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Keywords
May 1st Sutra; Kōmyō; *uchigami*; hemp paper; ramie paper; *mashi*

Of all Nara-period (710–794 CE) sutras, perhaps no other set is more widely known and valued than the copy of the Buddhist canon, *Kōmyōkōgō gogankyō* (光明皇后御願経) more commonly known as the *May 1st Sutra*, that was commissioned by Empress Kōmyō and dated 740 CE. One handscroll of the set, which originally numbered into the thousands, was found inside a Kamakura-period (1185–1333 CE) wooden sculpture of Amida Buddha and acquired in 2002 by the Freer Gallery of Art in Washington, DC, F2002.9f. Considering its advanced age, the sutra was in fair but fragile condition and required major conservation treatment. Treatment of an eighth-century sutra is relatively uncommon in Japan and quite rare in the West.[1] Therefore, it was a valuable opportunity to study not only its historical context, which has fortunately been well-documented in ancient Japanese texts, but also the material object itself. It was hoped that this knowledge would increase understanding of how the sutra was produced, particularly its paper support, in order to devise a safe and appropriate conservation treatment of an object that is well over a thousand years old.

History of the *May 1st Sutra*

Buddhism had survived its infancy through the political turbulence of the Asuka period (538–710 CE) and flourished, becoming firmly established in Japan under the aegis of Emperor Shōmu (701–756 CE) during the subsequent Nara period. With the support of Empress Kōmyō (701–760 CE), Shōmu spurred an intense effort to promote the religion through the nationwide construction and enrichment of provincial temples and nunneries including the famous edifices of Tōdai-ji, Kōfuku-ji, and Shin'yakushi-ji. An imperial scriptorium was established in which commissioned sets of *Issaikyō* (the complete Buddhist canon) were copied and disseminated throughout the temple network.[2]

Empress Kōmyō, renowned for her piety, commissioned a set of *Issaikyō* to commemorate the seventh anniversary of her parents' death, to pray for the prosperous reign of the imperial line, for the salvation of the populace, and as a personal act of devotion.[3] At the end of the dedicatory inscription (Fig. 1) is written, '*Tempyō jūni nen gogatsu tsuitachi ki* (天平十二年 五月一日記)', or, 'recorded on the first day of the fifth month of the twelfth year of *Tempyō*' (740 CE). The set therefore became known as *Gogatsu tsuitachi-kyō* (五月一日経), or the *May 1st Sutra*.

The production process is documented in minute detail in *Shōsōin* (Imperial Repository) texts. In 716 CE the priest Genbō travelled to Tang Dynasty (618–907 CE) China and returned in 735 CE bearing the *Kaigen shakkyō-roku*, a set of 5,048 sutras and the most important and recognized version of the Buddhist canon. It became the basis for the *May 1st Sutra* copy. Production began in 736 CE (*Tempyō* 8) on an organized and grand scale, which at one point, included the employment of more than 700 Japanese and foreign scribes, craftsmen and mounters.[4] According to the

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1 There are pre-tenth century sutras in the Stein collection of the British Library such as the well-known, printed Dunhuang Diamond Sutra dated 868. Other major collections of Dunhuang manuscripts including pre-tenth century material are held in the British Museum, the Bibliothèque Nationale in Paris and the Institute of Oriental Studies in St. Petersburg. Many of these institutions employ conservation treatments involving encapsulation, repair with thin, long-fibred Japanese papers and starch paste, and wet or damp flattening under weight or tension-drying. The Museum of Fine Arts in Boston also holds in its collection, two eighth-century Japanese sutra, one is a fragment mounted as a hanging scroll, the other is a plain paper sutra. It is not clear whether they have been treated. No other *May 1st Sutras* are known to the author in Western collections.

2 R.J. Bowring, *The Religious Traditions of Japan, 500–1600* (Cambridge: Cambridge University Press, 2005), 80.

3 Wadō Uemura, *Nihon no shakyō* (Tokyo: Rikōgakusha, 1981), 14.

4 Yumi Yamashita, 'Gogatsu tsuitachi-kyō sōshutsu no shiteki igi', in *Shōsōin monjo kenkyū*, eds. Ishigami Eiichi and Sakaehara Towaō (Tokyo: Yoshikawa Kōbunken, 1999), 27–68.

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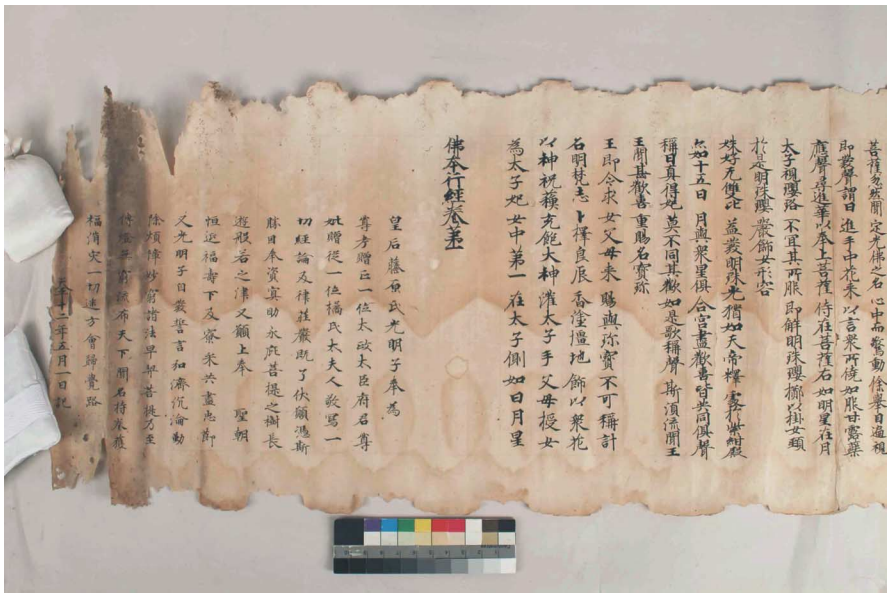

Fig. 1 The *May 1st Sutra* (F2002.9f) before treatment. The last sheet at the tail-end of the handscroll bearing the inscription and date. Freer Gallery of Art, Smithsonian Institution, Washington, DC: Purchase—The Harold P. Stern Memorial Fund and museum funds in appreciation of Nancy Fessenden and Richard Danziger and their exemplary service to the Galleries as leaders of the Board of Trustees, F2002.9f.

Shōsōin text '*Shakyō shikei*', copying was not complete by the inscription date of, 'the first day of the fifth month' of 740 CE, but continued until 749 CE (*Tempyō Shoho* 1).[5] By this time the copying production expanded beyond the *Issaikyō* to include other Buddhist texts, increasing the number of copied sutras to more than 7,000 scrolls.[6]

The sutras were written by brush in *sumi* ink on undecorated, hemp or ramie-based paper, sometimes dyed yellow in keeping with earlier Chinese models. The set is highly esteemed for its calligraphic style, with its sharp dotting, bold, crisp strokes and semi-squat form of the *kaisho* (standard Chinese block character) script.[7]

The *May 1st Sutra* comprises the largest extant set of Nara-period sutras with 750 scrolls housed in the *Shōsōin Shogozō* (Sacred Text Repository) and approximately 250 scrolls in foreign and domestic collections. As a whole it represents the pinnacle of undecorated Nara-period sutra in terms of the quality of its calligraphy and materials, and its great historical importance to scholars.

