamiya Shrine,* they used new wheat starch paste thinned with water as an adhesive. If the first layer had been replaced with new paper, the conservators would have used a paper mulberry bark, or *kozo,* paper that has no filler and is very thin but also is sturdy and crisp. With the second layer of backing paper came some subtle adjustments. The wheat starch paste was not new but aged, allowing for more flexibility during the rolling and unrolling of the stored scroll. Also, for the second layer, the *kozo* paper had a calcium carbonate filler, which both softens and gives weight to it and also helps it to roll up more easily.

After the second layer of paper was attached, thin strips of paper, called "crease reinforcement strips," were applied to areas previously damaged and creased from rolling. With this task completed, the painting was placed face up and flat on a special drying board: a wooden lattice frame covered in layers of paper. To allow the moisture to evaporate from the painting most efficiently, the paper of this board had been sealed with persimmon juice—a natural water repellant.

Conservators usually use a "round knife" to cut paper and silk.

Next, the conservators—in close consultation with the curators—tackled the critical aesthetic challenge of selecting the silks for the mounting. The colors of the silk were important because they had to complement both the painting and its content.

The conservators and the curators agreed that the new mounting for *The Deity of Kasuga Wakamiya Shrine* should reflect the painting's Shinto subject matter as well as the Buddhist influence on pictorial representations in Shinto. For this reason, the three-tier mounting was selected (see fig. 1). Features of traditional Buddhist mounting, such as a inner and outer borders and a subtle gold brocade, were also incorporated (see fig. 2).

The next step was to attach the middle overall lining paper and the final backing layer of paper. Paper "pockets" designed to hold the roller rods were pasted onto the back at the top and bottom of the hanging scroll, then the last layer of backing paper was laid in place. Finally, a layer of silk was attached to the back of the painting at the top to add strength and an additional layer of protection. When the scroll is rolled up, only this external layer of silk—and not the backing paper—is visible.

Outfitted with its new layers of silk and paper, the hanging scroll proceeded to the next stage: drying. Conservators applied new wheat starch paste to all four edges of the hanging scroll, then attached it to the drying board so it would "stretch-dry" tautly like the head of a drum. For about one week, it lay face down while the paste dried. A conservator rubbed the back side, or reverse, of the painting with a string of quartz beads to make the mounting more flexible. To reduce friction from the motion of the beads, the paper was dusted with a powdered insect-secretion wax *(ibota).* The scroll was turned over for a second week of drying, and the conservators began to "in-paint" the newly patched areas where the pigment was missing.

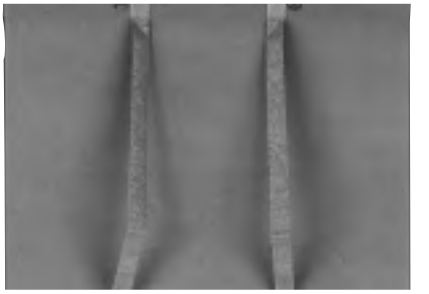
Finally, the conservators split open the paper pockets, wrapped them around the roller rods, and then attached undecorated gilded copper knobs to the rods. The thicker and heavier bottom rod is designed to aid rolling and to add weight to the bottom of the hanging scroll. With the addition of two decorative strips called *futai* and hanging cords to the top, the remounting of *The Deity of Kasuga Wakamiya Shrine* was complete.

How long will this mounting last? A good mounting should last at least one hundred years and can possibly last for several centuries. The work of the dedicated conservators in the East Asian Painting Conservation Studio ensures that future visitors to the Freer and Sackler galleries will have the opportunity to see important and beautiful East Asian paintings in their best possible condition.

Special thanks to Jennifer Perry, Jiro Ueda, and Andrew Hare of the Department of Conservation and Scientific Research.

