19

Textile Conservation for Period Room Settings in Museums and Historic Houses

MARGARET FIKIORIS

The Henry Francis du Pont Winterthur Museum, Winterthur, DE 19735

The first section of this chapter is a survey of the variety of problems encountered in a museum that displays textiles in a historic period room setting and the solutions available in the past and now. First to be considered is the problem of light, both direct sunlight and artificial lighting, and the various means of controlling light in the museum rooms and in the conservation laboratories. Other important environmental factors such as temperature and relative humidity are also reviewed. Special consideration is given to the problems of abrasion to rugs and upholstery, acidity of wood and paper supports, and acts of general carelessness, which can cause serious damage to historic textiles. The second section of the chapter surveys the storage of textiles and rugs at Winterthur. The final section discusses cleaning of textiles and rugs in the textile conservation laboratory at the Louise du Pont Crowinshield Research Building at Winterthur.

The Henry Francis du Pont Winterthur Museum is located six miles north of Wilmington, Delaware. It offers visitors an opportunity to see an outstanding collection of American decorative arts displayed in more than 195 room settings spanning the time period from 1640 until 1840. The room displays encompass six style periods—the Seventeenth Century, William and Mary, Queen Anne, Chippendale, Federal, and Empire. Textiles and rugs play an important role in the room displays, covering windows, chairs, sofas, beds, tables, and floors (Figure 1). They provide accent to the walls with framed needlework pictures and samplers and to the tables with embroidered pocketbooks, pin cushions, and hand-held fire screens. It is to their care that textile conservation at Winterthur

0065-2393/81/0193-0253$05.50/0

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

The Henry Francis du Pont Winterthur Museum

Figure 1. View of the Marlboro Room from Patuxent Manor, 1744, Lower Marlboro Maryland, displaying Queen Anne and Chippendale furniture from the middle colonies and the south.

is directed. The first section of this chapter surveys the variety of problems encountered in a museum that displays textiles in a historic period room setting and the possible solutions available in the past and now.

The foremost concern in any display of historic textiles is the problem of light. Historic fabrics are extremely sensitive to light damage. Exposure to light, whether by direct sunlight or by an artificial light source causes dyes to fade and natural fibers to lose their strength. Both forms of deterioration are linked to the effect of UV radiation; however, visible light is also responsible for fading even the most stable of textile dyes. The intensity of the lighting and the length of exposure determine the rate of deterioration. Damage from exposure to light is accelerated if the atmosphere is either damp or overheated or if there is the presence of dust or soot in the environment.

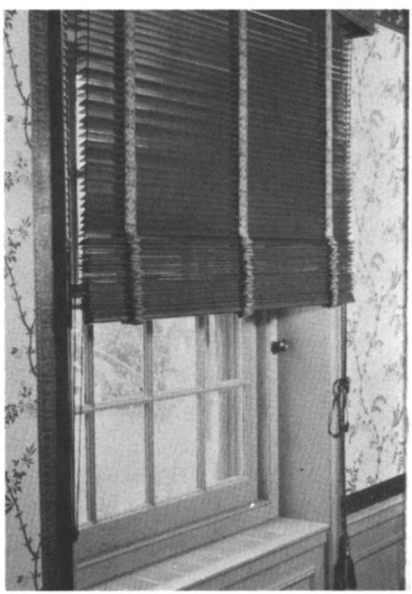
Light damage to collections in historic houses and museums is increasing in the recent decades. With the availability of air conditioning to maintain an artificial climate balance, there is little need to seal off the sunlight entering a room. This phenomenon is coupled with the increase in the number of historic private houses that are being converted into public museums with an emphasis on visibility and easy accessibility.

The owners of the great houses in the eighteenth and nineteenth centuries were well aware of damage caused by sunlight as recorded by

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

Susanna Whatman, Mistress of Turkey Court in Kent, England. After her marriage in 1776, she wrote detailed instructions to her staff, now published in *The Housekeeping Book of Susanna Whatman* (*1*) 1776–1880. She wrote to the housemaid, "The sun comes into the Library very early. The window on that side of the bow must have the blind let down" (*1*). Concerning her own dressing room she warned "The sun must always be kept out, or it will spoil the carpet, chairs, and mahogany cabinet" (*1*). Exterior and interior window shutters and Venetian blinds were used by the eighteenth century householder to seal out the sun, while allowing air circulation. Trade cards from the second half of the eighteenth century advertised stylish examples of painted Venetian blinds available in many colors. Winterthur has a fine example of late eighteenth century narrow-slatted (1¼″) dark green Venetian blinds that were used in the house of John Imlay, a Philadelphia merchant who retired to Allentown, New Jersey, around 1790 (Figure 2). Present day museum administrators need to return to the eighteenth and nineteenth century sensitivity to the problem of light and its certain damage to textiles and rugs, wallpaper, prints, and furniture and close their shutters and lower their blinds. Ironically, the energy crisis and rising utility costs may speed this process.

From 1951 until 1976 when separate morning and afternoon tours were given in the main Museum at Winterthur, opaque window shades were used to darken totally those rooms not on tour. These shades were pulled by cords located at either end of the rod pocket and were concealed from view. The museum maintenance staff had to walk across



The Henry Francis du Pont Winterthur Museum

Figure 2. Example of a ca. 1790 narrow-slatted green Venetian blind used in the house of John Imlay, Allentown, New Jersey

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

rugs and reach behind the curtains to pull the shades, which over the years caused some damage from abrasion to these textiles. The pulling of the shades was discontinued in 1977 with the doubling of the Museum tours so that all rooms were on view from 10:00 A.M. until 3:30 P.M. There is now evidence of accelerated fading in the collection and the shades again need to be pulled for protection against the late afternoon and early morning sun when the rooms are not on tour.