Eighth-century sutra paper and *uchigami*

With the transmission of Buddhism through Central Asia, China and Korea came the materials and technology of papermaking, and the precepts of sutra content and form. Paper used for copying sutras was often hemp or ramie-based and sometimes mixed with other fibres such as *gampi* (*Wikstroemia sikokiana*) and *kōzo* (*Broussonetia kazinoki*). Indeed fibre analysis that has been performed on a small number of eighth-century sutra paper samples has confirmed this. In Japan during the Nara period, it is believed that hemp rope or ramie rags from high quality cloth (such as cloth used to make summer kimono), mosquito and fishing nets were cut into small pieces and fibrillated by pounding.[8] The prepared fibre was then formed into sheets of paper that were finally hammered to prepare the surface for calligraphy.

Uchigami, or literally 'beaten paper', was produced using an ancient, labour-intensive technique mentioned in *Shōsōin* texts but the details of

5 Tokyo Daigaku Shiryō Hensanjo, *Dai Nihon komonjo: [Hennen monjo] Vol.7* (Tokyo: Tokyo University, 1968), 485–6.

6 Motohiro Yoritomo and Eikei Akao, *Shakyō no kanshō kiso chishiki* (Tokyo: Shimondō, 1994), 180.

7 Yoritomo and Akao, *Shakyō no kanshō kiso chishiki*, 178.

8 Akinori Ōkawa (personal communication, email to author), 2 February 2009.

the process remain obscure. Recently, paper technology researchers Akinori Ōkawa and Katsuhiko Masuda have been able to successfully recreate *uchigami* by analysing extant papers and experimenting with different hammering techniques.[9] They surmise that the sheets of paper were moistened, stacked and hammered with a mallet between layers of leather on a stone slab. The moisture in the papers slowly evaporated during the hammering and rotation of the sheets through the stack. Hammering imparted a smoothness and luster to the surface and yielded a crisp, resilient paper. The process compacted the fibres increasing the density of the paper and thereby lowering its absorption. The treatment of paper in such a manner was practical in that it prevented the bleeding of ink, and with its smooth surface, made a superior paper for writing.[10]

In *Shōsōin* texts concerning the production of Nara-period sutras, the terms *mashi* (麻紙) literally 'hemp paper', *shiromashi* (白麻紙) 'white hemp paper', *ōmashi* (also pronounced *kōmashi*) (黄麻紙) 'yellow hemp paper' among others, were used to describe types of paper used for copying sutras and imperial documents. Unfortunately, the names were not defined in terms of their fibre content or the process by which they were produced and there is scant literature on the papermaking technique of that time.[11] This has led to some confusion about the nature of ancient sutra paper.

What is *mashi* (麻紙)? The Japanese names of different plants such as hemp (*Cannabis sativa*) (Jp *taima* 大麻), ramie (*Boehmeria nivea*) (Jp *chōma* 苧麻), flax (*Linum usitatissimum*) (Jp *ama* 亜麻) and jute (*Corchorus capsularis*) (Jp *kōma* 黄麻) all contain the character *asa* (麻). *Asa* technically refers to the genus *Cannabis* to which hemp belongs. Often, the names of these different plants were abbreviated to the one character *asa*, perhaps, because they possess similar physical characteristics, though they are all taxonomically from different plant families. This abbreviation may have caused the Japanese term *mashi* to be literally translated as 'hemp paper'. Although hemp paper was in common use during the Nara period, *mashi* is often used as a catch-all term to describe Nara-period sutra paper regardless of their actual fibre content.

Raw materials such as hemp, ramie, *kōzo*, *gampi*, etc. used to make *washi* (Japanese paper) all differ in fibre morphology and their differences are reflected in the appearance and texture of the finished paper. *Gampi* often yields a crisp paper with a smooth, lustrous surface that does not readily absorb water. Hemp and ramie paper is more absorbent and felt-like in texture with a rougher surface. However, when hammered in the same manner as *uchigami*, it too yields a paper with similar characteristics as *gampi* paper. As a result, before the common use of fibre analysis, papers of differing raw materials have been mistaken for one another.

From the results of fibre analysis performed on a small number of Nara-period sutras, it is now known that some of the sutra paper referred to in *Shōsōin* literature as *mashi*, *shiromashi*, or *ōmashi*, consists, in fact, of ramie and therefore are not technically hemp papers.[12] There have also been many occasions when ancient hemp or ramie-based paper has been mistaken for *kōzo* or even linen paper through superficial observation. Therefore it must be noted that, at present, the vast majority of Nara-period sutra papers have not undergone fibre analysis and even for experts of *washi*, it is impossible to distinguish, with any certainty, between the raw materials of the paper without the confirmation of scientific techniques.

Shiromashi and *ōmashi* are types of *mashi* and differ from one another in that the latter may have been dyed with *kihada* 黄蘗 and the former was not dyed. *Kihada* (Jp) or *huangbo* (Ch), a yellow dye containing the alkaloid berberine ($C_{20}H_{18}NO_4$) and made from the bark of the Amur cork tree (*Phellodendron amurense*), was used extensively in Central Asia, China and

9 Katsuhiko Masuda and Akinori Ōkawa, 'Technical Study on Papermaking in the Nara period (7–8th c.) II—Hammering for Finishing Paper', *Science for Conservation* [*Hozon kagaku*] 22 (1983): 99–113.

10 Akinori Ōkawa, 'Kodai no zōshi gijutsu ni tsuite', in *Washi no kenkyū*, ed. Katsuhiko Masuda (Kōchi: Nishit ōmi tōshadō, 2004), 206.

11 Akinori Ōkawa, 'Kodai no zōshi gijutsu ni tsuite', 201.

12 Akinori Ōkawa, 'Kodai no zōshi gijutsu ni tsuite', 208–9.

Japan to dye ancient paper. The dye was known by the Chinese as early as the late seventh century to have insect repellent properties and was used to dye official papers to prolong their preservation. To Buddhists, the colour yellow symbolized the earth and the ideas of centre, balance of Yin and Yang, and stability in correlation with Chinese theories of Wu Xing (the Five Elements) in cosmology and geomancy. In addition, it was believed to allow for long periods of reading as the gentle colour did not tire the eyes and the dye lent a pleasing fragrance, like incense, to the sutra paper. Therefore, it was deemed appropriate to dye sacred and important books and documents yellow. The use of hemp and ramie gradually decreased until the mid-Heian period (794–1185 CE) when they were replaced by papermaking fibres that were much more easily processed such as *kōzo* and *gampi*. However, some of these papers were still referred to as *mashi*. Samples of sutra papers from the early Kamakura period (*Kongo jūmyōin darani-kyō*) that were called *shiromashi* have been found to be white *kōzo* papers.[13]

13 Akinori Ōkawa, (personal communication, email to author), 2 February 2009.

Pre-treatment condition and examination of the *May 1st Sutra*

Copies of several Japanese handwritten documents accompanied the handscroll when it was discovered inside the Kamakura wooden sculpture. One in particular, dated Meiji 22 (1889) stated that a restorer by the name of Kawabata Kansa disassembled the sculpture for repair and discovered a document entitled, '*Butsu hon gyō kyō*' inside the body cavity. The sutra was mentioned again in a later handwritten document dated Showa 31 (1956) when the sculpture was restored a second time and the sutra was found still stored inside.

