POSTPRINTS

OF THE

WOODEN ARTIFACTS GROUP

Presented at the 31st Annual Meeting
of the
American Institute for Conservation
Arlington, Virginia

Published by the Wooden Artifacts Group,
American Institute for Conservation.

JUNE 2003

Contents

Figure 1. Circa 1760 Dutch-style gumwood kast after restoration.

Preserving Change in the Restoration of an 18th Century New York Kast

Timothy Brennan, Furnituremaker

Kasten are the large, ornate storage cabinets that were used in homes in the Netherlands to hold linens and other valuables and to display ceramic, silver and glass objects on their tops. They were integral to the clean and well-ordered homes the Dutch were famous for in the 17th and 18th centuries.

The kast was equally important in the Dutch settlements in the New World. They were found in Dutch, English and French homes in what is now New York City, Long Island, New Jersey, western Connecticut and the Hudson River Valley. The 17th century Dutch settlers brought their domestic habits, aesthetic preferences and woodworking methods with them to America. The first kasten known to be made in the New York area were built during the second half of the 17th century of riven oak, employing frame and panel construction. Oak was the traditional substrate for the structure of old country kasten. Urban versions were often veneered with exotic hardwoods, trimmed with ebony moldings, and elaborately carved. American interpretations were understandably limited by the needs of less wealthy people in a much rougher environment and were simpler in both form and construction. Their designs reflected rural and urban Dutch forms. Their innovations were prompted by the availability of new materials and possibly the influence of other traditions.

The builders of 18th-century American kasten employed wide board, dovetailed case construction. They preferred woods from America's deciduous forests such as red gum, walnut, poplar, and cherry, but also occasionally built with imported mahogany. The wood most commonly used, though, was red gum, a fairly dense hardwood with a tight, interlocked grain and a reddish color, which planes and turns nicely but has a tendency to twist, especially in wide, flat-sawn boards. It is native to the mid-Atlantic and southern states, but was shipped and used as far north as Albany during the colonial period.

Although the English took political control of New York in 1664, Dutch-based communities remained established throughout the region for another century and a half. I have heard from more than one source that in the Hudson Valley there were small towns whose main language was Dutch into the 19th century. The basic kast form that had developed by the early 18th century continued to be produced with only minor design changes for over a hundred years.

The kast that I am going to discuss was brought to me because its cornice had been cut down and needed restoration. It was most likely built in the Kings County section of Long Island, now Brooklyn, and incorporates many elements characteristic of that school of kast making. It was built in two sections. The lower one was a dovetailed base unit, with a large side-hung drawer made to look like two drawers. It is supported by large, turned bun feet in front and straight board feet in the rear. Turned, half bun feet have been added to the rear feet, probably at a later date.

The upper cupboard was built of wide boards rabbeted and nailed together enclosing one narrow and two wide shelves and an inner shallow drawer. The façade is made up of three wide vertical stiles, with applied mahogany insets and molded glyphs. It encloses two frame and panel doors with triple fielded raised panels.

Figure 2. Side of the base section showing the two part dovetailing process. The sides must be joined to the backboard before the front boards can be fit to the sides.

The cornice is nailed to the upper case sides and capped with pine boards to make a flat top surface.

A common characteristic of Kings County work, which is evident on this piece, is an unusual method of dovetailing the lower case parts. The face grain tails and end grain pins show on both the front corners of the façade and the back corners of the sides. This joining requires that the sides be fitted to the backboard before the front can be fitted to the sides. (fig. 2)

The method seems to be unique to work done by certain shops in Kings County, as Peter Kenny noted in the catalogue to the Metropolitan Museum of Art's show of American kasten.

Upon examining this piece, I noticed that it had been significantly modified at least twice before it got to my shop. The cornice had been cut down by about 1/3, eliminating the smaller elements. (fig. 3) This seriously reduced the strong diagonal movement typical of both the Dutch and American Baroque kasten. The top had been carefully finished with ½″ thick pine boards laid front to back, their perimeter edges beveled and their joints covered with ¼″ battens, all of which had been stained. The work looked old, possibly 19th century.

The cupboard doors had been through two changes. Originally mounted on hidden pivot hinges and set behind the face frame stiles in the Dutch manner, they had been removed, cut down in width and rehung flush to the face frame, using butt hinges. This is a method more in keeping with English style furniture. A common cause of hinge failure on these pieces is the wedging action that takes place when a door is opened too far and contacts the face frame stile. Evidence of broken wood in front of the original pivot hinges indicates that the doors did suffer from this problem. Perhaps whoever repaired this damage wasn't familiar with the pivot hinging and felt that it would be easier to cut the doors down and re-hinge with butt hinges. A later worker restored the missing wood and replaced the doors into their original positions.

The other noticeable change was the addition of the turned half-round feet that had been applied to the plain board back feet. Turned feet in front and straight board feet in the rear supported most kasten of this design, although some were built with the more expensive option of four turned feet. It is not uncommon to find old world examples with six turned feet. The back feet on this kast were inconsistent in both design and technique with the front ones, and it would be hard to attribute them to the same hand and period. They were probably added later to increase the desirability of the kast. (fig. 4)

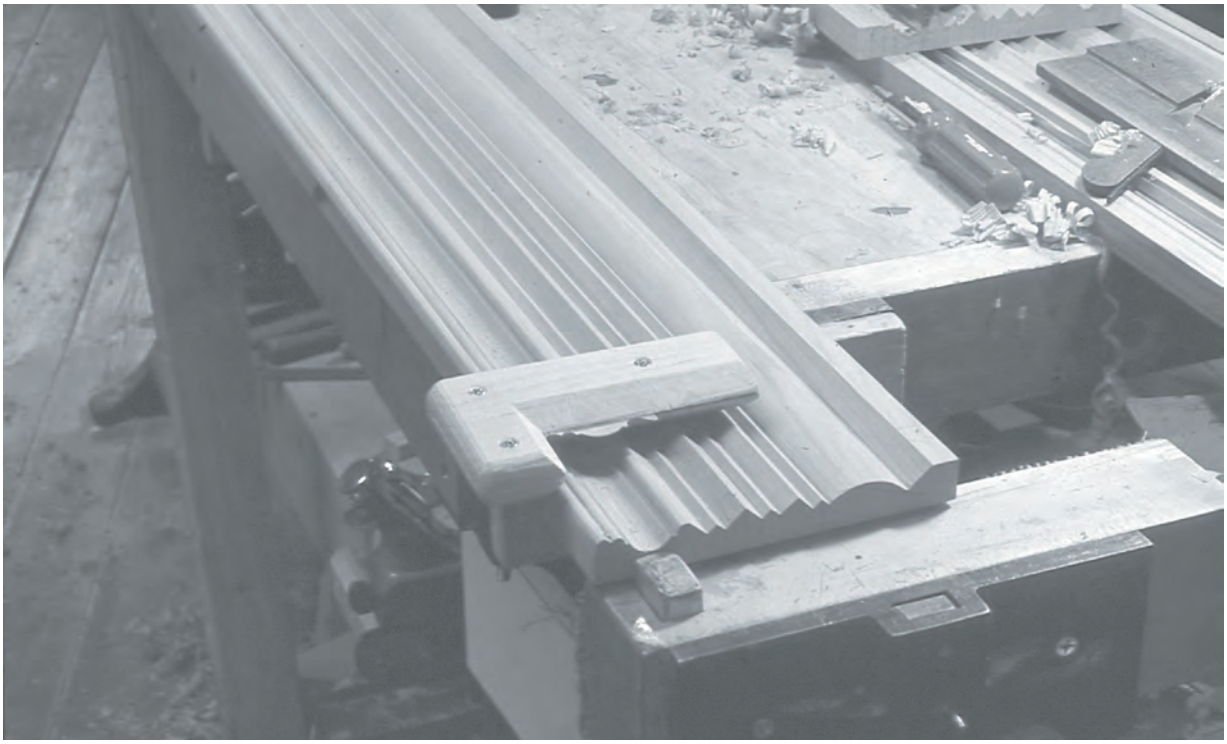
Figure 3. A sample of the proposed restoration was made to show the missing elements.

Figure 4. The turned half feet were added to the original straight back feet at a later date.

Over the years, the large cornices of many American kasten were cut down. Perhaps, when no longer considered fashionable or when being passed from one owner to another, a kast would be removed from a large to a small room, which had lower ceilings; or would have to be carried through doorways that were too narrow to pass through with the cornice intact. Cornices were often cut down or removed altogether and the kast relocated where it could continue to function storing linens or clothing. Many also had their interior shelves removed and were then fitted out for hanging clothes.

Another motive for cutting the cornice could be an attempt to modify the overall look of the form. Changing hardware, finishes and sometimes veneer to update a piece of furniture were not unusual practices in the eighteenth and nineteenth centuries. A nineteenth-century owner might have felt that by decreasing the weight of some of the Dutch Baroque details, he or she could make the kast more harmonious with current tastes. Conversely, the subsequent restoration of the doors and the addition of bun feet to the rear seem to indicate that at a later point, there was a revived appreciation of the object's original nature.

If the cornice reduction and the re-hinging of the doors *did* indicate a stylistic change to this object, I wondered if perhaps there were other kasten that had been modified for this reason during the same period. I discussed that possibility with a curator and some historians. They weren't aware of any evidence to support the notion of a widespread urge to modify these Dutch forms at a particular



Figures 5 & 6. The shaping of cornice elements underway.

period. Most felt that the cornices had been cut down for functional reasons but that one couldn't rule out a style-motivated change in this case.

The owner and I decided to save the existing modification to the top of the kast because it was carefully considered and well crafted. We would allow access to that work by making the cornice restoration removable. The new section would be built as a single unit that could be lifted on or off.

I took measurements and tracings for the profile's missing elements from the cornice of a Kings County kast at the Van Alen House in Kinderhook, NY, which is owned by the Columbia County Historical Society. This kast was chosen because it was a fairly typical example of one from this school, and because it was accessible and had lower elements in the cornice which were similar in design and scale to those existing shapes on my client's kast.

Cutting the cornice's profile proceeded in a typical manner. From the drawn design, a template was made and the cornice profile traced onto both ends of each hand-planed board, which would make up the front and two sides of the cornice. Parallel lines were projected from the high and low points of each element and drawn along the faces to guide both the wasting cuts on the table saw and the planing cuts that would develop the profile. It is possible that some kast cornices were cut with one or two large molding planes, but most of the ones that I have examined appear to have been worked with hollow and round planes for the large curved elements and individual molders or straight rabbet planes for the smaller shapes. The existing lower cyma and ovolo shapes of this cornice appear to have been cut using hollows and rounds since they show faceted markings along their length. I used hollow and round planes, straight rabbet planes and a shop-cut scratch bead scraper to cut the new section.

The profile was checked with the template at various stages in the process to maintain control of its emerging shape. It is notable that the square fillets on these cornices often end in obtuse angles at their points, which appear to be the original intent, though are certainly somewhat affected by shrinkage of the width of the board over time. (figs. 5 & 6. The images show the cutting of a larger cornice from a different restoration, but they illustrate the same procedure and results.)

Once the cornice was brought to final shape, I made a few cleaning passes with the planes and the scratch stock, to match as closely as possible the rhythm of starts and stops in the planing of the old profiles below. Some light sanding was done with 220-grit sandpaper to soften corners and simulate wear and some areas were burnished with a soft wooden block to emphasize that effect.