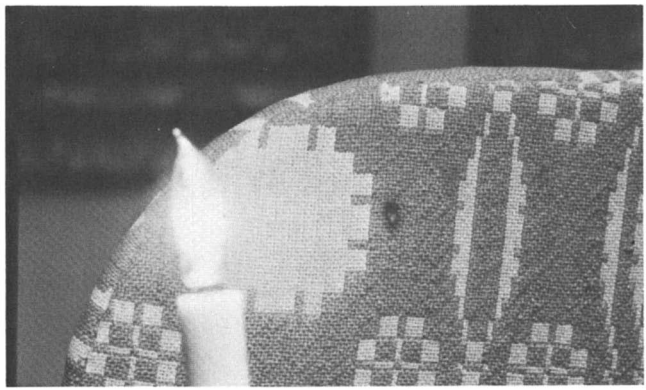
Closing historic window curtains to block the sun is not a viable solution. Curtains hanging at the windows are especially damaged by direct sunlight, as illustrated by this curtain set of an English copperplate print of exotic flowers dating from 1775–1785 that hung for many years in a dormer window of a historic house (Plate I). The intense blue of the print is barely visible and there are numerous losses in the cotton ground. The curtain set had both an interlining of a modern blackout material and a cotton outer lining. However, under such strong sunlight conditions a blackout lining gave only a false sense of security.

Winterthur has tried several other modern window covering techniques to prevent light damage to its collection. In the mid 1960s, ⅛″ Pittsburgh Plate Glass Pennvernon Graylite storm windows were installed on the exterior of each window of the period rooms. This tinted glass causes the windows to appear dark when viewed from a distance with the individual window mullions obscured; however, inside the museum, the visitor is seldom aware of the tinted storm windows because the historic window frames, glass, and mullions are clearly in view. While the Graylite Plate Glass greatly cuts back on light by allowing only a 31% transmittance of visible light, it does not appreciably screen out all harmful UV wavelengths.

Two possible solutions to the UV problem are found in the contemporary Louise du Pont Crowinshield Research Building, constructed in 1969. The Paper Conservation Laboratory and the Maps & Prints Study Collection have interior window inserts of UV absorbing plexiglass that eliminate almost all of the UV radiation from the daylight entering the rooms. Sheets of Rohm & Haas Plexiglas UF-3, available in ⅛″ and ¼″ thicknesses, can be cut to fit inside existing window openings. The Research Building has ⅛″ Plexiglas UF-3 panels mounted into wooden frames, painted to match the existing trim, which are held in place with wing bolts for easy removal for cleaning. These sheets of Plexiglas UF-3, which are lightly tinted, give a slight yellowish color to the window insert.

The interior surfaces of the skylight windows of the Technical Library in the Research Building are covered with 3M Scotchtint Solar Control Film, attached at the top and bottom by rods. This screening material is made of a flexible polyester film of 15/1000″ total thickness and is aluminum vapor coated. The color selected was smoke (grey black) and,

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.



The Henry Francis du Pont Winterthur Museum

Figure 3. Example of a scorch mark resulting from the artificial candle bulb

according to the manufacturer, it reflects 75% of solar heat, 82% of solar glare, and 99% of UV radiation. The 3M Solar Control films generally are applied directly to window glass, but the wire-glass in the skylights at Winterthur prevented this. These reflective solar control films are available in varying metallic colors: smoke, silver, bronze, and gold; and are compatible with the broad glass expanses of modern architecture. However, reflective glass surfaces are not a part of the seventeenth through nineteenth century architectural vocabulary, and such a design factor should be considered in the modification of window glass of a historic building.

The fading of fabrics can be accelerated by artificial lighting within the period rooms. At Winterthur, the individual lighting fixtures are wired to use 7½-watt incandescent candle bulbs with a candelabra base and candle flare. The bulbs lower the light intensity considerably in the rooms and give a more authentic atmosphere to the museum tours. The candle flame bulbs present their own problem, because if placed too close to an object such as a curtain or an upholstered easy chair, the fabric may become badly scorched (Figure 3) from the heat generated. From a random sampling in the collection, it was found that light fixtures with a single candle bulb need to be placed 14″–16″ from museum objects to maintain a light level of five foot candles. A greater distance is required for lighting devices with two or more bulbs.

In textile research and reproduction work, one must be alert to the changes in textiles caused by overexposure to light. The light-sensitive yellow in green leaves in a French "Indienne" block print from the late eighteenth century (Plate 2) has vanished, leaving the originally green leaves blue in color. Also, examples of the same fabric can appear quite different as a result of their surrounding environment and use as seen

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

in the faded and unfaded examples of the copperplate print by Francis Nixon, 1765–1775 (Plate 3). Compare the three examples of a resist-dyed cotton print from Rouen, France dating from the late eighteenth century (Plate 4). The soiled and faded slipcover in the background of the illustration gives a false impression that the eighteenth-century preference was for muted, pastel colors. In reality, the color schemes of that century could be extremely vibrant and even gaudy, especially in the first half of the century. An unexposed seam, when opened, can give a good indication of original color as seen in the example of a blue resist-dyed cotton, "Roosters and Pomegranates," dating from the third quarter of the eighteenth century (Plate 5). Therefore, it is critical to search for original color in unexposed seam and hem areas of bedspreads and curtains, on the reverse of framed textiles and lined rugs, and in tucked away areas such as under the flaps of needlework pocketbooks, in between pleats and gathers of garments, and along the tacking edge of upholstery.