The sutra was received in the Conservation Department of the Freer Gallery in a loose, fragile, unsupported roll (housed in a paper box) consisting of 2 separate sections of joined sheets with a combined total of 13 whole sheets and a 5-column portion of one sheet. In its rolled state, the sutra measured roughly 3.8cm at its maximum diameter. Unrolled, the first section measured approximately 26.9cm × 88.7cm (height × length) and the second section measured 26.9cm × 547.8cm. The average dimensions of a single sheet were 26.8cm × 45.2cm. During examination, it became evident that the sutra had suffered from insect and moisture damage. There were scattered areas of insect holes of varying size and the sheets at the head and tail of the scroll, in particular, were heavily damaged. The edges were ragged and had either rotted away or been consumed by insects. Along the entire length of the scroll was a repeating pattern of brown tide lines which suggested it had been damaged by exposure to moisture in its rolled state, perhaps while stored inside the sculpture of Amida as examination of the base of the Amida statue confirmed it had been restored on two previous occasions. There were also mould stains, tears, separating paper joins, abraded areas and paper repairs attached to the verso from previous restoration. Seven small fragments, 'islands', made by insect grazing, were found at the bottom of the paper box. The sutra was unlined and did not have any of the usual handscroll mounting elements such as a cover, wrapping cord, wooden roller, roller knobs, or stave.

The first section, beginning at the right-hand side or head of the scroll, consisted of a dark-coloured blank sheet with vertical and horizontal ruled lines (hereby referred to as Sheet 1A) that had been joined to one sheet of sutra text. The ruled sheet was much thinner, more brittle and markedly darker in colour than the rest of the sutra sheets and appeared to be a different type of paper. When the sutra text was compared, character for character, with a complete reproduction of the same text in *Taishō shinshū Daizōkyō Vol.4 by* Junjirō Takakusa and Kaigyoku Watanabe published by Taishō Shinshū Daīzōkyō Kankōkai in 1924, it was

discovered that the sutra was missing nearly a full page (or 21 of 24 columns per sheet) of text. It is likely that Sheet 1A was added at some point in the past as a substitute for the missing title page of text. The second, 12-sheet section made up the bulk of the sutra with the incomplete 5-column portion at the tail. The left edge of the tail had sharp, jagged edges and there was a dark vertical band of soiling indicating that this section may have been wrapped around a roller and then ripped from it in the vertical direction.

Tests for *kihada*

There are records in the *Shōsōin* pertaining to the *May 1st Sutra* that indicated both *shiromashi* and *ōmashi* paper were used in its production. Therefore, there was the possibility that the paper support of the Freer's *May 1st Sutra* had been originally dyed with *kihada*.

Berberine, the principle component in *kihada*, is known to fluoresce when observed under ultraviolet (UV) light. When Sheet 1A was viewed under UV, it weakly fluoresced overall. The three sheets immediately following showed tiny, scattered spots of fluorescence only in areas where there were insect holes which allowed direct contact with Sheet 1A while the sutra was in its rolled state. No fluorescence was observed for the rest of the sheets in the handscroll. Fourier transform infra-red spectroscopy (FTIR) and UV/Visible spectrophotometry (using fibre optic probes) did not detect the presence of berberine in any of the sutra sheets excluding Sheet 1A.

High-performance liquid chromatography (HPLC) is an effective technique used to separate, identify and quantify components in a mixture and has been used to separate ionic compounds such as berberine. Analysis was performed on two of the seven small sutra fragments, both measuring approximately 3mm × 4mm, that could not be replaced into their original locations in the sutra. The samples were extracted in methanol and injected into a liquid chromatography-mass spectrometry (LC-MS) system. The samples were run on a 2.1-mm diameter Vydak C_{18} column, and scanned at five different wavelengths: 254, 300, 350, 450, and 600nm. The results of the analysis showed that some unknown organic compounds were detected from the samples. However, no protoberberine dyes typical of *kihada* were detected.[14]

Although inconclusive, the observations suggested that, Sheet 1A may have been dyed with *kihada* and transferred some of the dye to the three nearest sheets when the sutra was exposed to liquid as berberine is soluble in water and alcohol; or the sutra had been dyed originally but little or none of the dye remained due to the age of the paper and was, thus far, not detected; or, that the sutra had not been dyed with *kihada*.

Fibre analysis

Fibre samples were taken from the sutra, Sheet 1A, and the paper repairs on the verso. Each sample was stained with Graff's C-stain and observed through a polarized light stereo microscope. The original was found to contain approximately 80% ramie and 20% *gampi* fibre with an average ramie fibre length of 1.5mm (Fig. 2). It was also noted that the fibres had distinct cut ends and showed a high degree of fibrillation which lends credence to the theory that old ramie cloth was cut into small pieces and pounded to use as papermaking material.

Sheet 1A and the repairs on the verso consisted of 100% *kōzo*. In consultation with the curator of Japanese art, it was decided Sheet 1A and the repairs should be removed as they were likely to be later additions. This theory was supported by the fact that Sheet 1A, located where the title page of the sutra would have been originally, was blank, except for the

14 HPLC analysis was performed by Xian Zhang under the supervision of Richard Newman in the Department of Scientific Research in the Museum of Fine Arts in Boston on the two sutra samples. Results are reported as received.

Fig. 2 Fibre sample taken from *May 1st Sutra* (F2002.9f) stained with Graff's C-Stain. Ramie fibres seen in red and *gampi* fibres seen in greenish-blue. Photomicrograph.

addition of ruled lines. Had Sheet 1A been an original part of the hand-scroll, calligraphy would likely have been added considering the importance of the title page to the scroll. Although *kōzo* was used for papermaking during the Nara period, the fibre content, thickness and surface quality of Sheet 1A and the repairs were completely different from the ramie and *gampi* sutra support. Also, the repairs on the verso caused an uneven thickness where it overlapped with the support and was causing further damage to the sutra.

Since some amount of moisture would be used in the treatment process, the stability of the ink was tested by applying a tiny amount of deionized water with a fine brush to discreet areas of calligraphy. A clean piece of cotton blotter was then applied to the area with gentle pressure to determine if there was movement of the ink, however, no transfer of ink was observed.

Each sheet of the original was documented in black and white film, colour film and digital photography before treatment. Digital photographs of the sutra were printed out and the location and type of damage in each sheet was carefully recorded before treatment.

Conservation issues

Before treatment could be undertaken, it was necessary to consider how the *uchigami* support of the sutra had been prepared. Because its density and smooth surface had been produced by hammering the moistened sheets of paper until they were nearly dry, wetting the *uchigami* would have the reverse effect. The swelling of the paper fibres with water would cause expansion of the paper, thereby changing its density and texture. Therefore, it was necessary to devise a treatment using a minimum amount of water so that the density and smooth surface of the *uchigami* support would not be altered. UV/Visible and FTIR spectrophotometry, and HPLC could not confirm nor rule out the possibility the artefact had been dyed with *kihada,* therefore, if the support was exposed to moisture during treatment, care could be taken to prevent the loss or movement of dye, if

present; and the possibility of existing stains and tide lines migrating from exposure to water could also be reduced. It was decided that the physical and dimensional stress of traditional wet methods of lining, repairing, and tension-drying on *karibari* (Japanese drying boards) should be strictly avoided.

Multiple paste lines and areas where the top sheet was found to be eaten through by insects while the bottom sheet was left untouched were found at the joins of the sutra sheets. In conjunction with the *kōzo* repairs, this evidence suggested the joins were not original. In addition, the sutra had a pronounced curving habit along its length, from past exposure to moisture while in its rolled state, that prevented it from being rolled evenly on a roller for storage. Therefore, the decision was made to separate the sutra at the joins into individual sheets, flatten, repair and finally join the sheets into a straight length to prevent future damage from mechanical stress during rolling and unrolling.