Vocabulary

BUDDHA



FUTAI

AESTHETICS
related to the beautiful

BROCADE
a silk fabric with decorations that are raised above the fabric surface

BUDDHISM
a religion based on the teachings of Siddhartha Gautama (ca. 563–ca. 483 B.C.E.), called the Buddha ("the enlightened one"), who attempted to find an answer to the cause of human suffering. Buddhism originated in northern India and was transmitted to Japan through China.

CALCIUM CARBONATE
a compound of calcium, carbon, and oxygen ($CaCO_3$) found in shells and bones

CONSERVATOR
a person who cares for, restores, and repairs fine art objects

CURATORS
a person who researches works of art, assembles exhibitions, and publishes information about museum collections

FUTAI
decorative silk strips attached to the top of a hanging scroll

GILDED
covered with gold

IBOTA
a waxlike substance made from insect secretions used to reduce friction when hanging scrolls are rolled and unrolled

IN-PAINTING
the part of the restoration process of applying new pigment to the corrective silk patches set into holes in the painting

KOZO PAPER
a strong but flexible paper made from paper mulberry bark; used as backing paper in the remounting process

PIGMENT
a colored substance made of mineral, plant, or chemical materials that is used to make paint

REMOUNTING
the process of detaching, repairing, and reattaching a surface to its support; in the case of a hanging scroll, a painting made of paper or silk is detached from a panel or silk borders, and its paper backing is repaired and reattached to either a new panel or new silk borders and fresh paper backing.

RESIN
a sticky substance (usually yellow or brown in color) secreted by certain trees

SHINTO
the indigenous religion of Japan in which deities *(kami)* are believed to inhabit the natural landscape; *kami* may also be revered humans, living or dead

SILK
a strong fabric made from the fibers of the silkworm cocoon

SEAWEED GEL
a weak adhesive derived from three different kinds of seaweed and used to adhere rayon paper to the front of a painting in the process of repairing and remounting a hanging scroll

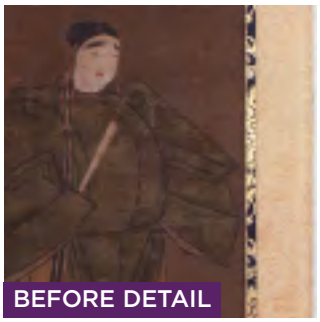
WHEAT STARCH PASTE (NEW)
an adhesive made from wheat starch powder cooked with water and used to paste the different layers of lining paper in the process of remounting a hanging scroll

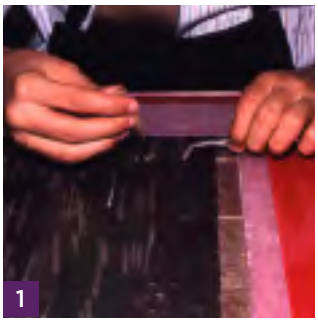
WHEAT STARCH PASTE (AGED)
an adhesive made from wheat starch powder that is cooked with water and then aged up to ten years and used to paste the second through the last layers of backing paper

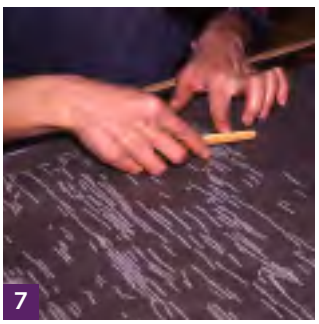
TOP LEFT Detail, *Four scenes from the life of the Buddha,* Pakistan/Afghanistan, Kushan dynasty, late 2nd-early 3rd century, schist, purchase, F1949.9a-d. Detail, *The Diety of Kasuga Wakamiya Shrine,* Japan, Muromachi period, 14th century, hanging scroll, ink, color, and gold on silk, purchase, F1964.13.