Another important environmental factor for any museum or historic house is that of relative humidity. The entire museum at Winterthur is air conditioned with the temperature maintained at 68°–72° F and the relative humidity at 50% ± 5%. With the need to conserve fuel, the offices and work areas are set at 66° F ± 2° in the winter and 78° F ± 2° in the summer. Should the relative humidity drop below 40%, there is the danger of embrittlement of the textiles; if the relative humidity rises over 70%, there is the danger of mold growth. Textiles, especially those of vegetable fibers, are susceptible to attack by molds that flourish in dark humid places with little or no ventilation. In the early stages of mold growth, there may be a musty smell before any visible sign of deterioration appears. In the late stages of mold damage, staining occurs, which weakens the fibers and badly discolors the historic textile. This discoloration can be of greenish, yellowish, or grey–brown spots that are irregular and speckled in appearance. Wet cleaning alone cannot remove this staining. Bleaching may be the only effective method of removing the staining, but this will further degrade the weakened cellulose and cannot be used on printed or dyed fabrics.

A needlework or textile displayed in a tightly sealed, standard wood molding frame may be damaged by mold growth from within, especially if the textile is in direct contact with the glass where moisture condensation occurs. Framed textiles and needlework pieces should be mounted on an acid-free support with an acid-free mat placed under the rabbet of the frame to keep the textile from touching the glass. This air space serves to protect the framed textile from the possibility of condensation and its possible result in mold growth.

Museums and historic houses without an air-conditioned environment lend themselves to tragic accidents resulting from open windows

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

and doors. Curtains, rugs, and upholstery can be destroyed needlessly by rain water containing atmospheric pollutants. Plate 6 shows a late eighteenth-century floral silk stripe material, used on an upholstered sofa, that was damaged irreversibly by rain water. The tide line of bleeding dyes and soil moving across the fabric left a permanent area of discoloration and degradation of the silk. Open windows and doors with improper screening also can give access to textile pests, which feed on collection objects and may leave excreta on the decorative surfaces.

The official "open door policy" with the goal of increased attendance presents other problems and challenges to public institutions. How can museums and historical societies charged with the preservation of the past balance the growing need for public participation in educational functions and maintain the stability of their collections? How can visitor numbers be increased in a historic house structure with limited space accommodation and often difficult access? Unsupervised crowds increase the possibility of theft, vandalism, and handling of objects.

One method to control museum visitor traffic is to have a physical barrier between the guests and the display. In the Washington Wing at Winterthur, where unreserved tours are offered, there are various barrier systems: ropes, wooden handrails, and drywall dividers, which are placed more than an arm's length from the object. Guests can look into the room or pass along one wall but they cannot enter the display area. With these restraints, groups as large as ten may be accommodated with a guide, and there is no minimum age limit. The guests may carry coats, jackets, handbags, and cameras on the tour; however, photography is not permitted in the collection.

On the reserved tours of the main museum, which lasts two hours, guests actually enter the period rooms escorted by trained guides. With four guests to a group, the guide is responsible for the tour and for the safety of the collection (Figure 4). There is a minimum age limit of twelve. The guests are asked to leave their coats and jackets in the entrance cloak room. Sweaters and jackets must be worn and may not be carried over the arm. All purses, tote bags, and cameras are placed in lockers before entering the period rooms.

In the main museum, the guests are instructed not to touch any museum objects and to walk only on the modern rug runners that cover the historic rugs in the collection. This routing keeps the guests together and away from the many decorative art objects on open display. The runners also protect the carpets underneath. These runners, woven with an uncut loop wool pile, were available until the mid 1970s from Hardwick and Magee Manufacturing Company. They were ordered in a neutral sandbark color without a rosin backing. A binding was applied to the edges to prevent raveling. The present museum runners are 28″

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

The Henry Francis du Pont Winterthur Museum

Figure 4. A Winterthur guide with four guests on a reserved tour of the main museum

wide but they are soon to be changed to 36″ or 40″ wide to accommodate visitors in wheel chairs. Since these runners are no longer available Bigelow–Sanford, Incorporated has offered to provide a museum rug runner if there is sufficient need.

The practice of placing a lesser rug on top of a more valuable rug is quite common in American life. The painting of Henry Sargent "The Dinner Party" (1821–1823) at the Museum of Fine Arts, Boston, shows the use of a green baize rug or crumb cloth placed under the dining room table to protect against spillage. Placing protective scatter rugs over larger rugs was a common practice in the nineteenth century. Thus, the twentieth-century museum rug runner is a continuation of this tradition.

It often has been asked if abrasion occurs on historic rugs with the traffic of guests, guides, and staff walking on top of the runners. The problem of abrasion is reduced greatly but not eliminated. However, without protection, fine pile or embroidered surfaces will be destroyed completely if constantly walked on, as is illustrated by this example of an English needlework carpet with the wool embroidery completely worn

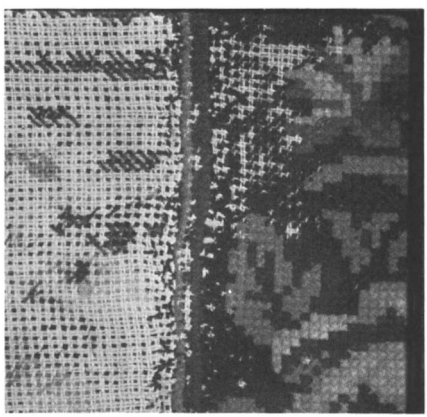
Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

away, exposing the canvas beneath (Figure 5). Traffic patterns over the years result in severe damage down the center of a rug located in an entrance hall or across a rug if there is a window or telephone to be reached (Plate 7). In some instances, the rotation of a rug may slow down this wear. It is better to locate important rugs away from general traffic, although this becomes difficult in a historic house or museum with narrow halls and exhibition areas using room size carpets.

The problem of abrasion does not need to be confined to the floor, as witnessed by the worn areas of nineteenth century wool and cotton American double-cloth coverlets that have been tucked in religiously by well intending housekeepers, or by the threadbare remains of once-elegant upholstered chairs that have received a great deal of wear and abuse over the centuries.