After conducting research on existing *May 1st Sutra* and other eighth-century Japanese sutras that retained mounting elements, it was decided that the Freer sutra would be treated using Japanese materials in a style that matched the few existing models as closely as possible.

Some necessary materials for the treatment of the sutra, such as repair paper consisting of ramie and *gampi* in the appropriate proportion would have to be acquired and then prepared in the manner of *uchigami*. Handscroll mounting materials such as roller knobs and wrapping cord that were in keeping with Nara-period style of knobs and cord would also have to be obtained. Finally, the decision to add a simple paper cover, dyed a solid colour, was made since most early, undecorated sutra were known to have simple covers made of paper or plain-weave silk for protecting the scroll in its rolled state.

Treatment

The sutra was separated into individual sheets at the paper joins by locally applying a small amount of deionized water to soften the adhesive and carefully sliding a micro spatula between the two layers. Once the sheets had been separated, the old *kōzo* repairs on the verso were removed in the same manner. Residual adhesive at the joins was gently removed by rolling cotton swabs moistened with deionized water over those areas.

For the purpose of flattening the sheets before repairing, a slow humidification process was employed to allow the sheets to relax without endangering the surface texture of the paper. A humidification chamber was made by placing each sutra sheet face-down between two layers of *sanmoa* under a layer of Gore-Tex® laminate sheeting.[15] Clean towels, dampened with deionized water, were laid on top and all the layers were covered with polyethylene film. Acrylic straight-edges were placed along the perimeter to seal the humidification chamber. The sutra sheet was checked every fifteen minutes for approximately one hour until it was just barely cool to the touch. At this point, the sheet was manipulated with tweezers to straighten out wrinkles, tears, folds and 'islands' created by insects before lightly pressing between sheets of *sanmoa* and blotters in a book press. The sheets were lightly pressed over a few days and the blotters were changed three times daily until the sheets were completely dry and flat. After flattening, the paper support seemed more supple and the surface quality of the support remained unchanged.

15 *Sanmoa* (サンモア) is machine-made, permeable, non-woven, polypropylene web, available in 1m × 60m rolls. Gore-Tex® laminate consists of a 100% polytetrafluoroethylene, permeable 0.2micron pore membrane fused to a permeable, felted, polyester substrate, available in variable lengths of 42″ width.

Preparation of the repair paper

Detailed information about the paper support, such as dimensions, area weight, average thickness, and density were sent to a colleague in Japan with a request to find a repair paper that matched the original as closely as

possible. The papermaker approached to supply the repair paper chose the closest match according to the detailed information about the Freer sutra support from a small existing stock of paper that had been custom-made for another early sutra project and that was felt to be appropriate for the Freer *May 1st Sutra*. Unsized paper of approximately 80% ramie and 20% *gampi* fibre was received from Japan. The papermaker understood the paper would eventually be hammered to make *uchigami*, therefore paper that was thicker than the specifications had been selected to allow for compaction.

1 Sun bleaching

The paper had a slight, greyish cast because old ramie cloth had been used in its production and dyeing over the grey colour would have caused the repair paper to become too dark for the sutra. Therefore, the papers were floated on *sanmoa* sheets and sun-bleached in stainless steel vats of deionized water covered with transparent polyethylene film. The papers were allowed to bleach on the roof of the museum in the intense summer sun for one to two hours and air-dried on felts in the conservation studio.

2 Dyeing

The sutra is a plain-paper document executed in *sumi* ink, void of colour mineral pigment, and composed of multiple sheets with many losses. In the Japanese tradition, papers for repairing documents or archival materials are toned before the repairing process usually by dyeing paper or adding colourant to pulp during papermaking. Often, due to the sheer volume of sheets to be repaired when treating documents, toning the repairs after application may unnecessarily introduce pigments and binders into the original and can also be time-consuming. Therefore, the author decided to entirely forgo hand-toning individual areas of loss as an ethical and time-saving measure.

Traditionally, plant or pigment dyes are used to tone repair papers in Japan. However, plant dyes can be impractical in that they are difficult to fix to paper and, if exposed to moisture, can migrate into the original. In the author's experience, they often fade when exposed to light and may colour shift if exposed to fluctuations in pH, when lined with acidic paste or alkaline papers. Mineral pigments are time-consuming to grind finely for dyeing in volume and pigment particles can transfer or become imbedded in the original. Fibre reactive dyes react with cellulose in paper fibre to form stable covalent bonds unlike most plant and pigment dyes. Because they have good to excellent light and wash-fastness and a neutral pH Procion MX fibre reactive dyes were selected to dye the repair paper.[16] The dyes are practical because they can be used in a non-industrial setting, require few chemical auxiliaries (which can be safely rinsed from the paper with water), and can be used at room temperature.

The current aesthetic in Japanese conservation studios calls for dyeing the repair paper the same colour as the lightest colour in the background of the original. In accordance with this aesthetic, the aim was to dye the repairs so that they would easily be distinguished from the original but blend visually with the sutra. However, the colour of the 13 sutra sheets varied from reddish-beige tones at the head of the scroll, to yellowish-beige tones at the tail. Brownish stains and tide lines were an added complication. Therefore, the sutra sheets were sorted into four colour categories for the sake of efficiency. A range of colour samples was made with small pieces of the repair paper and then hammered in the same manner as *uchigami*. When producing the samples, it was necessary to hammer them because hammering increases the density of the paper and deepens the resulting colour. The colour of the samples could not be accurately determined or adjusted otherwise. Hammering would also be a necessary step

16 Procion MX fibre reactive dyes are dichlorotriazine dyes which can be used with cellulosic materials such as cotton, linen, ramie, hemp etc., as well as silk and wool under acidic conditions. Use of rubber gloves and eye protection is recommended, http://www.prochemicalanddye.com/store/pages.php? pageid=12 (accessed 2009).

Fig. 3 Dying a sheet of repair paper using a *noribake*.

after dyeing to produce *uchigami* to match the properties of the original for later repair. The colour samples were viewed with each sutra sheet on a neutral background and evaluated.

Each of the four different colours that were chosen were a good colour match for each individual sheet within a colour category but were similar enough to each other that they made a seamless progression when all the sutra sheets were viewed together in sequence.

Finally, a yellow-brown color that visually harmonized with the tone of the original was chosen for the sheet for the cover.

3 Pad-batch dyeing method

Since the desired colours of the four tones of the repair paper were very light tints, and the quantity of dye used was very small, dye stock solutions were prepared with 0.5g of dye powder per litre of deionized water for each colour. Since the dyes oxidized fairly quickly in aqueous solution, colours were mixed by measuring and recording the amount (in milliliters) of each stock solution used for later reproducibility. Fresh solutions were made every few days. Once the desired colours were achieved with small colour samples, full sheets of paper were dyed using a modified pad-batch dyeing method for maximum control.[17]

Salt, usually used as a dye auxiliary to facilitate the swelling of the paper fibre and uptake of dye, was not added since migration is rarely a problem with pale shades of colour.[18] An alkaline dye activator was prepared by combining sodium bicarbonate and sodium carbonate in a ratio of 3:1 respectively. The dry alkali, 4g per cup (237ml) of dye, was weighed out and dissolved completely in a small amount of the dye solution. The alkaline solution was then mixed with the remaining dye solution to produce a pH of about 10.5. The dye was applied to the sheets of paper with a *noribake*, a Japanese brush made of sheep hair (Fig. 3), one at a time, by quickly and completely saturating the paper with activated dye solution. A sheet of Melinex®, cut larger on all four sides was then laid over the dyed sheet of paper and the edges were sealed with tape to prevent evaporation. The dyed sheets were allowed to dwell at approximately 70°F for 24 hours. The dyed papers were transferred and rinsed in a large vat of running, deionized water for an hour and a half until the surface of the papers indicated an approximate pH of 7 when tested with pH strips. The wet papers were then

17 Pad-batch dyeing is an industrial process used to dye textiles. Dry fabrics are saturated with a solution of dye and alkaline activator, wrapped in polyethylene film, stored at ambient temperature for a specific dwell time, then rinsed and dried. This method has the advantage of being relatively simple and calls for a minimum consumption of water and energy whilst allowing excellent reproducibility.