The angle at which the cornice projects from the sides of the cupboard was measured, and the front miter angles were laid out on a piece of plywood. Blocks of wood cut to the angle of projection were screwed down to an outline of the top view of the kast on the plywood. The molding pieces were clamped to these blocks and held in place while the miters were cut and adjusted to fit. Once the miters were fitted, glued and nailed, the three sides of the cornice were propped into their position on top of the existing cornice and the dimensions and the angles for the pine backboard were measured.

The backboard was cut to size and notched along the bottom to accommodate the existing battens, which pass through it. Next, the backboard was fastened to the molding returns with glue blocks and brads. Interior bracing boards were attached to the front board with glue blocks and to the backboard with rose head nails. (fig. 7)

To finish off the top, I fitted ½″ thick pine boards, laid front to back at the ends. These simulate the boards that would have originally filled the gap between the cupboard sides and the top of the molding before the sides were cut down. The space between these boards was then filled in with pieces running parallel to the front and back. These were tacked into place and finally nailed down with rose head nails. (fig. 8)

When the cornice unit was assembled, it was set into its position on top of the existing cornice and

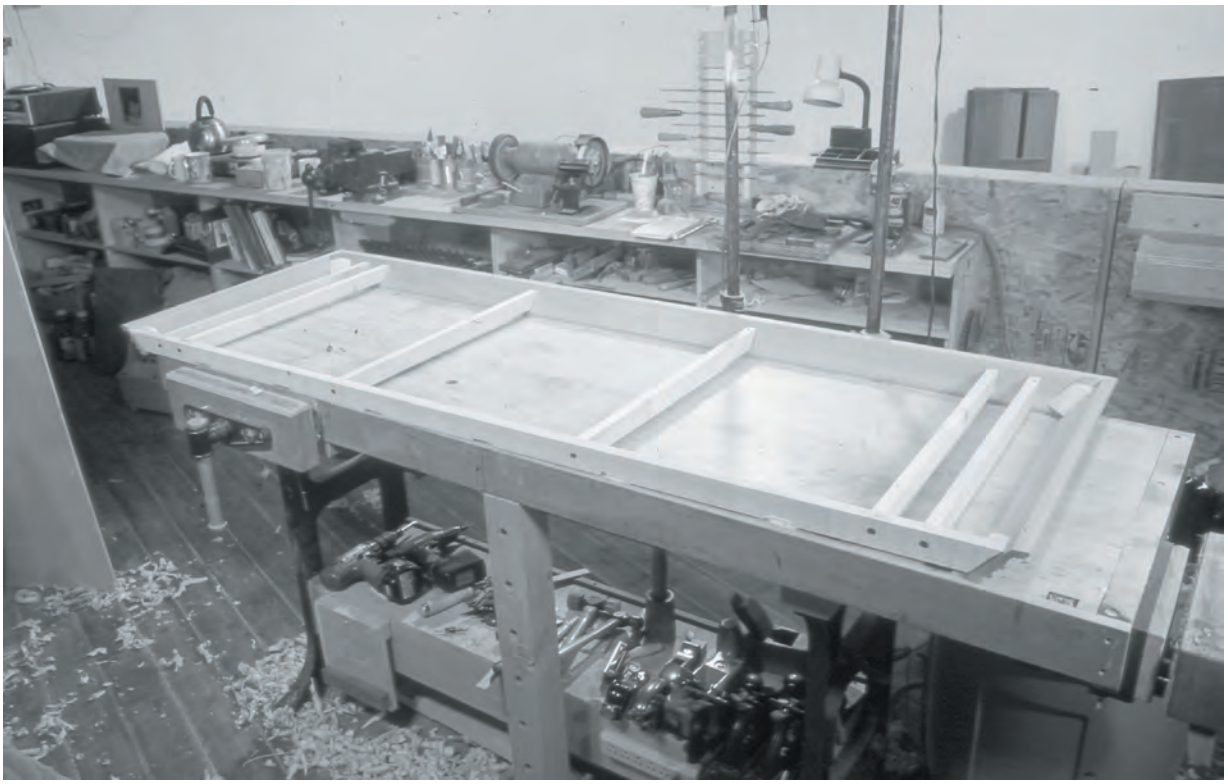


Figure 7

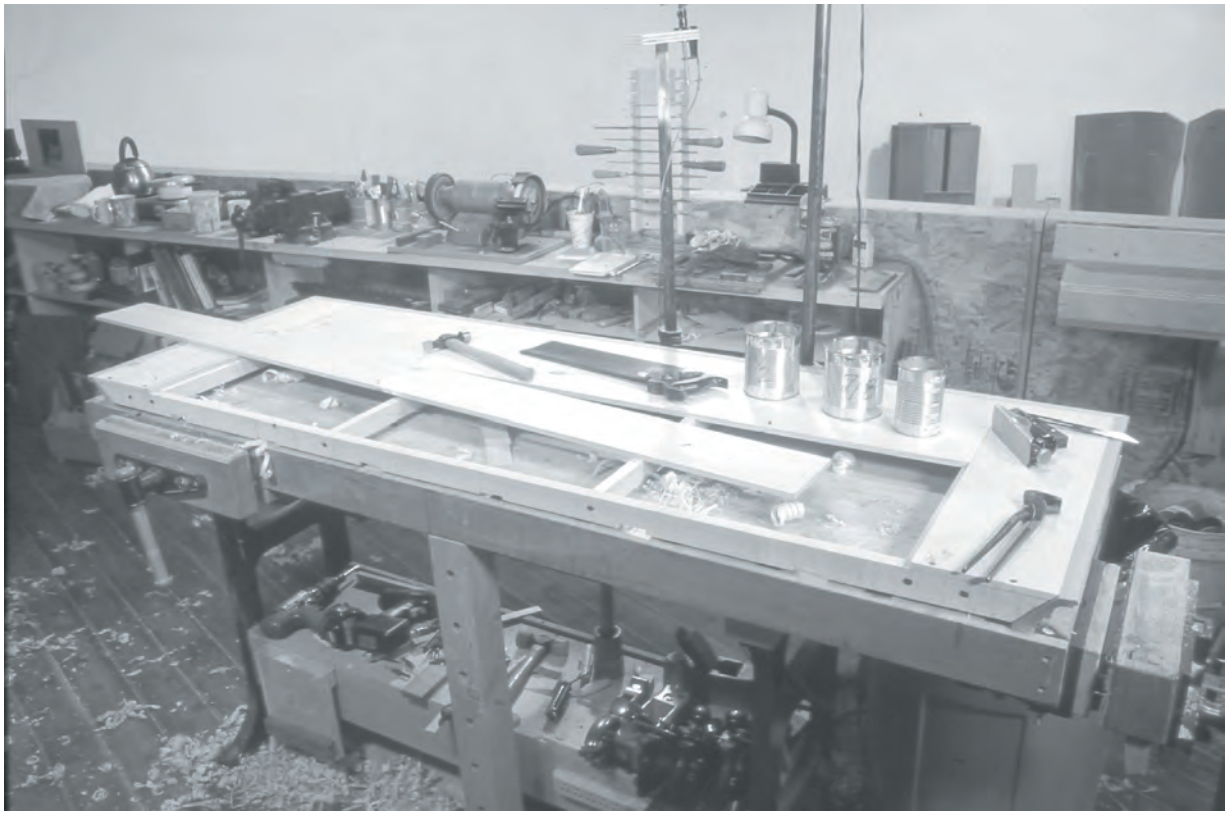


Figure 8. Fitting the top boards to the removable cornice extension.

Figure 9

the extra wood left on the bottom was scribed and planed off to bring the new wood tight to the old. The slight gap between the top and bottom sections all but disappeared due to its location under the fillet. (fig. 9)

The entire new section was given a wash coat of dewaxed orange shellac before being stained with a few coats of walnut crystals water stain. Each stain coat was sandwiched between thin applications of shellac to build towards a good color match. Once I had arrived at the right color, I brushed and wiped on additional coats of shellac until the surface matched the old in density. The sheen was later adjusted by rubbing with 4/0 steel wool and pumice. (fig. 10)

The top and the secondary wood on the new assembly were also stained, and all surfaces were sealed to provide as much stability against moisture-induced movement as possible.

The method used to provide access to the old treatment of the top did not affect the restoration budget significantly. I have used variations of this process on other cornices where the new work was glued into place.

The kast now represents, to a reasonable degree, the original aesthetic and functional designs of its builder. Whether the changes to this kast were motivated by stylistic or by functional concerns is uncertain. However, the accumulation of evidence of the changes to this far from pristine object gives clues to its use and its fluctuating value during more than two hundred years of existence.

About the Author

Timothy Brennan is a furniture maker and restorer working in the New York Hudson River Valley. He studied drawing, painting and filmmaking at the University of Rhode Island and the San Francisco Art Institute and in studios and museums in the US and Europe and has been designing, building and restoring furniture for the past fifteen years.

Figure 10. The cornice with the removable restoration completed.

Timothy Brennan, Furnituremaker
4 North Oakwood Terrace
New Paltz, NY 12561
845.255.3125
914.388.7341 daytime

A low tech method for insect eradication using Ageless™

Jon Brandon and Gordon Hanlon

Introduction

This paper will review the use of low oxygen or anoxia treatments using the oxygen scavenger Ageless™ to eradicate insect infestations in organic objects such as furniture, wooden sculpture and panel paintings. Insect damage to wooden objects is caused by several wood boring species which lay their eggs on unfinished areas of wooden objects. During the life cycle of the insect, the larval stage bores into the wood, forming tunnels or channels and the adults emerge through the characteristic round flight holes. This excavation of the wood undermines the structural stability of the wood and ultimately the object. The wood-boring insects which commonly attack wood objects in North America and Europe include: common furniture beetle (*Anobium punctatum*); death watch beetle (*Xestobium rufovillosum*); powder post beetles (*Lyctus* spp.); house longhorn beetle (*Hylotrupes bajulus*) and termites (*Cryptermes* spp.)

Traditionally insect infestations in objects have been treated with a wide range of toxic gases and chemicals to eradicate the infestation. Materials which have been recommended and used in the past include toxic gases such as Vikane, ethylene oxide and methyl bromide, all of which are still in use, and applied chemicals such as chloro-naphthalene, mercuric chloride, Xylamon CombiClear (Bayer) and arsenic salts (1-3). All of these materials are highly toxic and increased environmental and health concerns (4-7) over the use of these toxic fumigants has resulted in the restriction or banning of many of these traditional treatments. There is also concern that the use of these materials can cause chemical change and damage to artifacts such as discoloration of surfaces and corrosion of metal components (8). The residual effects of these chemicals may well still have health implications and there is some doubt as to the effectiveness of some of these chemical treatments (9). The use of toxic gases also requires the transportation of objects to pest eradication facilities which increases the risk of physical damage to objects and the cost of transportation and art handling must be added to the fumigation expense.