A common practice of the eighteenth century was to place protective cloth covers, "cases," over expensive upholstery to shield them from dirt, light, and wear. These covers were often plain weave linen or cotton woven in a stripe or check as illustrated in the print of the month of "January" by Robert Dighton d. 1784 (Figure 6). These slipcovers were generally loose fitting. However, until recently, twentieth-century collectors and curators made their eighteenth-century-styled slipcovers appear as actual upholstery, fitted tightly to the chair and held under a great deal of tension (Figure 7). Considerable damage occurs to the upholstery underneath as a result of changing of tight clipcovers (Plate 8). Museums are now returning to the looser slipcovers, which will again save both layers of fabric.

Another problem associated with upholstered furniture is the use of iron upholstery tacks, which will rust and thereby cause large holes in the upholstery fabric (Plate 9). Modern upholsters find that the use of the magnetic tacking hammer hastens production and, therefore, continue



The Henry Francis du Pont Winterthur Museum

Figure 5. Detail of loss of the wool embroidered surface of an English needlework carpet through abrasion from traffic

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

The Henry Francis du Pont Winterthur Museum

Figure 6. Print of the month of "January" by Robert Dighton d.1784 showing a loose fitting slipcover

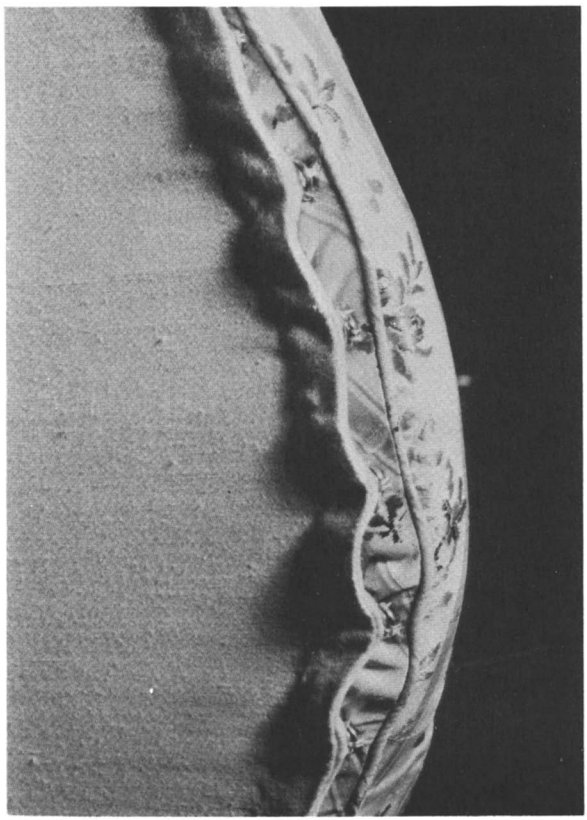
to use upholstery tacks with high iron content. Commonly used are blued and sterilized upholstery tacks that are coated to prevent infection if accidentally swallowed. Often, upholsterers hold the tacks in their mouth while working, which begins the corrosion process. Corrosion of the tacks is accelerated by high humidity and the presence of acids in the wood. Brass, copper, and bronze tacks also present a corrosion problem. The substitution of stainless steel tacks, if available, or anodized aluminum tacks may reduce the problem of tack corrosion in upholstery work. If decorative exterior tacks are required, they should be of anodized aluminum and not electroplated iron. They can be obtained in any color simulating the brass or bronze used originally.

The problem of wood in direct contact with historic fabrics is a pervasive one throughout a historic house museum. Textiles often are displayed or stored against wood with its problem of acidity. In a number

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

of rooms at Winterthur, lengths of linen homespun are displayed folded on wooden shelves in large schranks as seen in an example from the Kershner Parlor (Figure 8).

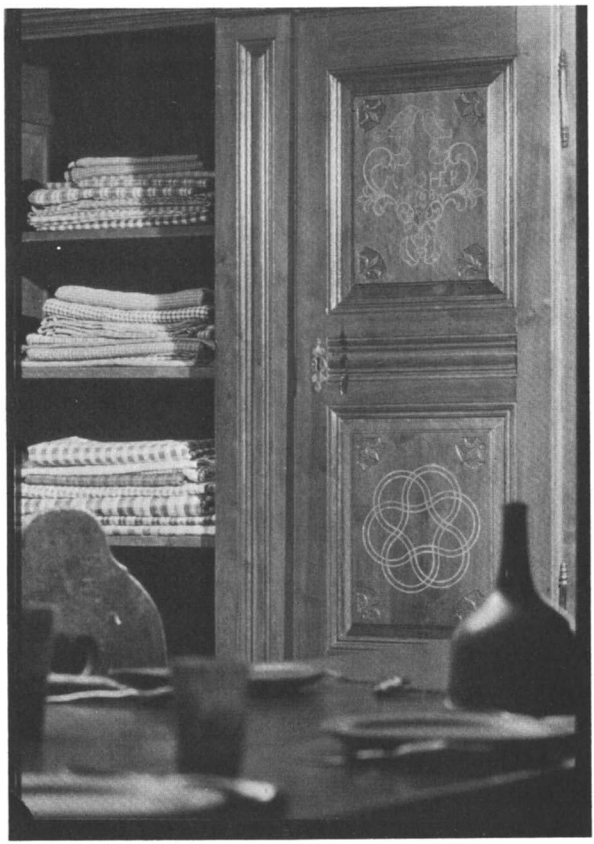
A common occurrence found with historic household linens and clothing is dark areas of discoloration where the cloth has been in direct contact with wood. A good example of a shelf mark and surface dust deposit is shown in Figure 9. This man's linen shirt from the nineteenth century had been neatly folded and stored on a wooden shelf. Here, the dark staining was removed by wet cleaning. However many historic tablecloths, napkins, towels, sheets and pillowcases often have a dark gridwork of fold marks that cannot be remedied by wet cleaning only. Bleaching is difficult because of the degradation of the fibers and the presence of polychrome embroidered monograms or ink signatures.