18 J. Shore, ed., *Cellulosics Dyeing* (Bradford: The Society of Dyers and Colourists, 1995), 230.

laid on felts to air-dry. The pH of the dyed and rinsed paper was measured at 21°C with a glass electrode pH meter using a cold water extract method.[19] The pH averaged a near-neutral pH of 7.2 over five separate measurements. The single sheet of paper for the cover was dyed a yellow-brown colour using 1.5g of the Procion dye and set aside for later use as a cover.

19 B.L. Browning, *Analysis of Paper*, 2nd ed. (New York: Marcel Dekker, Inc, 1977), 171.

4 Thinning

Because the papers were significantly thicker than the original it was necessary to thin them before hammering. However, since hammering would compact the paper, the author experimented thinning small samples of paper to various thicknesses and hammering them to determine the resulting thickness of the samples. The thickness of the samples were compared with the thickness of the original by measuring with a dial thickness gauge to determine to what degree the full sheets should be thinned before hammering in order to yield a paper that would match the original.

A sheet of Melinex® was laid on a light table to protect the surface. Using transmitted light, the sheets of paper were thinned by hand with fine sandpaper that had been wrapped around a small polyvinyl eraser for cushioning. Quick, back and forth passes with light pressure were made over one side of the entire sheet to remove an even, thin layer of fibre while the thickness of the sheet was checked frequently with calipers. The yellow-brown cover sheet was thinned so that the thickness gradually tapered from right to left. This was done so that the left edge of the sheet would correspond in thickness to the sutra (where they would directly join) while the right side of the sheet remained thicker to protect the scroll when rolled. Once the desired thicknesses of the sheets, measured with a dial thickness gauge, had been achieved, stray fibres were removed with tweezers.

5 Hammering

Recreating the process of preparing *uchigami* presented several technical challenges and hours of experimentation. Smooth, thick sheets of leather used for cushioning the blows of the mallet were unavailable and the author tried hammering paper between different cushioning materials found in the studio before a satisfactory solution was found. Finding an appropriate surface for hammering also posed a challenge in that a stone surface of adequate size was not readily available. Attempts at hammering on a table produced poor results in that the table absorbed most of the energy from the mallet blows and did little to change the qualities of the paper. Hammering on a sheet of acrylic set on the studio floor resulted in producing paper that had thin and thick areas since the floor itself was uneven and distributed the force of the blows unevenly. It became evident, as it was to the papermakers of eighth-century Japan, that a level stone surface was necessary and the author successfully hammered small samples of paper on the narrow, granite windowsill of the conservation studio. Afterwards, a 16″ × 23.5″ (approximately 41cm × 60cm) polished granite slab was purchased for this project.

The toned, thinned repair papers were laid on felts and sprayed with deionized water to dampen them slightly and arranged in stacks of six sheets. The stacks were placed between layers of thin *kasenshi* on the granite slab and a sheet of 3mm-thick polyvinyl was placed on top for cushioning to prevent mallet marks.[20] The stack was hammered systematically by moving in a vertical and horizontal grid pattern over the surface while hammering with a wooden mallet (Fig. 4). One pass was complete when the stack had been hammered once in both the vertical and horizontal directions. After each pass the papers were rotated through the stack by placing the bottom sheet on the top. Once all the papers had completed

20 *Kasenshi* （化繊紙） is machine-made, non-woven, polyester web that is often used as a release paper, available in 1m × 100m rolls.

Fig. 4 A stack of dyed and thinned sheets of repair paper being hammered to produce crisp, dense paper, with a smooth surface, characteristic of *uchigami*.

a rotation through the stack, the stack was flipped face-down. Hammering and rotation of the sheets continued until the sheets were nearly dry and the surface had become smooth and glossy. The thickness of each sheet was checked with a dial thickness gauge, compared to the original, and either hammered further or allowed to dry thoroughly on felts. Approximately one to two hours of hammering was required for each stack of *uchigami*.

Repairing the *May 1st Sutra*

Seven small fragments of the *May 1st Sutra* had been found in the paper box in which the artefact had been received. Five of the fragments retained partial calligraphic characters. The original locations of the five fragments were determined by comparing the sutra text to a complete library book reproduction of the same text and finding the corresponding characters in the sutra that were missing portions. The five fragments were returned to their proper locations in the sutra during the repair process. The two remaining fragments did not bear any identifying marks and therefore, their original locations could not be ascertained. They were used for HPLC analysis.

Two rectangular sheets of Melinex® were hinged at the top edges with a strip of heavy *kōzo* paper and wheat starch paste, cooked in a ratio of 1:4 wheat starch powder to water, to create a simple folder. On the outside, bottom-most surface of the folder, a template was drawn to use as a guide while repairing. The dimensions of the template drawing were based on the dimensions of the least damaged sheet of the sutra which gave the most accurate representation of what the original size of the sheets may have been. In the template drawing, a 10mm margin beyond the sutra sheet dimensions was added to all four sides. Paper margins would be added to the sutra sheets to extend to these marks as the sheets were not square and they would be necessary for later trimming. Damage is often caused to the top and bottom edges of a handscroll during handling when the reader attempts to keep the roll from telescoping to the sides by patting both ends of the roll with their hands. To help prevent this damage, a small width of the top and bottom paper margins was left to protect the edges of the handscroll.

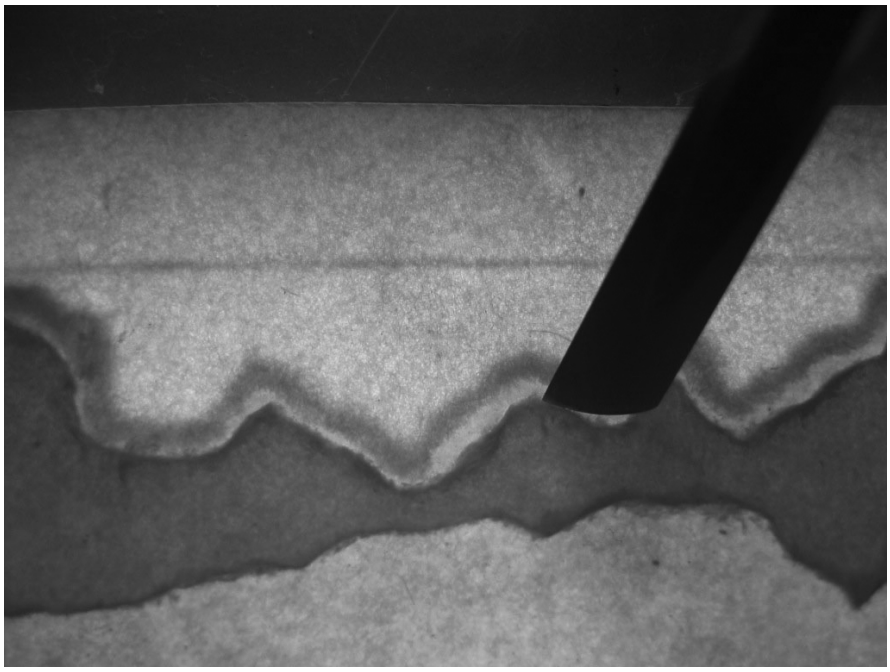

Fig. 5 Chamfering *uchigami* with an *into*, detail in transmitted light.