Theory of modified atmospheres

These concerns have encouraged research into viable non-toxic alternative systems for pest eradication in objects which will kill all life stages of the insects which infest wooden objects. The idea to use low oxygen atmospheres to control and eliminate pest infestations was based on research from the agricultural stored products industry, which has used modified atmospheres to control insect pests in stored grains and food for several years (10). However their aim was control (90-95% mortality rate) rather than total eradication and the insect species studied were not directly relevant for art object collections. Inspired by this work, several different studies were performed during the late 1980s and early 1990s which determined the oxygen concentration and duration needed to kill all life stages of the insects studied (11-15). A very comprehensive study of ten insect pests commonly found in museums was sponsored by the Getty Conservation Institute (GCI) and was performed by Rust et al. at the University of California, Riverside. This study determined the mortality rates of all life stages of the insects studied at 55% RH and 25.5° C in a nitrogen atmosphere having less than 0.1% oxygen (14). The time required for 100% kill varied from three hours for the adult firebrat to 192 hours for the eggs of the cigarette beetle. This study only included one wood borer, the western drywood termite (*Incisitermes minor*). Other studies have examined the mortality of some of the major wood boring insects such as furniture beetle (*Anobium punctatum*), powderpost beetles (*Lyctid brunneum*), and the house longhorn beetle (*Hylotrupes bajulus*) at

0.1% oxygen (16). This research showed that the wood boring insects are the most resistant to low oxygen atmospheres and required longer times of exposure to low oxygen concentrations to achieve 100% mortality. Further studies looked at the effect of temperature and relative humidity on the mortality rate. No significant impact was made by varying the RH but temperature has a significant effect. Temperatures below 20° C drastically reduced the mortality rate. (16)

Encapsulation and plastic films

The basic requirements for low oxygen fumigation are to encapsulate the object to be treated and to reduce the oxygen concentration within this enclosure to 0.1% or less. The simplest method of encapsulating an object for low oxygen atmosphere fumigation is to use plastic film which is heat sealed to form a bag or pouch to enclose the object to be treated. However, the oxygen permeability of different plastic films varies considerably and it is critical to select a plastic film which has the lowest possible oxygen permeability. (17) This is important as it will make it easier to maintain the low oxygen concentration within the bag for the duration of the treatment. There are several composite plastic films available which have low oxygen permeabilities or transmission rates and are suitable for this application. In addition to having a low oxygen permeability, the films must also have a polyethylene inner layer which will allow it to be heat sealed together to form a bag. Films which we have used include Marvelseal 360, which has an aluminium coating and has an oxygen transmission of 0.01 cc/m^2/day, and Filmpak 1193, which is transparent and has a transmission rate of 0.1 cc/m^2/day.

Reduction of oxygen level

After the object is encapsulated in its bag, it is necessary to reduce the oxygen concentration to less than 0.1%. Air is composed of approximately 20.9% oxygen with the remaining volume being made up of nitrogen and other gases. The procedure for producing and maintaining the low oxygen atmosphere within the bag is to either continuously purge the bag with an inert gas or to use an oxygen scavenger. The first method uses nitrogen or argon gas to flush out the oxygen contained within the encapsulating bag (18-21). The oxygen concentration is thus reduced by half with each exchange of the bag's volume. By this method eight volume exchanges will reduce the oxygen concentration to below 0.1%. However, a fair amount of equipment is required for this method, such as gas tanks, regulator valve and a humidification system

Figure 1. Loose packets of Ageless™ and oxygen indicator tablets.

(as the nitrogen gas contains no water). In addition, considerable time is required to monitor the bag during the flushing process and to maintain a slow flow of nitrogen to keep the oxygen concentration below 0.1%.

The second method uses the same encapsulating bag system but uses an oxygen scavenger (Ageless™) to reduce the oxygen concentration. Ageless™ (22-26) is manufactured by the Mitsubishi Gas Corporation and is made to be packed with certain foods to prevent them from oxidizing. Ageless™ is described by Mitsubishi as a mixture of finely divided iron and potassium chloride and is marketed in several different compositions which are used for a range of applications. Ageless-Z or ZPT™, which is formulated to react rapidly and thoroughly with oxygen at a relative humidity of 50% can be used with art objects (23). The active ingredients are contained inside small flat paper packets and are designated as Z-100, Z-1000, etc., to indicate the milliliters of oxygen which a single packet can scavenge. In most situations we have used Ageless™ Z-2000, which will scavenge two liters of oxygen, as this minimizes the number of packets which need to be placed inside the bag. Initially, the finely divided iron in the sachet is in its elemental state and as it is exposed to oxygen it oxidizes with the formation of iron oxides. As this reaction of Ageless™ with oxygen is exothermic, the Ageless™ packets can become fairly hot. It is therefore important that when the packets are placed in the encapsulating bag they are not placed on the surface of the object being treated.

Initially it was thought that using Ageless™ would only be applicable for small volume bags. However treatments were performed on two large objects: a contemporary wooden sculpture and an upright piano which required bags whose volume were 1,700 liters and 2,300 liters respectively. The oxygen concentration of both of these treatments was monitored with a Teledyne oxygen monitor and showed that the oxygen concentration took approximately three days to fall down to 0.1%. This time is accounted for by the rate of absorption of the oxygen by the Ageless™ packets but also that it takes approximately 2–3 days for all of the oxygen contained within the wood to diffuse out and be scavenged.

Detailed description of how treatment is performed

The two components necessary for a successful anoxia treatment are Ageless™ packets and a barrier film. The packets of Ageless™ come sealed in an airtight wrapper that should not be opened until you are ready to begin the treatment. Once the packets are exposed to air (fig.1) they will begin to absorb oxygen. You will notice the two small tablets at the lower left side of the pile of Ageless™ in figure 1. These are the oxygen indicators and they come with the sealed envelopes of Ageless™ packets. These tablets are to be placed inside the barrier film with the object and theoretically as the oxygen level falls below 0.1% they will turn pink in color, or if the oxygen level rises the tablets turn blue. In our experience the indicators did not work and when the supplier was questioned about this he admitted to the unreliability of the tablets. The other component needed for this treatment is an airtight barrier film large enough to hold the object. You have the option of purchasing a custom-sized ready-made bag or obtaining a roll of barrier film and then making your own bag. These barrier films are heat-sealable and can be made any size by joining pieces together with a tacking iron. The process of making a custom-sized bag is not very difficult and it is recommended to achieve a well-fitted envelope around the object. If a ready-made bag is used there are some drawbacks to be aware of. For example, a table that is 30″ tall, 36″ long, and 24″ wide (fig. 2) requires a bag that is 60″ wide by 96″ long. That's quite a large bag to gracefully slide around a three-dimensional object. Notice also that there is a wooden chest under the table and inside the same bag in figure 2. Including more than one object in a bag is an efficiency that can be used to your advantage when the geometry of the objects works out right. In this case the bag had to be gently slipped around two objects at once. This is not easy for two people to do while at the same time being careful not to damage the objects or cause a puncture in the barrier film. In practice it is much easier and safer to lay out enough barrier film to envelop the object,

place the object on top of the film and then build the bag around the object by heat-sealing the three sides. The advantages of making your own bag are: 1) it is easier for you and safer for the object, 2) there is less likelihood of creating a tear or puncture in the film, 3) it is cheaper than purchasing a custom sized bag, 4) you can make the bag fit your object more precisely. It is also a good idea to pad the objects inside the bag using blankets or furniture pads. This padding can act as a buffer in the event of temperature or humidity fluctuations and will also protect and prevent tearing of the barrier film around sharp corners of the object. Padding is not shown in the photo.

Once the object is in the bag you are ready to seal the envelope. Do not open the plastic bag containing the Ageless™ until you are ready to do this. You can use a heat sealer, a regular hand iron or a tacking iron. It's a good idea to make some test seals to make sure that the iron is at the right temperature and to give yourself some practice. If you are using a household iron, a good starting point is setting the iron to "cool polyester" or about 250° F and then make temperature adjustments as necessary. The seal should be at least ¾-inch wide with no folds or paths for air to enter the envelope. When you feel confident of your sealing abilities, open the envelope containing the Ageless™ and arrange it at one end of the bag or around the periphery of the object. It can be kept in a loose pile as long as it does not come in contact with the object. The reaction of the oxygen absorber is exothermic and the packets do become slightly warm during the treatment. Before sealing the bag completely gently push out the excess air leaving a little room around the object. Over the next day or so the scavenger will absorb the oxygen in the sealed bag, which will reduce the volume of the envelope by about 20%. You don't need to rush but the envelope should be sealed within fifteen minutes of opening the envelope of Ageless.™

Figure 2. Table and chest inside a sealed envelope.

Determining the amount of Ageless™ required is an easy calculation and it is best carried out using the metric system. Measure the total volume of the sealed envelope in centimeters and convert the volume to liters. Given that the oxygen content of normal air is 20% of the total volume, divide the total volume of the envelope by five to arrive at the approximate oxygen content inside the envelope. The individual Ageless™ packets are rated by their capacity to absorb oxygen. One packet of Z-1000 will absorb one liter of oxygen and one packet of Z-2000 will absorb two liters of oxygen. For example, if you are using Z-1000 and your bag has a calculated volume of thirty liters of oxygen, the minimum required amount of Ageless™ is thirty packets. It is recommended to use 25% more than necessary to be sure there is an excess amount of scavenger. In addition, the manufacturer purposely builds in excess capacity in the packets. The idea here is to err on the side of too much rather than too little. You should notice slight shrinkage or tightening of the bag around the object as the scavenger absorbs oxygen inside the bag. Be aware of this shrinkage and allow for it as you build your bag.

The recommended time of treatment is a minimum of 21 days and there is no harm in extending this time frame. In the case of the treatment shown in figure 2, the objects were left in the sealed envelopes for six weeks. When the time has expired the bag may be opened up and the treatment is complete. The barrier film may be saved and used for future treatments. One way to know if you used an excess amount of scavenger is to feel the packets after opening the bag. If there is excess or un-reacted Ageless™ the packets will feel warm to the touch as they once again begin to absorb oxygen from the fresh air.

Conclusion

By encapsulating objects in bags created from a plastic with a low oxygen permeability and using Ageless™ as an oxygen scavenger it is easy to create a low oxygen environment which will kill any insects infesting an object.

The use of low oxygen atmospheres for eradicating insect infestation is a viable alternative to toxic gas and chemical treatments. The additional advantages of this method is that it is safe for the person performing the treatment, low cost and can be carried out in a range of situations, such as private homes, galleries, storerooms or conservation laboratories.

Acknowledgments

We would like to thank Linda Coit, Vinod Daniel, Shin Maekawa, Brian Considine and Donna Williams for their help, support and advice.

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List of Suppliers

Conservation Support Systems, 924 West Pedregosa Street, Santa Barbara, CA 93101. Tel: (805) 682-9843. www.silcom.com (Films, oxygen scavengers, heat sealers).

DryPak Industries, 3940 Laurel Canyon Blvd, Suite 572, Studio City, CA 91604. Tel: (520)270-0884. www.drypak.com (oxygen scavengers).

Edco Supply, 323 36th Street, Brooklyn, NY 11232. Tel: (718) 788-8108. (Barrier films.)

Gaylord Bros. P.O.Box 4901, Syracuse, NY 13221-4901. Tel: (800) 448-6160. www.Gaylord.com (Barrier films, oxygen scavenger.)

Keepsake Systems, Inc. 59 Glenmount Park Road, Toronto, Ontario M4E 2N1. Tel: (416) 691-8854. www.keepsafe.ca (Barrier films, ready made bags, oxygen scavenger, heat sealer).

Talas, 568 Broadway, New York, NY 10012. Tel: (212) 219-0770. www.talasonline.com (Barrier films.)

Figure 1. Detail of the exterior, post crash. Note the SUV entry hole to the right of the front door.

Figure 2. Structural engineers propped up the sagging structure.

Surviving Disaster: Examination and Treatment of a Late 18th Century Desk and Bookcase from the Butler-McCook House

Tad D. Fallon, Furniture Conservator, Fallon & Wilkinson LLC

Abstract

During the early morning hours of August 4th, 2002, a sport utility vehicle crashed through a wooden fence and into the south parlor of the recently opened and revitalized Butler-McCook house, the last 18th-century house in Hartford, Connecticut. The Antiquarian and Landmarks Society's house museum had opened two months earlier after a four-year, $1.3 million restoration. The SUV landed sideways in the south parlor. The force of the collision caused major damage to the house and collections. This paper will focus on the examination and treatment of a late 18th-century desk and bookcase severely damaged in the crash. The type and extent of the damage sustained is unusual and will be discussed. The treatment includes cleaning, consolidation, fabrication of lost elements, fills, inpainting and re-saturation of the existing natural resin coating.