The Henry Francis du Pont Winterthur Museum

Figure 7. An example of the tension placed on a historic fabric when the slipcover is designed to look like upholstery

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.



The Henry Francis du Pont Winterthur Museum

Figure 8. View of lengths of homespun stored in a large schrank in the Kershner Parlor

For the storing of textiles on new wooden shelving or drawers, a coating of a polyurethane varnish may be applied to seal the wood. Sufficient time, up to a month, should be allowed for the coating to dry. The shelves then can be lined with acid-free, buffered papers purchased from archival paper supply firms. These papers liners can be cut to fit the contour of any object and so need not to be noticeable in a display.

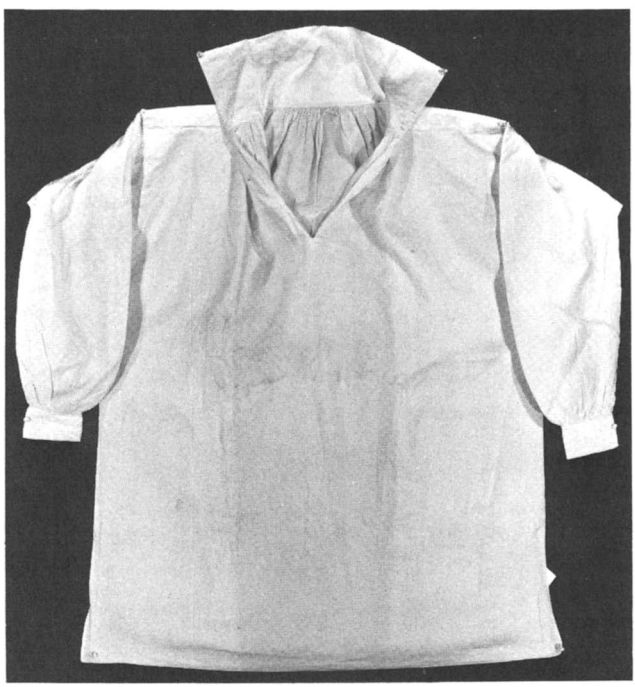
Framed needlework in the eighteenth and nineteenth centuries generally were mounted directly onto wooden stretchers or boards that were often covered with paper or fabric. Over the years, these materials can destroy the textile that they are supporting because of the acidity in the wood and in the paper. A good example of a poor support and its result is the 1738 framed floral silk embroidery shown in Plate 10, where there are great losses in the silk background. External environmental factors (light, heat, and humidity) can accelerate this destruction.

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

At Winterthur, framed needlework pictures and samplers on harmful supports are remounted on acid-free mounts held in place by stitches and not by nails. This mounting procedure for framed historic textiles was devised by Wanda Guthrie in the early 1960s (*2*).

The combination of the acidity of the wooden spool supports and the damage by sunlight can destroy elegantly adorned silk curtain tassels and braid trim of the late eighteenth and nineteenth centuries (Plate 11). These trims are extremely difficult to duplicate in their extravagance, fine workmanship, and attention to detail.

Curators, collectors, and conservators need to be on constant guard against acidic tissue paper that has discolored with age. Textiles stored with highly acid tissue papers also will become discolored with time. There are acid-free and alkaline-buffered tissue papers commercially available through archival paper and supply firms. In the last several years, paper companies have become aware of the needs of historic textiles and costume departments in museums, historical societies, and universities and are placing into production acid-free rolling tubes, tissue paper, and storage boxes for costumes and accessories.



The Henry Francis du Pont Winterthur Museum

Figure 9. Example of surface dust and shelf mark staining on a nineteenth-century man's linen shirt that was folded neatly on a wooden shelf

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

Unsuitable cloth lining materials also can do extensive damage to historic fabrics. It was common in the 1940s and 1950s for Winterthur's curtains to be lined with a plain weave linen. With fluctuation of temperature and humidity, these linen linings moved considerably and caused pockets of sagging of the lining at the bottom of the curtains. Winterthur now uses closely woven cotton linings for curtains and washed unbleached muslin for sampler mounts.

Museums are often the recipients of textile disasters. Unknowing, untrained people can cause great damage to historic textiles when attempting cleaning at home. Many tragic results are brought into Winterthur's Diagnostic Art Conservation Clinic, which is open to the public. Inheritors of nineteenth-century quilts and coverlets think nothing of putting their heirlooms through the "gentle cycle" in a home washing machine and wonder why only shreds remain. Purchasers of nineteenth-century needlework will wash them gently in a bath tub with a cold water detergent and then are surprised to see that the canvas has disintegrated, as in the case of this Berlin wool work parrot from 1850s (Plate 12).

Unanticipated accidents can occur if museum staff members and volunteers use ink near historic textiles, costumes, and rugs. There should be no ink used in the collection, in storage, or in the workrooms. Writing with ink for insurance forms or any legal document should take place away from textile objects. Pencils should be used for all catalog work sheets, condition reports, and conservation treatment records. A supply of pencils should be on hand to give to students and visitors. Other common rules for textile safety in a work space are to have a clean, uncluttered, padded work table, a nearby water supply for conscientious washing of hands, and a policy of no food or smoking in areas with textiles. There also should be large trays, sturdy mat boards, and other smooth, clean, flat supports easily available for transporting textiles from one area to another. Historic textiles need to be supported at all times.

