

Conservation and Stabilization of Palm Leaf and Parabaik Manuscripts

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Palm Leaf

Palm-leaf manuscripts are produced from two main types of palms: palmyra, and talipot. The palmyra leaf is rather thick and inflexible, inclined towards brittleness over time. The talipot is thinner and more flexible, with excellent lasting qualities, reportedly for as long as 600 years (1). Although there is often some variation in size in different areas, palm-leaf manuscripts seem to average 48 centimeters in length and 4 centimeters in width. There is a considerable range of "book" thicknesses, and I have treated single works of over 40 centimeters in thickness. Each "book" or bundle of leaves is usually fastened together with braided cords threaded through two holes pierced through the entire body of the manuscripts about 4 centimeters from each end or by the insertion of bamboo splints. The resultant "binding" is finished by the addition of heavy wooden covers at the front and the back, also tied by the braided cords or wrapped with webbing. There are generally two techniques used for writing on the manuscripts: through incisions with a pointed stylus, and by writing directly with a pen or brush. Most of the manuscripts that I have encountered in Burma, Cambodia, and Thailand, have been incised, with occasional additions or emendations written by pen on the surface. Incised writing is made visible by the application of a mixture of lampblack and oil, although sometimes other materials have been used, notably mixtures of bean plant juice, tumeric, and oil (2).

Preservation Problems: Damage and deterioration to palm-leaves are usually the result of insect damage, staining, splitting, and cleavage (i.e. separation of the upper from the lower surface), and mechanical damage. Some of the mechanical damage is caused by a traditional binding method that incorporates the threaded cord in a winding system around the edges of the manuscript causing breakage to leaf edges (3). Although I have seen leaves damaged by fungus, palm leaves seem to be fairly resistant, and are certainly much less subject to this form of damage than is paper.

Fumigation: Before treating manuscripts, it is important to kill any insects that may be infesting them. There are a variety of methods used, ranging from formaldehyde to phosgene gas and ethylene oxide, but great care should be taken to use methods that are safe for the materials and the staff. The safest and least damaging method of killing insects is by freezing, ensuring that the manuscript is protected by polyethylene film during its stay in the freezer. Temperatures should be reduced to minus 30 degrees centigrade for this method to be effective.

Another method that is quite effective and relatively safe, is through the use of para-dichlorobenzene or naphthalene. Both chemicals can be found in moth balls or similar household products. A group of manuscripts can be placed in an airtight container, such as a plastic garbage can with a tight-fitting lid sealed with a broad adhesive tape, with a quantity of mothballs exposed at the bottom. The manuscripts can be placed on bricks or similar to raise them above the level of the chemical. The manuscripts should be left in the container a minimum of ten days, after which they should be removed and carefully examined for live insects. If there is no evidence of insects, the leaves should be gently brushed with a soft brush to remove dust and insect parts.

Cleaning: There are a number of different techniques used for the removal of surface soil from palm leaves, including some solvents that may have a desiccating effect and cause leaching of some of the important leaf constituents (4), I prefer to use water, providing that pre-treatment tests indicate that the writing is incised, and the leaf is not saturated with oil. If the leaf is saturated with old, dried oil, it is very difficult to remove, but I have had some success with soaking the leaf in a non-bleach detergent and warm water. The old oil must be removed if effective repairs are to be carried out, as water-soluble adhesives will not adhere to an oily surface. If the leaf has surface writing, I use ethyl alcohol to clean the surface, taking care that the water content of the solvent does not move the image in any way.

Remedial Treatment: Repair of splits, broken edges, and holes are accomplished by the application of various types of japanese tissue or thin "sa" paper, applied with a water-soluble mixture of a very small amount of soluble polyvinyl acetate and methyl cellulose, conventional starch paste being avoided because of its attraction to insects. The mixture of adhesive is as follows:

- Place one cup (8 ounces or 225 milliliters) of clean water (preferably distilled) in a sealable container.
- Sprinkle into the water one and one half teaspoons (7.5 ml) of methyl cellulose, and stir until fully blended. After approximately one hour, the solution will assume a jelly-like consistency.
- Place one half cup (100 ml) of water into a container, such as a glass or paper cup.
- Mix into it one teaspoon of full strength PVA adhesive and stir vigorously until completely diluted.
- Gradually add the diluted PVA to the methyl cellulose, stirring until fully integrated. It is best to use only about two thirds of the dilute PVA initially, adding the rest if necessary, after which the mixture will be the consistency of thick cream.
- Allow the mixture to stand for one half hour before use. When not in use, seal and refrigerate if possible. Surface molding can be avoided by wrapping a mothball or thymol crystals in cloth and attaching it to the inside of the container lid with adhesive tape.