Introduction: The Butler-McCook House and Gardens

The Butler-McCook house on Main Street in downtown Hartford, Connecticut, is the city's oldest surviving residence. The house was built in 1782 by the physician and paper manufacturer Daniel Butler and his wife Sarah. The Butler-McCook House & Garden represents an unbroken chain of ownership from its construction in 1782 until its transfer to the Antiquarian & Landmarks society. Anson and Francis McCook, brother and sister, bequeathed the house and collections in 1967 and 1971 respectively. The bequests, both of which included modest endowments, were to facilitate the home being opened to the public as a historical museum. In addition to being Hartford's oldest house, the homestead also contains Hartford's oldest intact collection that includes furniture, Japanese armor, fine American paintings, antiques, and Victorian period toys. The restored Victorian garden is the only surviving domestic commission by the landscape architect Jacob Weidenmann, designer of Hartford's Bushnell Park and Cedar Hill Cemetery. The Butler-McCook house has survived for over 200 years, withstanding the effects of time and the threats of urban renewal. When it reopened on June 15, 2002 after a four-year, $1.3 million restoration by the Antiquarian & Landmarks Society, it seemed poised for some of its best days.

Disaster Strikes

During the early morning hours of August 4th, 2002, an SUV crashed through a wooden fence and into the house's south parlor, causing major damage to the structure and collections. (fig. 1) The 21-year-old driver was treated for minor injuries and was charged with driving with a suspended license and driving an uninsured, unregistered car.

The most widespread structural damage was to the south parlor, the hallway and the main staircase. Structural engineers were called in to prop up the sagging structure. (fig. 2) Plaster dust and debris blew through literally every corner of the lower and upper rooms. (fig. 3) The debris was so prolific that the mostly volunteer staff had to fill boxes with fragments so that they could be sorted through later. (fig. 4) A collection of Japanese armor was severely damaged when a piano was pushed from the force of the crash through the wall of the south parlor and into the library, smashing through the glass showcase containing it. Many paintings were damaged as well, including a portrait of Eliza Royce Sheldon Butler and a

Figure 3. Surviving objects from the north parlor. Note extensive plaster dust.

Figure 4. Boxing up debris for sorting. Note destroyed marble fireplace.

painting of nearby Talcott Mountain by William Wheeler.

An 18th century desk & bookcase

An 18th century desk and bookcase from the Butler-McCook house disaster was brought in to the lab for conservation treatment. The piece had been severely damaged as a result of the accident and had multiple detached fragments. (fig. 5)

Along with the main case sections came an assemblage of parts. The second desk drawer of the lower case was detached from the dovetails with fragments still attached to the drawer sides. The proper left door panel had broken in three pieces with one part still attached to the door. Pieces of the bracket feet were detached and parts were lost.

The drawer damage was puzzling, as we could not quite figure out how it had become detached from

Figure 5. Overall image of desk and bookcase, pre-treatment.

the sides. There was a corresponding backboard detached from the case, but there was no impact marks on the back of the drawer itself. (fig. 6)

The desk lid had severe scratches and gouges, the result of being peppered with shattered glass from built-in showcases where the collection of Japanese armor had been displayed. Two astragal moldings from the upper case were missing.

The proper left rear bracket foot had a 2 3/4″ loss, and the proper right rear foot bracket was detached, with the entire foot loose from the glue block. The proper right front leg knee block on the case side was detached and had an old loss.

By far the most challenging and disconcerting damage to the desk and bookcase was prevalent throughout the lower case. Here the glass shrapnel had damaged both the coatings and the wood. Some of the nicks were very shallow, while some areas were gouged with considerable loss to the wood. There were also old repairs to the drawer fronts that had been opened up again. (fig. 7)

While discussing the treatment options with the curator Beverly Lucas, it was concluded that prior to the accident the desk was considered in sound condition and had not required any treatment. Therefore, the goal of the treatment would be to bring the desk and bookcase back, as much as possible, to the "pre-disaster" condition. The undamaged areas of the upper case, when minimally cleaned and waxed, would be used as a reference point.

The treatment included consolidation, cleaning, fabrication of lost elements, fills, inpainting, and final re-saturation and gloss modulation.

Treatment

The detached door panel was re-aligned and re-glued, and small pine spacers were attached in the rabbet of the doorframe to accommodate for shrinkage and to provide a gluing surface for the astragal moldings.

There were multiple areas of embedded glass throughout the case, and these fragments had to be extracted using tweezers and dental picks. (fig. 8)

Figure 6. Detail of unusual damage to drawer, pre-treatment.

The losses to the feet were replaced with mahogany and carved for an exact fit. Small losses were perimeter isolated with paste wax, sized with fish glue and press filled with Mohawk epoxy putty, using Plexiglas to press and Mylar as a release. Mohawk epoxy putty was chosen for its smoother final consistency as compared to Araldite. The fills were then trimmed to level with a crank-neck chisel.

Two new astragal moldings were fabricated out of mahogany and toned to match the existing moldings using shellac, earth pigments and Orasol dyes. The new moldings lacked the slightly crazed surface of the original, so a fine dental impression material was used to take a mold of the existing surface characteristics, and this firm mold was used to impress the new mold-

Figure 7. Lower proper left side of desk, pre-treatment. Note extensive "shrapnel" damage.

Figure 8. Removing glass fragments from the drawer fronts.

Figure 9. Desk and bookcase after treatment.

Figure 10. Desk and bookcase after treatment.

ings with the fine crazing evident in the originals. Careful timing was needed to ensure the shellac coating was sufficiently tacky (but not wet) to take a good impression.

Visible examination of undamaged areas showed that the finish had good overall film thickness and gloss. The finish was fairly dirty and had a fine crazing but was quite transparent. UV analysis suggested that the lower layer of the finish was shellac,

with a later upper layer of a plant-resin varnish. Drips evident on the waist molding of the lower case exhibited an orange fluorescence. This orange fluorescence was also seen peeking out from behind worn areas of the carved feet. Four cross section samples were taken from various areas on the upper and lower case, and analysis using a Zeiss Axioplan 2 compound light microscope revealed that the desk and bookcase consistently had what appears to be a white fluorescing size coat, a continuous orange fluorescing base coat, with subsequent additions of a whitish fluorescing top coating. The coatings were sensitive to polar solvents.

Aqueous cleaning solutions were tested, and an emulsion of 60 ml distilled water, 20 ml Micro 90 and 90 ml naphtha, proved to be an effective way of cleaning the coatings. After cleaning, various methods of re-saturation and inpainting were researched and discussed. In order to fulfill the treatment goal, i.e. to return the desk and bookcase back to the "pre-disaster" condition, it was decided that what was needed was a method of re-saturation that would bring back an acceptable level of transparency and gloss to the damaged areas, while not obscuring the subtle patina and surface topography on the non-damaged areas. Therefore techniques of abrading and re-padding or solvent re-forming were avoided. A final consideration was that the desk and bookcase might be waxed at a later date by museum staff unfamiliar with the object's treatment history. It was decided that the technique of non-abrasive re-saturation with B-72 presented to the Wooden Artifacts Group by Arlen Heginbotham in 2001 would be an appropriate treatment. After cleaning, the larger fills were completed and the entire piece was re-saturated with solutions of 5 to 15% B-72 dissolved in a mixture of 95 parts Cyclosol 53 to 5 parts xylenes. The varnish was applied with a broad flat brush and worked thinly and evenly, in multiple directions, with continued feathering of the brush until the varnish was almost dry.

After a 24-hour drying period, shallower depressions were filled using mahogany-colored Modostuc that was applied slightly proud and then leveled using a firm foam sanding block with a slightly damp cloth stretched around as "sandpaper" replacement. These fills were leveled with no abrasion to the surrounding surface.

After the re-saturation with B-72 and fills were complete, inpainting was carried out using Golden fluid acrylic colors. When necessary, minor toning was accomplished using Orasol dyes. In order to seal in the inpainting and give a final unifying appearance, some of the severely damaged areas were lightly airbrushed with a 5% solution of B-72 for a final re-saturation.

The hardware, not original to the piece, was cleaned using a solution of 5% formic acid, followed by a final polishing with Solvol. The hardware was then coated with a thin 10% solution of Incralac in xylene.

This treatment proved to be very effective, allowing for successful re-saturation and inpainting of the severely damaged areas, while retaining the existing surface characteristics or patina of the old finish. A final light coat of paste wax and selective buffing allowed for gloss modulation, and provided a subtle finishing touch.

Although challenging, this treatment was successful in returning the Butler-McCook desk and bookcase to its "pre-disaster" condition as much as possible. At certain angles or in particularly harsh lighting some areas of the damage were still detectable, but in the low light levels of the period house setting, the overall effect was of a "well cared for but old" appearance. If at a later date more advanced treatment techniques are developed, the underlying surface has not been disturbed, and retreatment can be carried out with relative ease.

On a very positive note, the Butler-McCook house has once again undergone restoration through generous public and private donations. Tours of the house resumed during the restoration of the south parlor and library, and conservators from many specialty groups were involved in conserving the damaged collections.

Acknowledgements

I would like to thank the following people for their assistance with this project:
Mecka Baumeister, David Bayne, Arlen Heginbotham, Marijn Manuels, Chris Swan, and Randy Wilkinson for their support and consultation during the treatment.

I would also like to extend my gratitude to the Metropolitan Museum of Art's Objects Conservation department for their generous assistance with the microscopy and photomicrographs.

Materials

Cyclosol 53: Guard-All Chemical Co., P.O. Box 445, Norwalk CT. 06856, (203) 838-5515

Golden Fluid Acrylic Colors: Golden Paint, New Berlin NY, 13411, www.goldenpaints.com (607) 847-6154

Incralac: Conservation Resources International, LLC, 8000-H Forbes Place, Springfield Virginia 22151 (800) 634-6932
www.conservationresources.com

Micro-90: Industrial Products Corp., P.O. Box 70, Burlington NJ 068016 (609) 386-8770

Modostuc: Perigrine Brushes and Tools, P.O. Box 200, Wellsville, UT 84339, (435) 245-5830

Mohawk epoxy putty sticks: Mohawk Finishing Products Inc. (800) 545-0047
www.mohawk-finishing.com

Omega Series 40 Varnishing Brushes: Perigrine Brushes and Tools, P.O. Box 200, Wellsville, UT 84339, (435) 245-5830

Orasol Dyes: Kremer Pigments, 228 Elizabeth Street, New York, NY 10012 (212) 219-2394 or 1-800 995 5501 Fax. 212.219-2395

Paraloid B-72: Rohm and Haas Co., Philadelphia, PA. 19105

Solvol: Conservation Resources International, LLC, 8000-H Forbes Place, Springfield Virginia 22151 (800) 634-6932
www.conservationresources.com

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About the author

Tad Fallon has 12 years of experience in the restoration and conservation of furniture and wooden artifacts. In 1993 he received a BFA from the Fashion Institute of Technology's Restoration of Applied Arts Program. He completed the Smithsonian Institution's Furniture Conservation Training Program in 2000 and held an Internship at the Metropolitan Museum of Art's Sherman Fairchild Center for Objects Conservation, where he assisted in the conservation of 19th century New York furniture for the "Art and the Empire City" exhibition. Most recently, Tad was a participant in the WAG Furniture in France study trip in 2001 and is currently a furniture conservator in private practice with the firm Fallon & Wilkinson, LLC, 240 Scotland Road, Baltic, CT, 06330.