On a light table, each sutra sheet was placed inside the Melinex® envelope for protection. Dyed repair paper of the appropriate colour and thickness was laid over the template and the shape of each loss was chamfered from the sheet allowing for an approximate 1.5mm overlap when applied to the original. A decision was made to chamfer the edges of the fills because the hammered paper was too dense for water-cutting. Chamfering was accomplished with an *into* (single-edge Japanese seal carving knife) and produced repairs with thin, bevelled edges that provided a smooth transition between the repairs and the artefact (Fig. 5). Most if not all of the sutra sheets were damaged along the top and bottom edges and the repairs for those areas were chamfered in one continuous piece from left to right and into connecting interior losses (Fig. 6). This method prevented the creation of joins that would weaken over time with repeated rolling and unrolling of the sutra and was considered to be more aesthetically pleasing than including visible joins in the repairs.

A 1:1 mixture of *funori* (seaweed paste derived from certain red seaweeds in the genus *Gloiopeltis*) and wheat starch paste was used to affix the repairs. *Funori* was used to temper the strength of the wheat starch paste and to prevent gloss and darkening of the pasted overlap. Paste was applied to the chamfered edges with a fine brush and then the shaped patch was applied to the loss from the verso. A small square of *kasenshi* was laid over the area and a rounded bone folder was used to gently burnish the overlap for contact. The area was immediately weighted with clean squares of *kasenshi* and blotters to prevent cockling. Large, complicated patches were pasted and applied in small sections to avoid having the pasted edges dry out prematurely. In creased, torn or thinned areas of the sutra, repair paper was thinned to reinforce these areas and to even the overall thickness of the sheet. Finding the correct consistency of paste was critical and thus the amount of added water had to be adjusted according to the size and location of the fills. When using paste that was too thick, there was danger of the patch drying out or becoming too stiff, while thin paste could cause the patch to expand beyond the shape of the loss (particularly with large or long patches for the edges) or might lead to

Fig. 6 Shaped repair for Sheet 1 viewed with transmitted light.

Fig. 7 The *May 1st Sutra* (F2002.9f), Sheet 1 after repair. Freer Gallery of Art, Smithsonian Institution, Washington, DC: Purchase—The Harold P. Stern Memorial Fund and museum funds in appreciation of Nancy Fessenden and Richard Danziger and their exemplary service to the Galleries as leaders of the Board of Trustees, F2002.9f.

serious cockling. Once a full sheet had been repaired, it was transferred to a book press to dry thoroughly under light pressure with clean *kasenshi* and blotters (Fig. 7).

Aligning, joining and trimming

It is important to join the sheets of a handscroll so that it lies straight with top and bottom edges parallel, otherwise it will not roll evenly and will cause future stress and damage to the artefact. However, ancient documents such as sutras often have a curving or undulating habit along their length. This was the case with the Freer's *May 1st Sutra* which had been previously exposed to liquid in its rolled state causing the bottom edge of the sutra to expand disproportionately to the top edge, lending it a pronounced upward curve as it progressed from head to tail. The horizontal ruled lines on the sutra were a natural and convenient reference point for aligning the sheets since they were fairly square and had been carefully drawn with straight-edges by the original scribes. Therefore, the repaired sheets were laid in sequence on a long table and two threads were stretched over the sheets, from the head to the tail, and secured to the table. The position of each sheet was adjusted, overlapping right sheet over left, so that the two threads aligned with the top and bottom ruled lines of each sutra sheet.

Since most of the sheets were not square, the joins were scrutinized and many fine adjustments were made to align the sheets with the threads thus avoiding visual gaps in the calligraphy. Once satisfied with their position, pin pricks were made in the added paper margins of both sheets to mark the exact location of the join, allowing approximately 2mm for the overlap. The left and right paper margins were trimmed to the marks, joined with wheat starch paste, and weighted with *kasenshi* and blotters (Fig. 8). The sheets were first joined in pairs and the pairs were joined into four-sheet lengths. Finally, these sections were joined to make one continuous length of 14 sheets. A dyed, blank sheet was added to the head of the sutra to substitute for the missing title sheet of text (Sheet 1A) and the yellow-brown cover sheet was joined to it.

Two, long straight-edges were placed along the top and bottom edges of the joined sutra. They were positioned parallel to each other while exposing approximately 2.5mm at each edge of the added paper margins. Again, pin pricks were made along the straight-edges on the paper margins and the sutra was trimmed to these marks. Since the joined sutra was longer

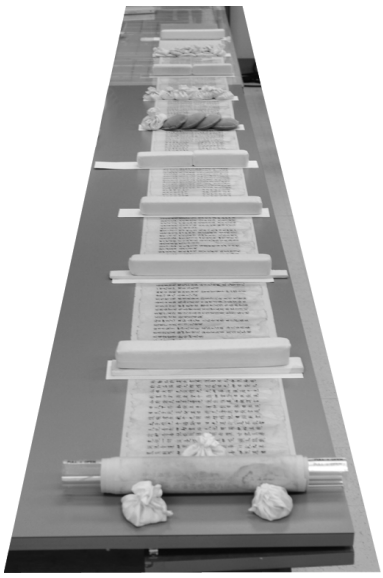

Fig. 8 *May 1st sutra*, aligning and joining the repaired sutra sheets.

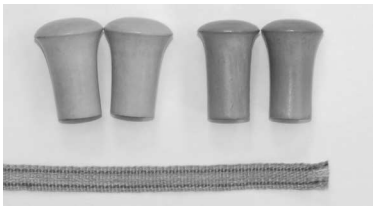

Fig. 9 Simple ochre-coloured roller knobs and plain-weave cord were selected in keeping with the unassuming style of known Nara-period Buddhist sutras. The set of knobs on the right was used.

21 Yoritomo and Akao, *Shakyō no kansh ō kiso chishiki*, 166–7.

22 *Exhibition of Shōsōin Treasures*, Exhibition catalogue (Nara: Nara National Museum, 1996), 28.

23 Imperial Household Agency of Japan, *Shōsōin Takaramono, Chūsō II*, vol. 5 (Tokyo: Mainichi Shinbunsha,1995), 24, 133–140.

than the work surface, marking and trimming was completed by rolling and unrolling sections.

Finishing

Due to their thirteen-hundred-year age, there are very few Nara-period handscrolls that still retain mounting elements such as a wooden roller, roller knobs, stave, cover and wrapping cord. Existing examples in the *Shōsōin* often have cedar rollers, and in rare cases cypress rollers, with simple paper or plain-weave silk covers and plain-weave or twill-weave solid-colour wrapping cords.[21] Coloured glass and wooden roller knobs in the *bachi* shape (flared, rounded tip cylinder), also called *ichiyō* (gingko) shape, are the most common. The wooden knobs were frequently painted with lead oxide pigments in solid colours of yellow, white, red, brown and black.[22] However, knobs constructed of a wide variety of materials including crystal, jade, sandalwood, rosewood and pear wood also exist. In the more extravagant examples, the tips of the wooden roller were painted in bright colours or decorated with floral and bird designs in gold pigment and capped with transparent crystal or glass knobs.[23]

Nara standards of Buddhist sutra production including content, materials, techniques and precepts of form were taken directly from Chinese and Central Asian models which were, for the most part, plainly executed and unassuming in style. It is clear from existing records that the *May 1st Sutras* were produced in vast quantity and it is likely they were meant to serve as functional, not decorative, objects in temple libraries. The roller knobs on most of the *May 1st Sutras* in Japanese museum and temple collections that still retain them have ochre, dark brown or black solid-coloured, wooden *bachi*-shaped knobs. It is also known by the author that those of the sutra set treated in a Japanese conservation studio have been mounted using similar style knobs with plain cord and cover. Although these few examples can not be considered to be proof positive of the original style of the *May 1st Sutras*, they lend sway to the argument for a sober aesthetic. For these reasons, it was decided that simple roller knobs, cord and plain paper cover would be the most logical choices for finishing the handscroll.