Guides should use clean, white, cotton gloves while giving special subject tours on textiles and should try to avoid all unnecessary touching of objects. Clean cotton gloves should be worn by custodial staff when moving upholstered furniture. However, in dressing a bed or hanging curtains, cotton gloves may become awkward for working with snaps and hooks. Then great attention should be paid to general cleanliness and numerous hand washings. Clean, close-fitting smocks or garments should be worn for work with textiles in the collection. Personal jewelry, whether for male or female, should not be worn when working with historic textiles. There is a great risk of snagging, tearing, and abrasion.

Outside the museum, general carelessness can cause extensive harm to textiles and costumes before they reach the museum. Antique dealers and shop owners often use sticky glue-on labels to list lot number and sale price. Once the labels are removed, the label marks remain. The

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

adhesive darkens the textile underneath and becomes embedded in the fibers. The use of Scotch Tape or any adhesive tape for patching small tears or breaks in a fabric has the same result. Modern framers are continuing to glue needlework and printed textiles to cardboard. Moreover, dealers, collectors, small historical societies, and museums fall into the practice of using plastic drycleaning bags to cover their costume collections. These plastic bags, though a convenience, need to be discarded because of the eventual degradation of the film. Other serious drawbacks are their static electrical property, which attracts and holds dust and the constant problem of condensation and its resulting mold growth if there is great fluctuation of humidity and temperature. At Winterthur, washed muslin or cotton and polyester sheets are used for dust covers in storage and in work areas.

The Storage of Textiles at Winterthur

Winterthur has eight large textile and rug storage rooms to accommodate those objects that are not on view in the period rooms. Many are alternated sets held for seasonal changes. Still others are kept for the study for visiting scholars, graduate students in the Winterthur Program in Early American Culture and the Winterthur/University of Delaware Program in the Conservation of Artistic and Historic Objects, and participants in Special Subject Tours on needlework and textiles. The rooms are described in detail in Reference 3.

The curtains are stored in two storerooms, constructed in 1948 and 1957 (Figure 10). They are stored on curtain racks attached to a sliding carriage with permanent curtain rings. The carriages are raised and lowered by means of ropes and pulleys and are locked in place to boating cleats. The curtain racks may be pulled out into the room to have the curtains changed. When a curtain set is taken off or placed back on the rack, a white mattress pad is spread out on the floor, and the curtain carefully placed onto it. The curtain can be transferred onto a special cart that fits the museum elevator and passes easily over the museum runners.

The outside walls of the curtain storage rooms have been furred out with two-by-fours covered with plywood and painted. This false wall has a 4″ spacing behind to prevent condensation. Box valances are held in place on the walls with L-shaped brackets; flat valances are attached by means of snaps or Velcro tape. There are no windows in the storage rooms and the rooms are kept in total darkness.

Bedspread storage (Figure 11) is a long, low ceilinged room accommodating over 183 spreads. The bedspreads are stored on long, varnished wooden poles suspended from standard aluminum curtain tracks. Bedspread storage was designed in 1962 and completed in 1967. The original

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

The Henry Francis du Pont Winterthur Museum

Figure 10. Overall view of curtain storage

pole length was 9′ 3½″, and each bedspread could be moved fully out into the room. In 1969, to double the storage, the nine-foot poles were cut back to 6′11″ and a second bank of 5′7″ poles were added to the existing tracks. One or the other can be pulled into the center of the room. Now the bedspreads have to be folded to fit the shorter poles, which causes abrasion problems when the spreads are being pulled out or being placed back in again. Ideally, both sets of poles should be long enough to accommodate the full width of the spreads, and there should be adequate space in the center of the room to pull out either bank completely. Most bedspreads range in width from 8′–10′; however, there are some bedspreads in the Winterthur collection that measure over 12′ wide.

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

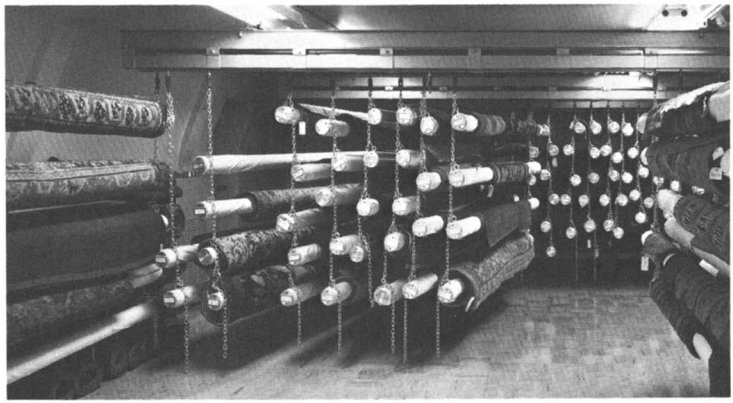
The space between the tracks measures 5″, which is adequate for lighter spreads, but a 6″ spacing is generally better. However, there should be up to an 8″ spacing between the tracks for heavy quilted pieces and large bed rugs. Although the poles are varnished, there should be an additional barrier between the bedspread and the wood. Under consideration are a covering of acid-free paper tube or a sleeve of polyethylene tubing. The polyethylene sleeve may cause the problem of a static build up with the spreads being taken on and off.

General Textile Storage houses rolled textiles in movable storage cabinets. These units were based on a design by Virginia Harvey (*4*). Winterthur's carts measure 6′6½″ outside height, 6′5″ outside width, 24¼″ outside depth. There are twenty-two shelf supports to a cabinet with an average of three poles to a shelf. There are a total of sixty-four poles to a cabinet. Each shelf support has holes drilled every 1½″ to accommodate adjustable pegs. Thus, the poles can be arranged to give an adequate spacing between the rows of rolled textiles suspended on them.