The Coffin of Paseshes: A Treatment

Rick Parker, Senior Conservator, Parker Conservation, Inc. Gentry, AR

Abstract

In 1997, Parker Conservation, Inc. of Gentry, AR was contacted about possibly treating a damaged Egyptian Late Period (800 BC) coffin prior to exhibition. The coffin, when examined before treatment, was a modest example of a hand-painted coffin by a provincial scribe, whose dedication to text was at best minimal. The coffin consisted of a single log of cedar (possibly Lebanese), cut in half, hollowed out with shoulders and beard added to complete the profile. A bituminous coating covered the coffin with gesso and paint, completing the ornamentation.

This paper will deal with the treatment of the coffin as conducted by Parker Conservation, Inc. In addition, because almost nothing was known about the coffin, other than it was first identified in Los Angeles, CA on May 10, 1973 and verified by the Cairo Museum, a detailed history and complete translation of the coffin is included. All export and museum taxes were paid and the case was sent under government supervision, as verified by the intact seals on the outside of the shipping case.

Mummification History – Herodotus

To more fully understand Egyptian funeral rites, the following is taken from a contemporary source at roughly the same time of the coffin's making. The text is by Herodotus, born possibly in Asia Minor around 490 to 480 BC. He traveled widely through the classical world and many of his reports are considered to be the best of the surviving first hand accounts of life in this area. In *Book Two*, he describes in a fair amount of detail the Egyptian funeral rites. In the passage below, Herodotus describes his observations of the Egyptian funeral processes.

> "Mummification is a distinct profession. The embalmers, when a body is brought to them, produce specimen models in wood, painted to resemble nature, graded in quality; the best and most expensive kind is said to represent a being whose name I shrink from mentioning in this connection; the next best is somewhat inferior and cheaper; while the third sort is cheapest of all. After pointing out these differences in quality, they ask which of the three is required, and the kinsmen of the dead man, having agreed on a price, go away and leave the embalmers to do their work. The most perfect process is as follows: as much as possible of the brain is extracted through the nostrils with an iron hook, and what the hook cannot reach is rinsed out with drugs; next the flank is laid open with a flint knife and the whole contents of the abdomen removed; the cavity is then thoroughly cleansed and washed out; first with palm wine and again with an infusion of pounded spices. After that it is filled with pure bruised myrrh, cassia and every other aromatic substance with the exception of frankincense, and sewn up again, after which the body is placed in natrium, covered over entirely for seventy days–never longer. When this period, which must not be exceeded, is over, the body is washed and then wrapped from head to foot in linen cut into strips and smeared on the underside with gum, which is commonly used by the Egyptians instead of glue. In this condition the body is given back to the family, who have a wooden case made, shaped like the human figure, into which it is put. The case is then sealed up and stored in a sepulchral chamber, upright against the wall. When, for reasons of expense, the second quality is called for, the treatment is different; no incision is made and the intestines are not removed, but oil of cedar is injected with a syringe into the body through the anus which is afterwards stopped up to prevent the liquid from escap-

ing. The body is then pickled in natrium for the prescribed number of days, on the last of which the oil is drained off. The effect of which is so powerful that as it leaves the body it brings with it the stomach and intestines in a liquid state, and as the flesh, too, is dissolved by the natrium, nothing is left but the bones and skin. After this treatment it is returned to the family without further fuss.

The third method, used for embalming the bodies of the poor, is simply to clear out the intestines with a purge and keep the body seventy days in natrium. It is then given back to the family to be taken away.

When the wife of a distinguished man dies, or any woman who happens to be beautiful or well known, her body is not given to the embalmers immediately, but only after a lapse of three or four days. This is a precautionary measure to prevent the embalmers from violating the corpse, a thing which is said actually to have happened in the case of a woman who had just died. The culprit was given away by one of his fellow workmen. If anyone, either Egyptian or a foreigner, is found drowned in the river or killed by a crocodile, there is the strongest obligation upon the people of the nearest town to have the body embalmed in the most elaborate manner and buried in a consecrated burial-place; no one is allowed to touch it except the priests of the Nile–not even the relatives or friends; the priests alone prepare it for burial with their own hands and place it in the tomb, as if it were something more sacred than the body of a man."

Paseshes – Hieroglyphic Translation – Brian E. Smith

Before any treatment was started, a thorough visual examination was conducted on the coffin. Since a full translation had not been done on the coffin, it was deemed necessary to look into the background of the object more fully. To aid the process, Parker Conservation, Inc., enlisted the assistance of Brian Smith, a graduate student at the University of Arkansas in Fayetteville. Brian had considerable translation skills as well as overseas experience in Egypt as a translator of hieroglyphics from this period. It was during this initial examination that the name Paseshes was first identified as belonging to the coffin.

Translation of the coffin provided some difficulties in that the text is hand written in a hurried Late Period style. Some spellings and a few signs remain in question, but most have been reconstructed on the majority of text.

The four sons of Horus who protected the viscera of the deceased (and were also patrons of the cardinal points of the compass) face the ventral center of the coffin. In front of each is a column of hieroglyphs that incompletely quote a particular formula that is well associated with each god. The text is shortened for the purpose of introducing each god by name, though a complete example of the quote is given below.

> "Hapi says: 'I am your son, O Osiris, I have come to be under your protection. I bind for you your enemies under you. I give to you your head forever.'"

From the example above, the nature of each god in their funerary context can be understood; each was depended upon to reconstitute the body of the deceased (identified as the chthonic god Osiris) for his resurrection in the afterlife. As to the literal translation of what we have on the coffin of Paseshes, only the quote from column 1a and 5a can be translated as the beginning of this quote:

Column 1a Hapi
Says Hapi: "I am (thy) son"
Column 1b Qebsennuf
Says Qebsennuf: (no quote)
Column 5a Amseti
Says Amseti: "There/Therefore I am (thy) son"
Column 5b Duamutef
Says Duamutef: (no quote)

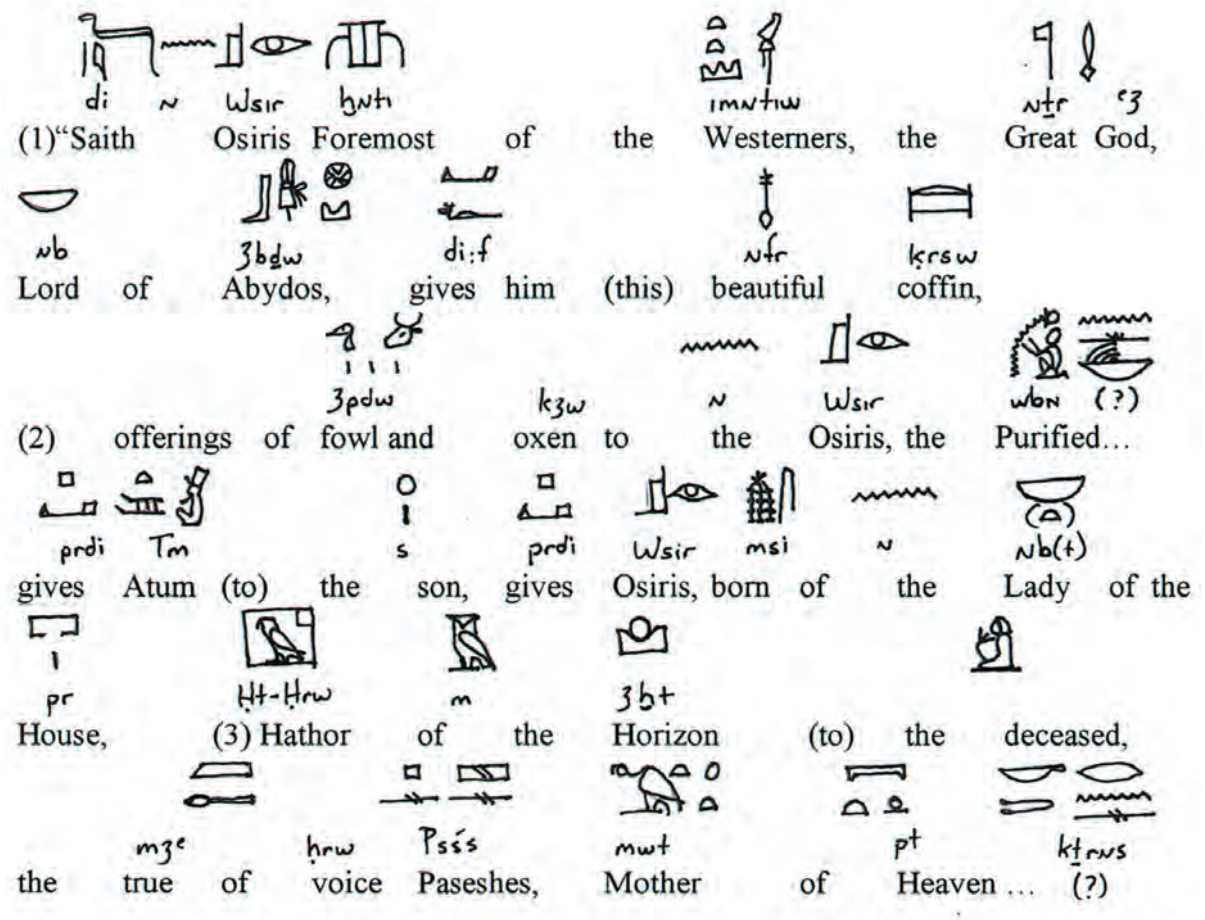

Figure 1

The exclusion of the second person personal possessive pronoun "thy" is indicated by parenthesis and inserted by inference. Perhaps the reason that column 1b and 5b do not have the introduction that is included in column 1a and 5a is the length of the names of the gods listed in the former columns. It was possibly understood that the whole quote (or a derivative thereof) was just understood by the simple fact that the gods were represented at all.

The three columns of the main text begin with the standard titles of Osiris, god of the underworld and spiritual resurrection. In the drawn copy, an attempt has been made to represent how the signs were painted on the surface of the coffin, thus the crudeness in size and shape of the hieroglyphs. Below, the written text is in horizontal form with a translation and transliteration of the signs in clearer signs. In parenthesis assigned numbers indicate each respective column of text. (fig. 1)

Interestingly enough, the proper name of the deceased does not follow after his titles "the Osiris, the Purified" as is standard. Also, the determinative for the deceased and his epithet "true of voice" precede his name. The last part of the main text ends confusingly with a few characters that spell out a word that could not be identified. No determinative or other indicators of meaning are included, so the translation ends only with the transliteration of the last part. The reference to the "Mother of Heaven" could only be a title of the preceding reference to Hathor "of the horizon." In all, it seems that the text attempts to follow standard funerary examples with a few grammatical mistakes and a few obscure words. The verb form *prdi* is a common indicator of late period change in spelling and language from the original form of the verb *rdi*.