Ochre-coloured plain weave cord and a set of wooden, *bachi*-shaped roller knobs that had been coloured with ochre and shell-white were obtained from Japan (Fig. 9). A half-round bamboo stave was planed and sanded to 3mm in width and a cedar dowel was similarly prepared to match the diameter of the roller knobs. The knobs were attached to the cedar roller with concentrated *nikawa* (animal skin glue). The tail sheet of the Freer's sutra was bevelled, in keeping with all the *May 1st Sutras* viewed by the author, to an angle of 52° by trimming the upper left and lower left corners before attachment to the roller with wheat starch paste. The angle of the bevel was calculated by measuring the bevels of other sutras and taking the average. The stave and wrapping cord were attached to the paper cover, and the roller was attached to the tail sheet with wheat starch paste to complete the handscroll (Figs 10 and 11). The unrolled handscroll measures 27.4cm × 719.1cm (height × length) including the added cover and bevelled tail sheet.

Storage

Since they were not regarded as precious *objets d'art*, it is unlikely that the sutras originally had individual storage boxes, which were expensive and time-consuming to produce, nor *futomaki* (roller clamps) which are a modern invention. As part of a museum collection, however, the need to account for safe handling and proper long-term storage of the handscroll precedes its original intended function. Therefore a 4.6cm diameter Melinex® *futomaki* was made to increase the rolled diameter of the

Fig. 10 The *May 1st Sutra*, after treatment. Tail section of the handscroll showing the inscription, bevelled tail sheet, roller, and roller knobs. Freer Gallery of Art, Smithsonian Institution, Washington, DC: Purchase–The Harold P. Stern Memorial Fund and museum funds in appreciation of Nancy Fessenden and Richard Danziger and their exemplary service to the Galleries as leaders of the Board of Trustees, F2002.9f.

Fig. 11 The *May 1st Sutra*, after treatment. Head section of the handscroll showing the blank, dyed sheet used as a substitute for the missing title sheet of text, the dyed paper cover and wrapping cord. Freer Gallery of Art, Smithsonian Institution, Washington, DC: Purchase–The Harold P. Stern Memorial Fund and museum funds in appreciation of Nancy Fessenden and Richard Danziger and their exemplary service to the Galleries as leaders of the Board of Trustees, F2002.9f.

handscroll and support it during handling. The rolled dimensions of the handscroll measure 27.4cm in width and 5.7cm at its maximum outer diameter. In addition, a wide strip of heavy *kōzo* paper was wrapped around the handscroll under the wrapping cord to prevent crush damage. Finally, a box was custom made with archival blue board and lined with 1/8″ Volara® foam to store the treated handscroll.[24]

Conclusion

The conservation of the *May 1st Sutra* in the collection of the Freer Gallery of Art proved a particularly challenging treatment that required long hours researching its history and production, and experimentation with dyeing, thinning and hammering paper to produce *uchigami*. Numerous conversations with paper technology researchers and conservators helped the author to devise a treatment without the use of wet methods which: prevented the loss or movement of existing tidelines and *kihada* dye that may be present; preserved the qualities of the *uchigami* support; avoided the introduction of a large amount of adhesive into the artefact; and prevented the sutra from being subjected to unnecessary stress from expansion and contraction. Slight humidification and flattening appeared to add resiliency to the paper support rendering lining and tension-drying superfluous. Stable fibre reactive dyes were used to tone repair paper in lieu of hand-toning to avoid the addition of pigments and binders to the original. The repairs were easily distinguishable from the original but visually unified the sheets of the joined sutra and restored its structural stability.

24 A. Hare, 'Guidelines for the Care of East Asian Paintings: Display, Storage and Handling', *The Paper Conservator* 30 (2006): 73–92.

And, with few existing Nara-period examples, an educated guess was made to complete the sutra as a handscroll in an unassuming style with plain paper cover, wrapping cord and roller knobs. A combination of traditional Japanese and Western conservation techniques were employed with minimum risk to the artefact and resulted in a successful and fully reversible treatment. Finally, housing with a modern, *futomaki* roller and padded acid-free box will help protect the scroll long term.

Acknowledgements
The author would like to thank the staff of the Department of Conservation and Scientific Research (DCSR) of the Freer and Sackler Galleries, particularly the members the East Asian Painting Conservation Studio (EAPCS). Special thanks to Katsuhiko Masuda and Akinori Ōkawa for sharing their unparalleled expertise concerning Nara-period sutra paper; Richard Newman and Xian Zhang in the Department of Scientific Research in the Museum of Fine Arts, Boston for performing HPLC analysis on sutra samples; Isamu Naito, Atsushi Sawada, Yutaka Suzuki and Naohide Usami for generously providing materials and technical information. Additional thanks to Mary Ballard, Jennifer Perry and Yae Takahashi. A debt of gratitude is owed to Yumi Shintani for her help with written Japanese articles and Andrew Hare for his support and guidance.

Abstract
Kōmyō kōgō gogankyō (光明皇后御願経), more commonly referred to as *Gogatsu tsuitachi-kyō* (五月一日経) or *May 1st Sutra*, is the largest extant set of eighth-century Japanese sutras. Commissioned by Empress Kōmyō (701–760 CE), the details of its large-scale production are recorded in numerous *Shōsōin* (Imperial Repository) documents. Not only is it regarded as the finest example of Nara-period sutras in terms of the quality of its calligraphy, it also holds enormous historical value for scholars of Buddhism and classical Japanese linguistics. It has been given the designation 'Important Cultural Property' by the Bunkachō (Agency for Cultural Affairs) and is rarely seen outside of Japan.

One handscroll from the sutra set belongs to the collection of the Freer Gallery of Art in Washington, DC. Discovered inside a Kamakura period (1185–1333 CE) wooden sculpture of Amida Buddha during the Meiji period (1867–1911 CE), the sutra had suffered damage from insect attack, exposure to moisture, and previous restoration. The scroll lacked mounting elements and protective housing. Due to its importance to the collection and its fragile condition, conservation treatment was undertaken between 2006 and 2007 by the author. This article will detail the treatment of the sutra, a rare undertaking in the West, which involved the need to research the materials of eighth-century sutra paper and papermaking technology, the laborious process of preparing traditional *uchigami* repair paper, the eschewing of wet repair, lining, and tension-drying methods, and the resolution of issues of aesthetics when faced with a dearth of extant Nara-period examples.