The rolling of textiles takes place elsewhere and is described in Reference 5. As mentioned earlier, the major archival paper suppliers are now producing 10′ acid-free rolling tubes for textiles in 3″-, 4½″-, and 6″-diameter sizes. This eliminates the problem of using regular mailing tubes for a support. Also, the museum slipcover changes are stored in recently available acid-free boxes for textiles, and costumes; these storage boxes measure 40″ × 18″ × 6″.

The Henry Francis du Pont Winterthur Museum

Figure 11. View of bedspread storage



The Henry Francis du Pont Winterthur Museum

Figure 12. View of rug storage

The rugs at Winterthur are stored rolled on heavy gauge aluminum tubes protected by muslin sleeves (Figure 12). The tubes are 4¼″ in diameter and vary in length from 5′ to 16′7″. They are suspended from industrial, cadmium-plated, welded steel chains attached to steel trolleys and tracks used in factory assembly line production. The combined weight of the rugs, tubes, chains, and tracks is carried by the steel beams of the roof rafters. Each rug is placed on alternate sides of the chain with an 8″ to 12″ spacing between each tube. The rugs are generally rolled pile side in and in the direction of the pile. Most embroidered rugs are rolled with the embroidered surface out. This also applies to most of the lined rugs so that any buckling will occur in the lining. However, the best rule for rolling rugs and textiles is to consider each one individually.

The Cleaning of Textiles and Rugs

The cleaning and mounting of textile objects takes place in two large rooms on the fourth floor of the Louise du Pont Crowinshield Research Building constructed in 1969. The Sewing Room is a large L-shaped room and houses four large padded work tables constructed on wheels to be arranged easily for different projects. The overall dimensions of the tables are 10′ × 6′ and 12′ × 6′ and the height of each is 31″. The table dimensions were determined by the sizes of Winterthur's window curtains and bedspreads. The table tops are covered with cotton mattress pads and cotton sheets, which can be easily removed and laundered.

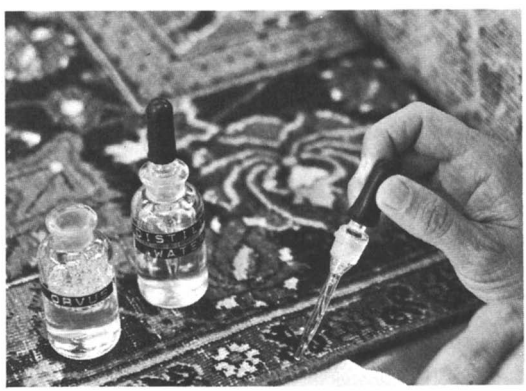
Before wet cleaning a textile or rug, a condition report is filled out for each object and record photographs are taken. The textile is meas-

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

ured, the fiber content identified, and the construction of the weave recorded. The nature of the support is documented. This heading covers various categories ranging from historic wooden frames for needlework samplers to historic or modern lining materials with support hardware such as rings, hooks, rods, and Velcro. The condition of the external edge is described with a general contour sketch added when amplification is needed. The interior condition is discussed with a description of missing areas, tears, and areas of abrasion with loss or warp and/or weft. The next heading is that of surface disfigurement where fading, soiling, stains, marks, and accretions are noted. Then all previous repairs are described and located. Because textiles present such varied problems, general headings are used on the condition form rather than a detailed line by line check list, which may not always be applicable.

The textile or rug is then vacuumed carefully through a flexible fiberglass screen with an upholstery brush attachment to a vacuum that has adjustable suction. The edges of the screen are bound with cotton twill tape to prevent snagging. Vacuuming a textile or rug in this manner protects the piece from direct suction and possible abrasion. Also, the vacuuming should follow the predominate element of the weave. Two people should work together if the object is especially fragile. One can hold and adjust the screen while the other vacuums. The textile or rug should be vacuumed on both sides beginning with the side with the largest amount of loose surface dirt.

After vacuuming, the dyes are tested first with distilled water and a detergent solution; in this instance, with a 1%–2% solution of Orvus, a neutral synthetic anionic detergent. Each color is tested with an eye dropper and blotting paper (Figure 13). The blotting paper is placed



The Henry Francis du Pont Winterthur Museum

Figure 13. Testing of the dyes with distilled water and a detergent solution

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

underneath and on top of each test area and then gently pressed to see if any dye appears on the test paper. Repair areas are also checked carefully for dye bleeding.

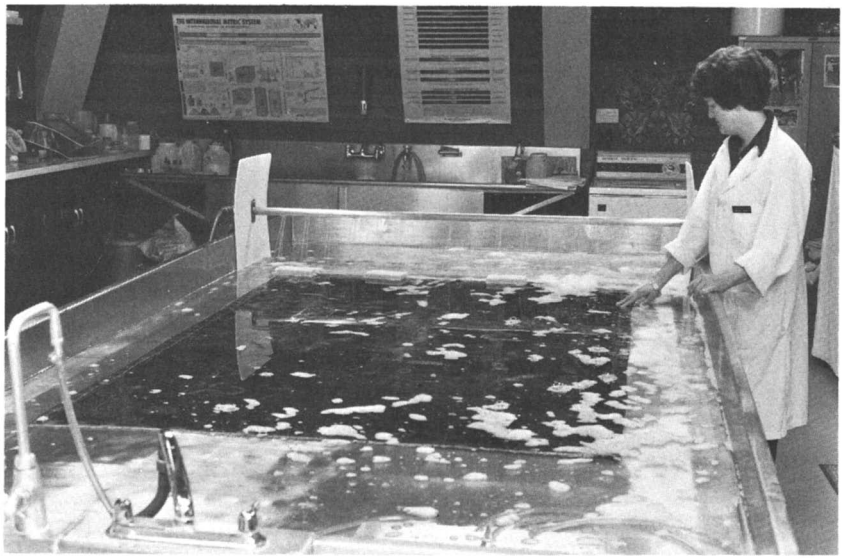
If the dyes prove to be fast, the textile or rug may be wet cleaned. The cleaning process takes place in a large adjacent room that is connected by double doors. The object to be cleaned is placed in a large stainless steel wash table that measures 13′ long by 6′ wide and 6″ deep. The length of the wash table was determined by the average curtain panel at Winterthur. The width was designed so that two people can reach to the center for sponging and blotting. If the textile or rug is in strong condition, it may be placed directly in the sink for wet cleaning. However, fragile textiles are sandwiched between polypropylene screening with additional protective fine nets used when needed.