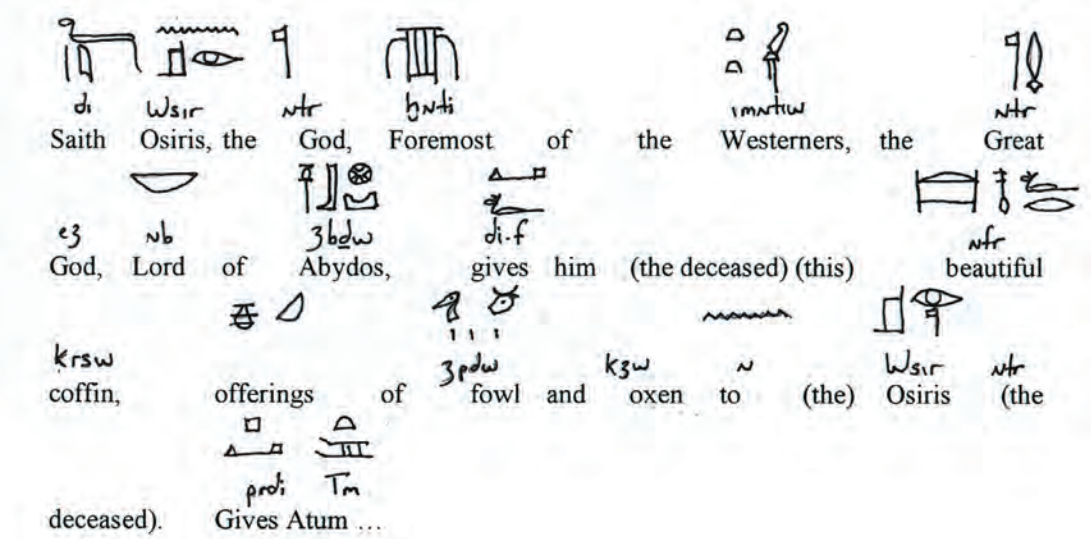

Figure 2

Along the back of the coffin on both sides are single columns that repeat text, except for a few minor spelling changes, as the beginning of the text on the ventral side of the coffin. (fig. 2)

The text on the coffin's left side is damaged at the beginning and also at its conclusion. Those characters that are visible are duplicates of the text on the right side; thus the translation can be made secure. However, at the end of this column, the wear and breaks render the text illegible. This portion of the text cannot be made certain with current knowledge.

There are interesting spellings in these columns, firstly the name of Osiris (Ws-ir) is misspelled (Irws) on the right shoulder at the beginning of the line. There are also variant spellings of the city of Abydos, which are not to be taken as mistakes. These spellings of Osiris's sacred city are, however, different from the spelling in the main text on the torso of the coffin.

In Egypt's Late Period the traditionally complex language of the hieroglyphs become even more so with such variables as compounded and obscure sentences, loan words and spellings from exposure to other cultures and the common experience of human error. The coffin of Paseshes is a modest example of Late Period work, hand-painted in a provincial location by a scribe whose dedication to the text was minimal. The text is brief, quite standard and hastily written. In the later centuries of Egypt, the funerary culture of the necropolis often worked in a mass production assembly line where specialists exploited their own talents. The coffin of Paseshes appears to be an example of this type of work.

We can also infer that Paseshes was probably a low level priest possibly from Abydos. Due to his stature, he was given a mid-level burial and not the lowest, usually found with a more common person. His ranking in the Egyptian culture did not warrant the complex ornamentation one of a higher social status would receive.

Egyptian Pigments – An Overview

Black, Dark-Brown or Purple

Black and very dark colors were obtained by the use of manganese-ochre pigments. The color of this black depends on the manganese content that is in the crystals of hematite. Hematite, when pure, is red. 5% manganese darkens the color to a brown and at 8% it is a reddish black (purple). Usually anything over an 8% mixture results in a true black. In Theban style pottery, the pigment has been identified not as manganese ochre, but as soot. Asphaltum is not a true pigment color. This material produces a blackish-brown solution in oil or turpentine. At several periods it has been used extensively as a glazing color. Asphal-

tum dries badly causing wrinkling and cracking. It develops almost every fault of oil colors in the extreme, especially if mixed with other oil colors. It is used as scumbling in some early cases. Asphalts are highly acid-resisting and softer varieties will impart flexibility. The harder versions will also add strength and resistance to handling. Asphalt tends to shorten the mixture or lessen the natural sticky adhesion of the wax component. The hardest and most brittle asphalt is Gilsonite, which is like a hard resin. Softer kinds of asphalt include varieties from Trinidad, Barbados, California and the Egyptian asphalts.

Red

The most common red used by the Egyptians is closely related to the manganese-ochre mentioned in the above section on blacks. The difference is that no manganese is present in the red hematite ochre. Red is commonly found in the Egyptian desert. The pigment could be added to a clay suspension for pottery coloring or mixed with oils or resins and used with a brush.

White

During the Dynastic Period, calcite and gypsum were substances used as white pigments. Gypsum also served as the bonding substance of blue, green and yellow pigments. In most cases, the color is more of a grey white or yellow white rather than a true white. Kaolin, which occurs naturally in the area south of Aswan, was used during the Christian era as a white pigment.

Yellow

Yellow ochre occurs naturally in the oasis and was a common pigment in ancient Egypt. Some yellows used in pottery and sometimes in paints used gyrostat, which contains iron and was imported from Cyprus.

Green

Green pigment that was used naturally consists of a mixture of gypsum and copper hydro-chloride. It is found naturally as the mineral atacamite, but it has been suggested the Egyptians may have prepared it artificially.

Blue

The use of blue in the ancient world in pottery is rare. The Egyptian technology is worth mentioning. The blue that is most unique is not the "Egyptian blue" used for wall painting or decorating coffins. This pigment usually belongs to the spinel group and the blue color is caused by a cobalt ion with gypsum as a bonding agent. There are other variations as well. What is unique about their use of blue is the Egyptian's use of cobalt blue. This pigment was (re)discovered in 1804 by L.J. Thenard. Since this pigment does not occur naturally, it must have been synthetically produced by the early Egyptians. It appears quite frequently in many different sources in early Egypt. The Egyptians could have obtained the pigment through a precipitation from a hydrous solution of alum and a soluble cobalt compound with ammonium or sodium carbonate as precipitants. After a reaction, the pigment would have been filtered out from the solution, heated to 800-1000° C in order to be transformed into the spinel structure. This is a curious and a very complicated procedure for the period.

While there was no blue pigment used on the coffin of Paseshes, it is worthwhile to note one of early Egypt's more curious, unexplained scientific works. How and why the early Egyptians developed cobalt blue is unknown, but there can be no denying the fact that they did possess it and use it frequently several thousand years before it was rediscovered by Thenard.

The Treatment

Initially, nine microscopic samples were taken from the following areas for examination:

1 Black on PR Eye	41 microns
2 Black on Neck PL Side with w/Fill	170 microns
3 Yellow Stripe on PL Shoulder	96 microns
4 Red From Ra on Maat	56 microns
5 White Flower Upper Chest PR Side	164 microns
6 Green Face PL Cheek	40 microns

7 White Stripe PR Hieroglyphic Separator	85 microns
8 Maat Feather PR Side	96 microns
9 Anubus PL Foot	88 microns

The samples were examined under visible and ultra-violet light using a Nikon Alphahot 2 light microscope at 40X, 100X, 200X, and 400X magnifications. The samples were cast in small cubes of polyester resin (Excell Technologies, Inc., Enfield, CT., USA) using methyl ethyl ketone peroxide as a hardener. The samples were barrier coated in Rhoplex AC33 using fumed silica as a thickener, to reduce infiltration of polyester into the sample. The samples were then cured at room temperature for 24 hours, ground and polished using Micro-Mesh abrasives to 12,000 grit. The samples were also stained with a variety of standard biological stains to allow identification of any binding media present. Microchemical testing was also done to determine solubility parameters and to assist in developing a cleaning plan for the coffin.

After examination, it became apparent the coffin had been made from a single log of cedar (possibly from Lebanon), cut in half and the respective sides hollowed out. The log was not full enough to fill out the proposed form of the coffin. Four additional pieces were added (one on each shoulder) to complete the upper body form. One was added to the PL corner of the base and one piece added to complete the beard. These additional pieces were also of cedar and held in place by randomly drilled dowels of sycamore placed at odd angles. To complete the form, a fill composed mostly of fine sand and resin was used to fill and smooth the joint areas followed by paint. When new, the coffin would have been very smooth and extremely glossy, completely hiding the added wood and joints.

Structure

After careful examination of the shoulder structure, it became clear that the shoulders were very stable despite the loss of considerable fill. The cracks at the joins of the four pieces comprising the shoulders were stable in place and the numerous pins securing the areas were still very much intact. Other areas of the coffin revealed that the joints were somewhat less than perfect and that a very fine fill was used in conjunction with some form of plant resin and paint to smooth the irregular surfaces. There is slight movement of the four shoulder pieces when moved and this may have caused most of the considerable cracks to become once again visible after years of handling. The fill, before being treated in these joined areas, was very fragile and prone to just falling into grains of what appeared to be sand. Searches are still underway to determine if any adhesive was used on this type of coffin, but at the time of this writing, no obvious adhesive such as hide glue can be found. The main bonding for the additional pieces appears to be only the random pins at all angles mechanically holding the shoulder structure together. At present, it is still a very strong bond or join, and required no intervention. All the pins that could be identified were made of sycamore. Some deformation has occurred over the years to the added pieces on the shoulders, but the only way to make the added wood line up would require the area to be filled and painted as the Egyptians did originally.

Three of the four sycamore dowels that secured the PL corner of the base on the coffin were broken. At one point, someone had secured the loose corner with two wire nails. These nails were removed and replacement dowels were hand-cut to roughly match the original broken and lost pieces. Once the dowels were added, the base corner of the coffin was again secure. Examination revealed residue of the same type of fill found on the shoulder. Apparently this section of the foot, having undergone treatment in the past, had lost almost all of its original fill material. No attempt was made to refill the gaps created by the lost fill.

Surface

The raw surface of the coffin, while exhibiting wear, was already deemed in good to excellent condition and was only surface vacuumed to remove loose surface dirt. On the inside of the bottom portion of the coffin, several layers of wrapping were still

present just below the waist area. These appeared to be very firmly attached to the case. Apparently the body was not as perfectly sealed as one would be led to believe. Tests with Luminol confirmed a blood component. Testing for a gum residue in or on the linen wrapping also produced a positive response. There was also an area of seepage in the head area that produced similar results as the lower area.

Coatings

The numerous areas of the bituminous coatings that were tented and/or loose were, after examination, clearly the result of seasonal expansion and contraction, resulting in the failure of the previously-mentioned fine sand fill used to smooth and fill much of the coffin. In areas of high movement, the fill had failed to hold and had become very loose. Even with the over-coating of the black paint, the fill was still unstable in many areas. Fifteen "Torpac" #13 100% gelatin capsules were dissolved in 100 ml of distilled water and carefully injected into the loose sand as a consolidant. The thin mixture went into the fill and hardened nicely without a trace of a tide line or additional gloss. All areas of the coffin with fragile or loose fill were treated in this same manner. The coatings were very stable and sound and should present no problem with reasonable handling and proper housekeeping. No attempt was made to fill any voids of lost coatings. The only modern material added was the gelatin. No barrier coating or wax was applied. The coatings, at this point, still retained a haze of surface dirt. After considerable micro-chemical testing, a water-based enzyme cleaning system was chosen as most effective and safest to use on the very fragile coatings of the black bituminous paint. The haze cleaned very nicely and the surface again returned to a deep brownish black. The areas on the black still retained the original high gloss. Areas of yellow and white, previously thought to have had early re-paints or touch-ups proved actually to be fairly recent attempts at cleaning of the original surfaces. The whites and yellows of the coffin were soluble in water and almost all other solvents to one degree or another. These areas, under both long and short wave UV, showed no re-touching whatsoever. After cleaning, the black showed such an improvement in color and saturation, that no further cleaning was done in the very fragile areas of the glyphs and trim. The green tented areas of the face were injected with the previously-mentioned gelatin and with very mild heat from a lamp were relaxed back into place. As a result of microscopic testing, a plant resin varnish was found to still be in place over the green coating on the face. The green appears to have reacted with the base gesso over the years, giving the appearance of thin paint. The plant resin coating is still in wonderful condition and