Résumé
«Le Sutra du 1er Mai: conservation d'un rouleau horizontal de la période Nara»

Le *Kōmyō kōgō gogankyō* (光明皇后御願経), plus fréquemment mentionné comme le *Gogatsu tsuitachi-kyō* (五月一日経) ou le Sutra du 1er Mai, est le plus grand ensemble de Sutras japonais du huitième siècle. Sa commande par l'impératrice Kōmyō (701–760) et les détails de sa production à grande échelle sont enregistrés dans de nombreux documents du *Shōsōin* (le Registre impérial). Non seulement il est considéré comme l'exemple le plus achevé des sutras de la période Nara pour la qualité de sa calligraphie, mais il porte aussi une énorme valeur historique pour les spécialistes du Bouddhisme et de la linguistique japonaise classique. Le Bunkachō (Agence pour les affaires culturelles) l'a désigné «Bien Culturel Important» et il est rarement vu en dehors du Japon.

Un des rouleaux horizontaux de l'ensemble de sutras appartient à la collection de la Freer Gallery of Art à Washington DC. Découvert au cours de la période Meiji (1867–1911) dans un Bouddha Amida sculpté en bois datant de la période Kamakura (1185–1333), le sutra a souffert de dommages dus à des attaques d'insectes, une exposition à l'humidité et une restauration antérieure. Le rouleau a perdu des éléments de son montage et sa boite de protection. Etant donné son importance pour les collections et son état de fragilité, un traitement de conservation a été entrepris entre 2006 et 2007 par l'auteur. Cet article détaille le traitement du sutra, une rare entreprise en Occident, qui a impliqué la nécessité de faire des recherches sur les matériaux constitutifs des papiers des sutras du huitième siècle et des recherches sur la technologie de la fabrication du papier, de préparer du papier de réparation *uchigami* traditionnel selon un processus laborieux, d'éviter les réparations humides, le doublage et les méthodes de séchage en tension, et de résoudre des problèmes éthiques quand on fait face à une pénurie d'exemples de la période de Nara.

Zusammenfassung
„Die Sutra des 1. Mai: Konservierung einer Horizontalrolle aus der Nara Periode"

Kōmyō kōgō gogankyō (光明皇后御願経), gewöhnlicherweise *Gogatsu tsuitachi kyō* (五月一日経) oder Sutra des Ersten Mai genannt, ist die grösste existente Gruppe von Japanischen Sutren des 8ten Jahrhunderts. Sie wurde von Kaiserin Kōmyō (701–760) in Auftrag gegeben und die Details dieser Grossherstellung sind in zahlreichen Dokumenten des *Shōsōin* (kaiserliche Schatzkammer) festgehalten. Die Gruppe wird nicht nur aufgrund der Qualität der Kalligrafie als das beste Beispiel der Sutren der Naraperiode angesehen, sondern sie stellen auch einen enormen historischen Wert für Forscher des Buddhismus und Linguisten des klassischen Japanisch dar. Die Gruppe wurde durch die Bunkachō (die Agentur für Kultur) zum Important Cultural Property (Wichtigem Kulturgut) erklärt und sie wird selten ausserhalb Japans gezeigt.

Eine Rolle der Sutrengruppe gehoert der Sammlung der Freer Gallery in Washington DC an. Sie wurde während der Meiji Periode (1867–1911) in einer Holzskulptur des Amida Buddha der Kamakura Periode (1185–1333) entdeckt. Die Sutrenrolle war durch Insekten, Feuchtigkeit und frühere Restauration beschädigt worden. Sie war nicht montiert und hatte auch keine sonstige schützende Behausung. Da sie für die Sammlung sehr wichtig war und wegen ihres delikaten Erhaltungszustands wurde die Rolle von 2006 bis 2007 einer konservatorischen Behandlung durch den Autor unterworfen. Dieser Artikel wird die Behandlung der Sutra, ein seltenes Unterfangen hier im Westen detailliert darstellen. Dies beinhaltet die Erforschung der Materialien und Herstellung der Sutrenpapiere des 8ten Jarhunderts, den arbeitsintensiven Prozess, traditionelles *uchigami* Reparaturpapier selber herzustellen, den Verzicht auf feuchte Reparaturen, Doublage und Spannungstrocknen, sowie Lösungen zu Fragen der Ästhetik, wenn man mit der Spärlichkeit anderer Beispiele aus der Nara Periode konfrontiert ist.

Resumen

"*Sutra 1ro de mayo*: conservación de un rollo del período Nara"

Kōmyō kōgō gogankyō (光明皇后御願経), más conocido como *Gogatsu tsuitachi-kyō* (五月一日経) o Sutra 1ro de mayo (*May 1st Sutra)*, es el conjunto más grande de sutras japoneses del siglo VIII que hoy existe. Encargados por el emperador Kōmyō (701–760), los detalles de su enorme producción están mencionados en numerosos documentos *Shōsōin* (Depósitos Imperiales). Están considerados como la más extraordinaria muestra del periodo Nara, no sólo por la calidad de su caligrafía sino por su enorme valor histórico para los estudiosos del budismo y de la lingüística clásica japonesa. La Bunkachō (Agencia para los Asuntos Culturales) le ha otorgado la designación de 'Importante Propiedad Cultural', y raramente pueden ser vistos fuera de Japón.

Uno de los rollos de la serie de sutras -perteneciente a la colección de la Freer Gallery of Art en Washington, DC. fue descubierto durante el periodo Meiji (1867–1911) dentro de una escultura de madera de Amida Buda del periodo Kamakura (1185–1333), el sutra había sufrido daños producidos por ataques de insectos, exposición a la humedad y por restauraciones previas. El rollo carecía de montura y protección. Debido a la importancia de la colección y a su fragilidad, el tratamiento de conservación fue realizado por el autor entre 2006 y 2007. Este artículo dará detalle del tratamiento del sutra, una rara intervención en Occidente, que ha significado la necesidad de investigar los materiales de papel de los sutras del siglo VIII, la tecnología de hacer papel, el laborioso proceso de producción tradicional del papel *uchigami* de reparación, el cómo evitar la reparación húmeda, la laminación, y los métodos de secado por tensión y, además, cómo resolver los temas estéticos cuando nos enfrentamos a la inexistencia de ejemplos provenientes del propio período Nara.

Biography

Regina Belard graduated in 1997 from Cornell University with a Bachelor of Fine Arts degree. In 2000, she began training in Japanese painting conservation as the Hirayama Fellow in the East Asian Painting Conservation Studio (EAPCS) at the Freer and Sackler Galleries. She subsequently travelled to Japan for advanced training at Oka Bokkodo Co., Ltd in Kyoto. Since 2006, Ms Belard has returned to the Freer as an independent conservator to work on special projects and care for the museum collection with EAPCS staff members.

Materials and suppliers

AYTEX® P wheat starch:
Talas
20 West 20th Street
5th Floor
New York, NY 10011
USA

Blue board box blanks: (custom orders only)
Abby A Shaw
(Affiliated with Hollinger Metal Edge Archival Storage Materials)
237 Fitzwater Street
Philadelphia, PA 19147
USA

Funori (dried seaweed sheets):
Hasegawa Kaiga-dō
5 Kamanza-cho Sanjo-dori Nishinotoin Higashi-iru
Nakagyo-ku
Kyoto 604-8241
Japan

Gore-Tex® laminate, 100% cotton blotters and Volara® foam (1/8" thickness):
University Products
PO Box 101
517 Main Street
Holyoke, MA 01040
USA

Granite slab:
Stone Surfaces Inc.
15700 Crabbs Branch Way
Rockville, MD 20855
USA

Kasenshi No. 12 polyester web and *sanmoa* No. 20 polyproplyene web:
Yoshida Co., Ltd
18–2 Umazuka-cho Yasui Uzumasa
Ukyo-ku
Kyoto 616-8077
Japan

Procion MX reactive dyes, sodium bicarbonate and sodium carbonate:
PRO Chemical & Dye
PO Box 14
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