Conservation in Action

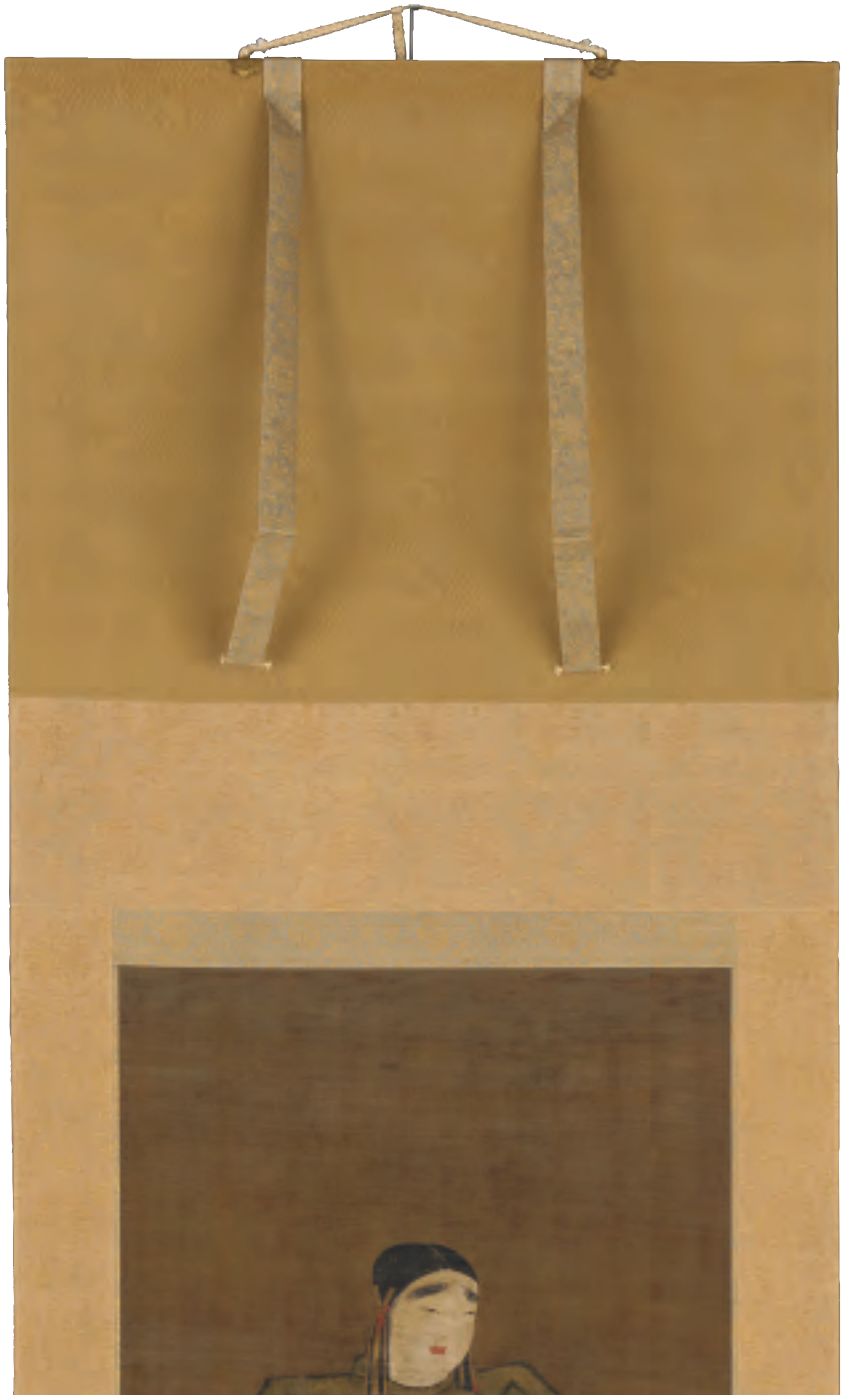
It takes a steady hand, great patience, and years of training to preserve a work of art successfully and delay its deterioration. These photographs show the process conservators at the Freer Gallery of Art followed when they repaired the scroll *The Deity of Kasuga Wakamiya Shrine.*