Figure 3

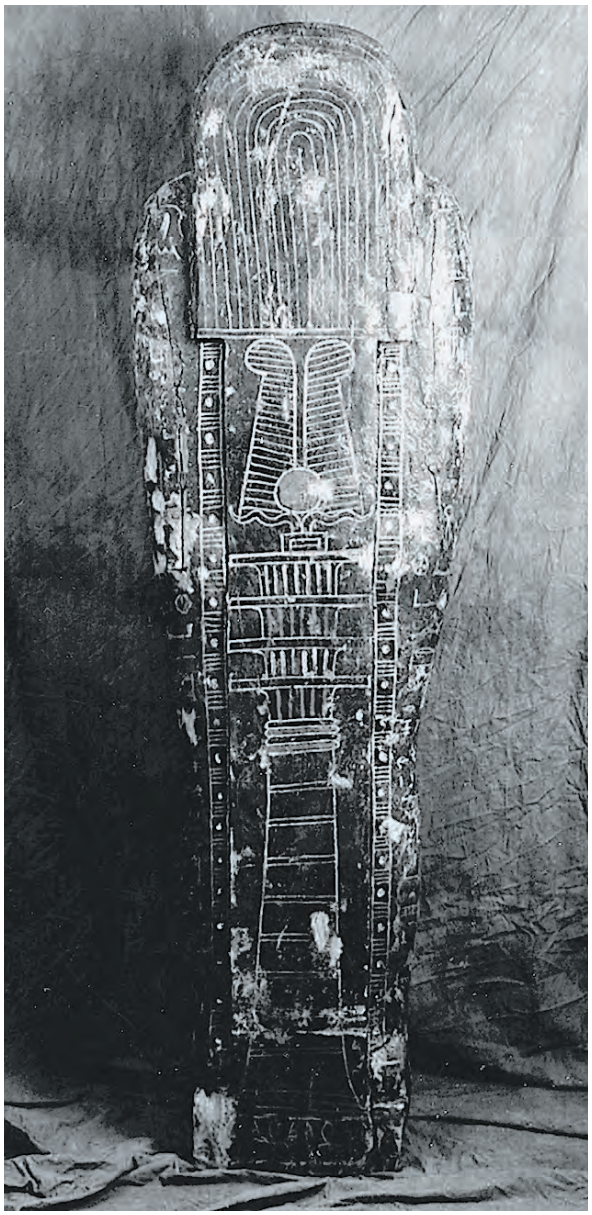

Figure 4

was left in place. No attempt was made to replace any of the lost gesso or green on the face. An oil residue, very possibly the remains of holy oil or some applied oils at the time of burial was found on the PL side of the face running down the side of the coffin. This is almost surely funeral remains and should be left in place. Also remaining was a single, very coarse brush hair on the PR side of the head piece. The brush hair remained in place after treatment.

While cleaning on the PL side of the head and shoulder area, the enzyme cleaning solution,

Figure 5

which was water-based, released some type of fragrance that lasted only a few seconds at most, but was most pleasing. It was very possibly something also water-based left over from the funeral rites that reacted with the water in the cleaning solution. Whatever it was, no trace could be found of any residue that might identify it.

The Coffin of Paseshes is currently on public display in Little Rock, AR at the Arkansas Museum of Science and History.

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About the author

Rick Parker is Senior Conservator and owner of Parker Conservation, Inc. in Gentry, AR, USA. Parker is an AIC Professional Associate and was Chairman for the Wooden Artifacts Group of the AIC in 1992. Parker Conservation, Inc., currently in its thirtieth year in business, is a private firm dealing in the conservation of wooden artifacts, furniture, gilded objects, paintings, and frames. Parker Conservation, Inc. also utilizes in-house microscopy for complete coatings analysis and examination. Parker Conservation, Inc. can be reached at 479-736-8703 or via e-mail at rparker48@aol.com.

Figure 1. Wester Kittochside Farmhouse, East Kilbride, Glasgow.

Figure 2. Museum of Scottish Country Life, East Kilbride, Glasgow.

A Comparison of Conservation Philosophies: A Collaborative Project between the National Museums of Scotland and the National Trust for Scotland

Sarah Gerrish

Introduction

Wester Kittochside farm and farmhouse (fig.1) in East Kilbride near Glasgow were donated to the National Trust for Scotland (NTS) in 1992 by Mrs. Margaret Reid in fulfilment of the wishes of her late husband Mr. James Reid. The Reid family had farmed Wester Kittochside for generations and, when arriving to survey the farm for the first time, conservationists were amazed to find the land virtually untouched by modern farming methods. Having used little of the machinery thought necessary to manage a late 20th century farm, the Reids had gifted NTS a time capsule of 1950s farming: to modern eyes, a bucolic idyll. It was James Reid's desire that the farm should be kept, as he had left it, for the enjoyment of all.

In a collaboration between NTS and the National Museums of Scotland (NMS), part of the gifted land was used to build the new Museum of Scottish Country Life (MoSCL) (fig. 2). The museum was planned to house the NMS collection of country life artefacts and, while part of the collection had been displayed at the (now closed) Agricultural Museum at Ingleston near Edinburgh, many of the artefacts, particularly the larger objects, were previously unseen by the public. Both farmhouse and museum were opened in July 2001.

Although the farmhouse dates from the eighteenth century, the NTS felt it was appropriate to present the house to the public in the mid-twentieth century, pre-1960s style in which the farmhouse was last used as a family home.

With tight time constraints, a new museum building, restoration of the farmhouse and conservation of the artefacts for both museum and farmhouse, and the preparation for the opening of the Wester Kittochside site to the public was an exciting challenge for all concerned. For the conservators, particularly those working on the furniture and wooden artefacts, an additional challenge was set by the requirement to work on artefacts from both the museum and the house simultaneously within the same workspace. NTS and NMS are two large and important Scottish institutions with distinct roles within the heritage sector and, as a result, each organisation has its own specific conservation requirements. With one collection destined for a museum and the other for a house to be opened to the public, very much not a museum, the differing needs and philosophies of each organisation and ethical approaches of individual curators were brought into contrast.

The conservation of both the wooden artefacts from the NMS Scottish country life collection and the NTS collection of furniture from Wester Kittochside farmhouse was undertaken by NMS conservators at the NMS conservation workshops at Granton in Edinburgh. While the conservation treatments themselves were not ground-breaking, the experience of simultaneously working within two distinct approaches to conservation was particularly thought-provoking.

Figure 3. The dining room as viewed by the public today.

Philosophies

NMS Conservation

Ethically, the approach to the conservation of artefacts for display in MoSCL was similar to conservation within the museum environment generally. However, the creation of a new purpose-built museum is not an everyday occurrence and the conservation of the MoSCL collection proved to be a rewarding and, occasionally, testing experience as the conservators worked with designers, architects and curators to present artefacts in entirely new ways and create innovative displays. Many of the normal considerations for conservation have to be re-thought when considering the mounting and display procedures required, particularly for fragile objects.

NTS Conservation

Treatment proposals were made in close collaboration with NTS curator Ian Gow and NTS conservators Wilma Bouwmeester and Libby Finney. The NTS approach was to do "as much as necessary and as little as possible." While it was necessary to stabilise furniture, to prevent it from deteriorating further, treatments had to be carried out without changing the appearance or the surface patina of each piece; it was important that the house should look as though the Reid family had just that moment walked out. In addition, as Mrs. Reid still lives locally and was to be invited to view the house before its opening, there was a general consensus that it was particularly important to take her views into consideration so that the house would be presented in a way which would be acceptable to her.

Considerations

Wester Kittochside Farmhouse

i. Wear and tear of visitors on interior furnishings such as carpets and soft furnishings.

ii. The layout of room settings taking into account "traffic" through the house.

iii. The environmental considerations of the doors constantly being open, lights on in the rooms and natural daylight coming through the windows.

iv. The interpretation of living spaces, the house itself telling a story of the family who occupied it and what their life was like.

v. Considerations for preventive conservation for the long term protection and stability of the collection.

Although the original intention was to return the contents to exactly how they had been when the Reid family left, in practice this was not fully possible as provision had to be made for visitors circulating around the house. Furthermore, in order that no objects were in danger of being accidentally damaged, some of the room settings were adjusted accordingly; however, as many of the original fixtures and fittings were used as possible. (fig. 3)

MoSCL

i. Interpretation of the artefacts by curators and designers.

ii. Settings designed for the artefacts which help with the interpretation of the object by the public.

iii. Mounting the objects, to allow proper support for each artefact on display which also fits the architects' and designers' brief.

iv. Access to the object; as part of the design scheme some artefacts were mounted twenty feet high on the wall or needed to be built in as part of the museum.

v. Environmental conditions following the guidelines set down by the Preventive Conservator for objects on display.

vi. Whether the object is on open display or in a case and the preventive measures which are required accordingly.

Having had experience working with a team of conservators conserving and installing artefacts for the new Museum of Scotland three years earlier, we were aware of potential hazards which might occur and did our best to avert them, although it must be said not always successfully.

Preparation

Wester Kittochside Farmhouse

A programme of work was drawn up for the treatment of furniture, allowing time for conservation, transportation from Granton to Kittochside and installation.

Prior to the contents being removed from the house to make way for structural refurbishment, a series of very detailed photographs were taken by the NTS of the interior. These photographs were invaluable during the conservation process, the additional knowledge of the final setting of each particular piece of furniture helping with the choice of conservation treatment as well as acting as an accurate pictorial inventory for reference. After a period in storage, the farmhouse furniture and contents were brought to NMS Granton Centre and a condition survey carried out. This provided both an overview of the general condition of the objects and a basis on which to decide upon appropriate conservation treatments.

The quantity and range of objects within the house was extensive and, as might be expected from a home developed over generations, eclectic. Boxes containing the contents of kitchen cupboards and drawers, walking sticks, umbrellas and tennis rackets from the stand in the hall, paintings, documents and photographs, carriage lamps and coal buckets, clothes and shoes all had to be condition surveyed. Carpets, curtains and some light fittings were all retained for re-installation.

There was also a wide range of furniture, including an extraordinary number of dining chairs, several long case clocks, various desks, bureaux, tables, mirrors and beds. Many of the drawers in the bureaux and chests were full of personal items belonging to the Reids; spectacles, letters and cards, photographs, milk bills, cheque books and other documents all providing insight into the lives of the Reid family.

MoSCL

Much of the collection of working life objects to be installed into the MoSCL had previously

Figure 4. The crannan gad plough before conservation.

been on display in the agricultural museum at Ingleston, just outside Edinburgh. These objects were surveyed as they were taken off display and the appropriate treatment carried out before they entered the new museum. As a precaution to make sure the new museum was completely pest free, all wooden objects were either frozen or treated with residual pesticide. Many objects were taken from storage to be displayed for the first time; these items also underwent pesticide treatment or freezing to eliminate the risk of pest outbreaks. All conservation treatments were discussed with the relevant curator, with additional consideration being given to the proposed mounts for each object as sometimes higher levels of intervention were required in order to ensure the artefact was stable enough to be mounted in the way required for display.

Conservation Treatments

MoSCL

The oldest plough in the collection is a stilted plough, originally from the Western Isles of Scotland, known as the Crannan Gad plough, which was traditionally said to be dragged by the wife and guided by the husband. This artefact came to the studio in extremely poor condition—in fact in four separate pieces. The plough was to be put on open display in "Breaking the soil" in the Museum of Scottish Country Life, suspended twenty feet on a wall with a range of other ploughs also attached to the wall.