To repair a tear or break, place a piece of thin tissue, such as Tengujo or fine "sa," that has been torn or water-cut to the required size onto a small square of polyester film, such as mylar. Carefully apply paste to the tissue, and lay the tissue in place onto the damage, rubbing the area down with a bone folder through the film. Gently remove the film, and allow the tissue to dry. It is important to allow one repair to fully dry before proceeding with others in case the adhesive will not properly adhere because of residual oil. If not properly adhered, the PVA component may be increased or the leaf washed again.

If a significant portion of the leaf is missing, a piece of thick "sa" or japanese tissue should be carefully torn or water-cut to match the missing area. A light table is a valuable aid in this process. The repair piece is carefully tipped into place by matching the slightly overlapping edges of the leaf and the repair tissue together. When dry, it is supported on both sides of the "fill" by the thin tissue in the manner described above. Loose leaf fragments are secured in the same fashion.

Oiling: Following repair, the leaves are oiled to impart flexibility. Various oils have been used for this process, and I have used cedar wood oil in the past with some success. However, recent research on camphor, citronella, castor, lemon grass, cedar wood, mustard, neem, eucalyptus, clove, and sesame, indicates that cedar wood oil has a slower absorption rate than some of the other oils (5). Related research on neem (maragosa) at Cornell has demonstrated its insect repellent qualities, thus all future treatment by Cornell will involve neem oil. If oiling alone is done, the oil can be lightly applied by laying the leaf onto a piece of glass or polyester film, and laid onto the leaf with a soft brush. Leaves should be air-dried in a constant flow of air to avoid molding.

Although sometimes lampblack is mixed with the oil and applied to the leaf to help clarify the writing after treatment, my experience has indicated that minute amounts of surface oil and soil, washed from the leaf surface during cleaning, lodge in the incisions and provide ample clarity of the lettering against the clean surface of the leaf. If detergent is used to remove the old oil however, it may be necessary to mix a small amount of fine powdered lampblack with the oil, and apply it with a soft cloth or cotton wool. The dark residue can be cleaned off with ethyl alcohol. Similarly, it is sometimes the practice to color repair pieces (tissue, palm-leaf fragments, wood veneer), but I have found that final oiling alone helps the repairs to blend into the leaf without this added coloring.

After cleaning, repair, and oiling, the manuscript should be lightly polished with a soft dry cloth, restrung with cord, cased, and boxed, together with a small amount of insect repellent.

Parabaik Manuscripts

Another common form of manuscript is the parabaik, a manuscript constructed from crude, but very strong, paper made of bamboo, bark, straw, or leaf fiber, sometimes referred to as "sa." Parabaiks are generally made up of two types: "white" parabaiks, written in black ink on the uncolored surface; "black" parabaiks, written with a limestone or chalk pencil on a black surface (6). The parabaiks are usually made up into accordion-folded books, often lacking covers. The white parabaiks were sometimes richly illustrated in quite sumptuous colors, and are obviously intended to be permanent works. The black parabaiks were not intended to be permanent works, as the writing may be easily erased, and research has found that black parabaiks were sometimes used to produce early drafts of palm leaf manuscripts. I have found parabaiks to be extremely robust and stable, even when stored in the most adverse environment, where the most serious enemies seem to be fungus and insects. Repair is sometimes necessary when insects and/or rodents have eaten the edges of the manuscripts, leaving multiple losses on the folds. These are repaired through the use of Japanese tissue with rice starch paste or the mixture described above.

When work on both palm leaf and parabaik manuscripts has been completed, they should be placed in protective enclosures and boxed with a small amount of insect repellent.

1. O.P. Agrawal, "Palm Leaf and Paper: Illustrated Manuscripts of India and Southeast Asia," (editor John Guy). Victoria, Australia: National Gallery of Victoria, 1982, 85. ([Return to Text](#))
2. O.P. Agrawal, Conservation of Manuscripts and Paintings of Southeast Asia, London: Butterworths, 1984. ([Return to Text](#))
3. Ranbir Kishore, "Preservation and Repair of Palm Leaf Manuscripts," India Archives XIV(January 1961). ([Return to Text](#))
4. D.G. Suryawanshi, M.V. Nair, P.M. Sinha, "Improving the Flexibility of Palm Leaf," Restaurator 13 (Number 1, 1992), 37-46. ([Return to Text](#))
5. D.G. Suryawanshi, P.M. Sinha, O.P. Agrawal, "Basic Studies in the Properties of Palm Leaves," Restaurator 15 (Number 2, 1994), 65-78. ([Return to Text](#))
6. Myat Khine, "The Fine Writings on Ancient Parabaiks," Forward, (October 1986), 22-25. ([Return to Text](#))

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