1) A conservator removes old paper strips that were used to reinforce areas where creases had damaged the scroll.
2) Overlapping patches from a previous repair are evident.
3) After all the linings, repairs, and patches were removed, the white areas show where the scroll is missing original silk.
4) A conservator uses a paste brush to apply seaweed gel to a temporary facing made of rayon paper.
5) Conservators carefuly realign the silk weave on the back of the painting while it is still moist.
6) The temporary facing is removed after the painting is infilled with silk and the first paper lining layer is applied.
7) New reinforcement strips cover creases after the second paper lining is added.
8) To assure adhesion, silk mounting fabrics are gently hammered into place.
9) A conservator uses a tamping brush to apply a middle layer of paper over the scroll.
10) With great skill and precision, a conservator carefully tones tiny areas of the new silk.



The Deity of Kasuga Wakamiya Shrine

Japan, Muromachi period (1333–1573), 14th century
Hanging scroll; ink, color, and gold on silk
176.2 x 54.1 cm mounted
Purchase, F1964.13

The Shinto god of the Wakamiya shrine, located in the Japanese city of Nara (near Kyoto), is portrayed here as a young nobleman dressed in a green robe decorated with delicate gold patterns. He stands on a rocky plateau that is intended to suggest to the viewer the earthly site where his spirit resides. In Japan, the gods *(kami)* of Shinto were often worshiped as unseen spirits who resided in specific places. Beginning in the thirteenth century, however, the production of paintings of Shinto deities increased due to the promotion of ideas linking specific *kami* with Buddhist gods. Buddhism had a long history of representing Buddhist figures in paintings, prints, and sculptures. Shinto deities were usually depicted with human features and very little indication of their supernatural identities.

The Paste in the Scroll

By Faith Deering, Entomologist, Science Educator

Repairing and remounting a Japanese hanging scroll is a highly skilled and painstaking process that involves aesthetic choices as well as scientific knowledge of physics, chemistry, and biology. Conservators must understand the properties of light, pigments, temperature, humidity, fibers, metals, force, pressure, and tensile strength before they repair a scroll. One important scientific process is the "chemistry of adhesion," which is how molecules link up to form substances, such as glue and paste, that are capable of binding materials together.

Types of Adhesives Used in the Conservation Process

Four main kinds of adhesives were used during the long and careful process of remounting *The Deity of Kasuga Wakamiya Shrine.* These adhesives come from natural materials (not synthetics) and have been used for centuries. The adhesives used by conservators in the Department of Conservation and Scientific Research at the Freer Gallery of Art were prepared in traditional ways and applied using brushes and other tools made specifically for this purpose.

ANIMAL SKIN GLUE: This glue is obtained primarily from cattle hides that come from meat packing houses or tanning factories. Occasionally, deer, horse, or rabbit skins are used. The hides are rinsed several times in solutions of water, lime, and mild acid. Next, the hides are soaked in large kettles filled with water. After hours of cooking, the hide forms a thick gelatin that is drained and filtered, and the water is evaporated from it. Once the solution cools, it forms a thick, jelly-like glue due to the presence of collagen, the primary structural protein found in all animals. Collagen exists as long fibrous, polymer molecules that are flexible and cohesive.

FRESH WHEAT STARCH PASTE: Water mixed with wheat flour forms the traditional paste used for making papier-mâché and wallpaper paste. The gluten is separated from wheat flour leaving starch. This starch is cooked in water to make the wheat starch paste used in the conservation process.

ABOVE Sieve and paddle used to strain wheat starch paste. CLOCKWISE FROM BELOW RIGHT Brushes used to attach mounting materials, apply water, and tamp paper layers together.

AGED WHEAT STARCH PASTE: To produce this adhesive, fresh wheat starch paste is aged for up to ten years. Traditionally, this paste was aged under buildings in earthen pots placed in cool, ventilated storage areas. During the first five years of the aging process mold grows on the surface of the paste. This mold is then periodically scraped off until the mold culture eventually dies. Ultimately, the aged paste, or "cold paste," turns an opaque yellowish white and becomes stiff and granular. When it is used, the paste is mixed with water to an extremely thin consistency. Aged wheat paste is used in the restoration process when a very flexible adhesive is needed.