The first step in the wet cleaning process is the clear rinse to remove loose surface soil. Rinsing is accomplished by moving a hose attached to a perforated 1″ stainless steel pipe across the width of the wash table. The pipe is mounted on two 17½″ × 17½″ × ¼″ Teflon square supports that hold the pipe 8″ above the textile being rinsed. The pipe can be moved easily up and down the length of the sink. The rinse water with the loose soil is drained quickly from the table as clean water comes in through the hose. There are three sunken drains at the end of the table located in a 3″ deep trough, which is 12″ wide. These drains empty into a large drain box located below the sink, which then empties into a floor drain. The drain trough has an ⅛″ mesh stainless steel screen cover to protect the textile or rug in the sink from the suction of the draining water.

After the first clear rinse is finished and much of the loose surface soil removed, the sink is filled, and the detergent is added. Generally 2–4 fluid ounces of Orvus detergent is added to 75–100 gallons of water with a water temperature determined by the nature of the fibers. The detergent solution is sponged carefully into the rug or textile (Figure 14). The length and number of the detergent baths is determined by the amount of the soil to be removed. Rinsing is a long process, employing a combination of long soaking baths and shorter hose rinses. Rinsing varies in time according to the object and generally takes several hours.

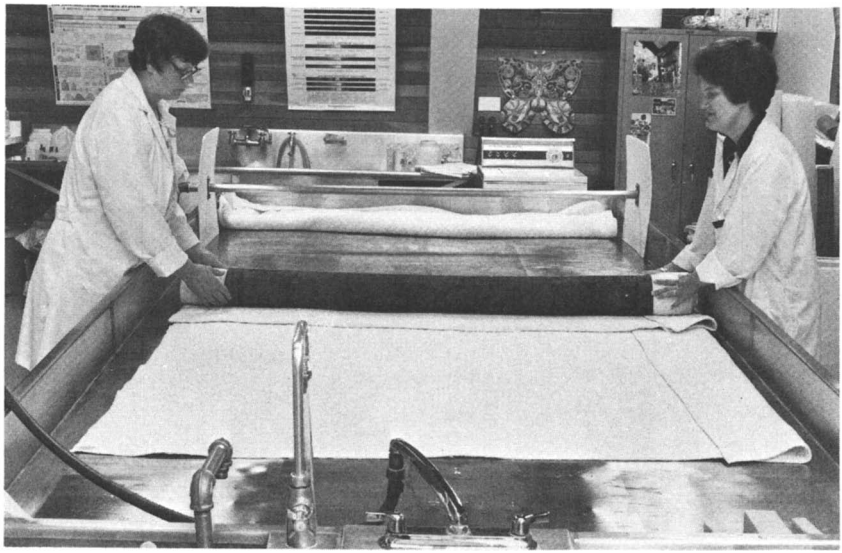
After the final rinse, the table is tilted to be drained, and the textile or rug is blotted with cotton mattress pads to remove excess moisture. The pads are placed underneath of and on top of the textile object. If the object is in a strong condition, it often is rolled between pads to further extract the water (Figure 15). After blotting with mattress pads, the textile or rug is placed on a stretched polypropylene screen in a large drying cabinet on a specially constructed cart that houses four 4′ × 9′ expanded metal shelves (Figure 16). If the textile or rug is too large for the shelf units, the piece can be draped over four 10′ metal poles

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.



The Henry Francis du Pont Winterthur Museum

Figure 14. The detergent bath



The Henry Francis du Pont Winterthur Museum

Figure 15. Blotting between cotton mattress pads

Williams; Preservation of Paper and Textiles of Historic and Artistic Value II
Advances in Chemistry; American Chemical Society: Washington, DC, 1981.

The Henry Francis du Pont Winterthur Museum

Figure 16. The drying cabinet

covered with muslin sleeves, suspended across the top of the cart. The air inside the cabinet is heated by steam generator and is circulated across the surface of the textile. The cabinet is heated to 90°–110° F depending on the fiber content of the textile object. Unheated air can be circulated when possible shrinkage may occur. There is an auxiliary thermostatic, bell-type alarm system separate from the temperature control unit. It will sound an alarm should the drying cabinet exceed 130° F. After the textiles and rugs are cleaned, they are reassembled and returned to exhibition or storage.

One final aspect of Winterthur's textile conservation program is the construction of new reproduction sets, which present to the public an authentic view of eighteenth- and nineteenth-century designs for windows and bed treatments that demand an abundance of yardage. With the use of reproductions, Winterthur's historic fabric collection can be preserved for study and for the future.

Literature Cited

1. "The Housekeeping of Susanna Whatman"; Balston, Thomas, Ed.; Geoffrey Bles: London, 1956; pp. 19, 22.
2. Fikioris, M. A. *Museum News* **1976,** *55*(2), 8–9.
3. Fikioris, M. A. *Museum News* **1973,** *52*(3), 34–41.
4. Harvey, V. *Museum News* **1963,** *42*(3), 28–33.
5. Fikioris, M. A. *Museum News* **1976,** *55*(1), 13–18.

RECEIVED March 31, 1980.