SEAWEED GEL: This gel is derived from three kinds of seaweed. The seaweed is washed, soaked overnight in water, and then dissolved by heating. The resulting liquid is then passed through a straining cloth. Seaweed gel can be mixed with animal skin glue or wheat starch paste to make them more flexible.

Activity: Scroll Bookmark

Brainstorming Session

Gluing and pasting are familiar activities, but what materials might be considered adhesives? During a brainstorming session, students might think of egg white, boiled rice, cooked pasta, boiled oatmeal, plant sap, pine pitch, honey, and sugar-and-water solutions.

Comparing Paste and Glue

Powdered wheat paste is available at hardware and paint stores. Mix with water and create thicker and thinner solutions to test their adhesion. Also mix ordinary white wheat flour with water to test its adhesion. (Cooked and non-cooked recipes for wheat paste are available on the Internet). Handmade wheat flour paste can be tested against commercial wheat paste and white glue. Students can then brainstorm as to which uses would be best for each of the different adhesives.

> How long does it take to adhere to a surface? Is the paste water soluble? Are the two pieces of paper flexible after being pasted together? What color is the glue or paste when it dries? Is it transparent or opaque?

Scroll Bookmark

THIS ACTIVITY IS SUITABLE FOR ELEMENTARY AND MIDDLE SCHOOL STUDENTS.

The scroll bookmark project introduces students to the process of layering paper and pasting. It also makes them familiar with grasses as a source of gluten (wheat paste, for example). This simple project results in a creative bookmark that the students can use. The completed bookmark is not meant to represent a scroll. The importance of this project is the *process* and the opportunity students have to use wheat paste and to work with materials that require pasting.

Materials

> Small dry grasses or grass like weeds (collected locally)
> Manila folders (oak tag stock), cut into 2-x-8-inch rectangular strips; one per student
> White tissue paper, cut into 3-x-9-inch rectangular strips; one per student
> White glue such as Elmer's
> Prepared wheat paste (hardware or paint stores sell common wallpaper paste)
> Heavyweight decorative Japanese papers (colorful mulberry papers are available at local craft stores), cut into 5-x-11-inch rectangular strips; one per student
> Raffia or silk ribbon, cut into 15-inch strips
> Small bamboo or gold metallic beads (available at local craft stores); two per student

Create!

1. Collect enough short, thin-stemmed or weedlike grasses, 7 to 8 inches in height, for one per student. Sturdy grasses growing in sidewalk cracks or along playing fields are perfect for this project. Keep the roots with the plant when picking, but remove any clinging soil.
2. Sandwich each plant between newspapers and press overnight between heavy books
3. Remove the dry, flattened grass plant from the "book press." Use dabs of glue to attach one grass to each manila strip. Let dry.

4. Using a clean paintbrush, spread a thin, even layer of premixed wheat paste over the entire surface of each manila strip. While the wheat paste is still wet, position one piece of white tissue paper over each manila strip and settle it into place. The tissue paper should extend over each edge by half an inch. Gently press the tissue paper closely around the grass stem to reveal its form as distinctly as possible. The tissue paper will immediately become soft and fragile. Lifting the tissue paper to re-position it will cause it to rip, so be careful! A few wrinkles are fine and will add to the bookmark's beauty.
5. Place the manila strips under stacks of books, and let them dry thoroughly overnight.
6. Once the strips are dry and pressed flat, trim away the excess tissue paper around the edges.
7. Center and glue each manila strip to a strip of decorative Japanese paper. When it is dry, use a paper punch to make one hole at the bottom of the backing strip
8. Pass a piece of raffia or ribbon through the hole and knot it into place.
9. Thread the beads onto the raffia or ribbon, and tie them into position. This tassel will be 3 to 4 inches in length.

Read a good book and use your new bookmark to save your place!