The plough was extremely badly wood wormed and crumbling and the iron work corroded. (fig. 4) It was frozen as a preventive pest measure to ensure that any previous pest infestation was dead. The treatment plan had to take into account the way the plough was to be displayed; as the plough was in such poor condition it was necessary not to just stabilise it but to reconstruct parts of it. In this case, the plough was the only one of its kind in the collection; where a choice of several similar objects is available, the most complete object would usually be chosen.

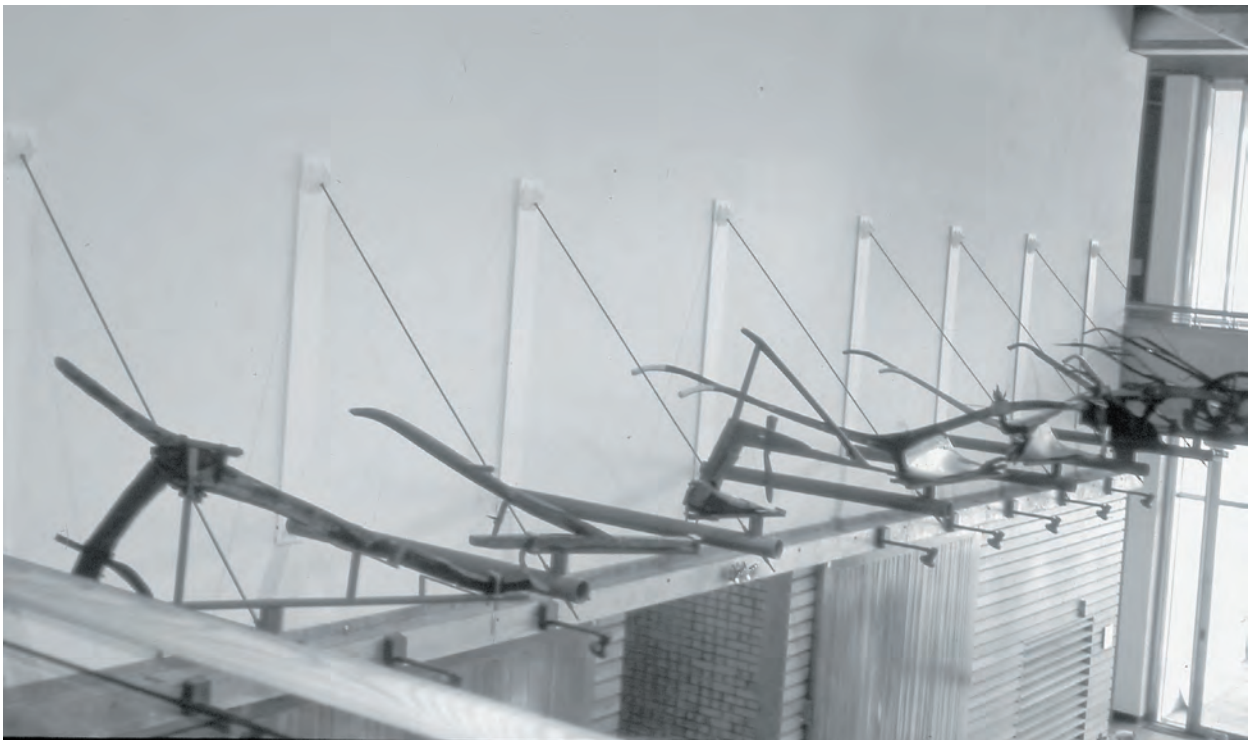

Figure 5. The plough after conservation and on display in MoSCL.

The treatment proposal was to consolidate, pin, fill and, where necessary, reconstruct. Had the plough had not been required to be free standing on open display, the treatment might have involved stabilising the separate pieces and mounting them in a way which suggested how the plough had been used without the requirement to pin and reconstruct some areas. However the treatment was sympathetic to the object and technically reversible materials and methods were used. The consolidant was Paraloid B72 in acetone and the fill made up of Paraloid B72 and microballoons. The percentage was varied as required and the fill was tinted with pigments to achieve a unified base colour.

The curator, designer and conservator met to discuss the requirements of the plough. From a conservation point of view a suitable method to support the plough was required due to its fragility even after conservation. Careful consideration went into the plough mounts which were made in the NMS workshop to meet our specific requirements. The curator required that the mount did not alter or interfere with the interpretation of the object and the designers were insistent on the mount matching the other mounts within the museum to present a unified effect in keeping with the architects' design. (fig. 5)

The Shandwick Hearth Room is a re-creation of a room, believed to be inhabited until the 1950s, from the Scottish Highlands. The hearth and two doors are the only part of the original dwelling in the museum collection and the curator and the design team decided to incorporate these original features into the room re-creation. However, the hearth was found to be extremely dilapidated and would have required hundreds of hours of conservation to stabilise, so it was decided that the hearth itself would also be replicated and the original would remain in storage.

The doors were both in a poor state and required considerable conservation before being suitable for display. One door had traces of original wallpaper, cardboard and drawing pins remaining around the frame where it had been cut out of the wall, which added to the provenance of the door and illustrated how the room was decorated and used. The painted surface of the door was flaking and the

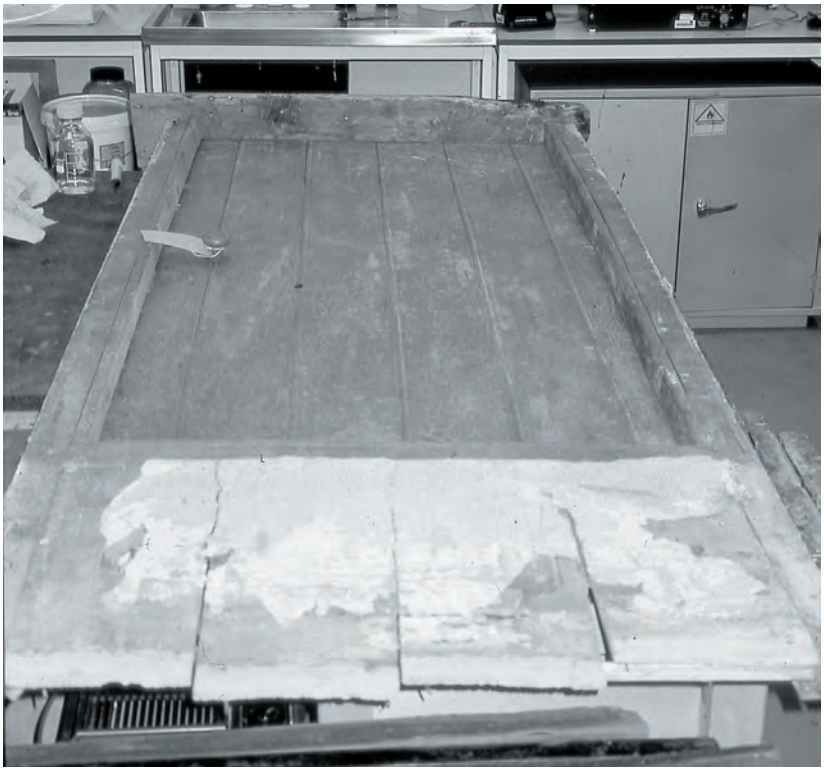

Figure 6. The Shandwick door before conservation.

Figure 7. The Shandwick room re-creation with replicated hearth and door to the left of the hearth, the door on the right is original.

Figure 8. Detail of the hall chair seat before conservation.

threshold was rotten. (fig. 6) When the contractor charged by the design team to build the room reconstruction within the museum came to inspect the doors, it soon became clear that they wanted to replace the rotting threshold, paper over the original wallpaper and cut down the door to fit the aperture they had made for it. After listening to the argument from conservation staff, that so much historical evidence would be lost by adapting the original door to fit the room reconstruction, it was decided that, like the hearth, the door would go into storage and a replica made. The other door, to the left of the hearth, was conserved, successfully consolidating the flaking painted surface and was installed in the room re-creation. (fig. 7)

Wester Kittochside Farmhouse

The challenge for the conservation of the furniture and contents of the farmhouse was to preserve and protect a massive range of artefacts which were to be returned to their original surroundings and to allow visitors the privilege of seeing these objects without the intervention of glass cases or barriers in the open surroundings in which they were used and loved by their past owners. Working closely with curator Ian Gow and conservators Wilma Bouwmeester and Libby Finney the aim for the NMS conservators was to present the objects in the farmhouse as if the Reid family had just walked out.

Figure 9. The hall chair after conservation.

Figure 10. The bedroom chair after conservation in the farmhouse.

The condition survey showed that, generally, the furniture from the house was in very good condition. If any treatment was required the "as much as necessary and as little as possible" approach ensured that each object was stable, that any broken fragments or mouldings were re-attached to prevent loss, lifting veneers were re-laid, excessive dirt and dust were removed and minimal consolidation and pest treatments carried out.

A small hall chair had suffered badly from a previous woodworm attack resulting in the loss of much of the decorative surface of the seat (fig. 8). The edges of the area that had been eaten by woodworm beetle were very fragile and in danger of further loss with the surrounding area very spongy and crumbling. It was necessary to use a consolidant to stabilise the crumbling veneer; a 10% solution of Paraloid B72 in acetone was injected into the worm holes and along the edges of the loss. As the chair was in a very conspicuous position in the hall of the house, it was decided to tone down the light area of beetle damage using a water-based stain (fig. 9).

An upholstered pink bedroom chair also required substantive treatment as the upholstery was shredded due to wear, tear and, particularly, light degradation; the farmhouse faces south and the main rooms catch most of the sunlight throughout the day. To prevent further damage of furniture by the sun, UV film and blinds were placed at the windows to control light levels. Again keeping to the NTS philosophy of "as much as necessary and as little as possible," only the worst affected area, the left arm of the chair, was treated by sewing fine net, dyed to match the upholstery, along the arm to provide added support and to protect against further degradation. The net was shaped along its edge to match the floral pattern of the fabric,

enabling it to blend in better and resulting in an almost invisible treatment (fig. 10). The treatment as in all cases was fully documented.

Summary

When embarking on the conservation for both projects, it was assumed that conservation treatments for the artefacts from the MoSCL would differ from those of the farmhouse furniture. However, in practice, with a few exceptions, the treatments were remarkably similar.

While conservators constantly strive for treatments which involve minimum intervention, applying this code to the entire contents of a family home is a very challenging prospect. When conserving artefacts to enter displays in a new museum, having to be involved in the design and making of mounts is an interesting process. Inevitably, in the conservation of such artefacts, compromises are made, not only to ensure the long-term stability of an object, but also to take into account the use for which the object was intended and the best way to interpret and display that use.

Working on both projects was stimulating and rewarding. The creation of a new museum presented a unique opportunity to conserve a wide variety of objects brought together in a display which represents Scottish country life, while the conservation of the furniture and artefacts from the farmhouse provided a very rare opportunity for insight into another family's daily life. The contents of the house were very personal and completely absorbing and the satisfaction of seeing the house fully installed was particularly fulfilling. The project was not only important in terms of the right conservation approach, but also in presenting the house to the public in a way which was acceptable to Margaret Reid, who attended the opening as guest of honour.

Bibliography & contact details

Sarah Gerrish has been furniture conservator at the National Museums of Scotland for eight years.

Address: National Museums of Scotland, Granton Centre, 242 West Granton Road, Edinburgh, Mid Lothian, EH5 3AA, Scotland, UK.
Telephone: + 44 (0) 131 247 4497
Email: s.gerrish@nms.ac.uk

Figure 1. Deming and Bulkley pier table before treatment.

Figure 2. Detail of face of frieze, after wax removal but before saturation.

Finish Conservation on a Deming and Bulkley, circa 1825 New York Classical pier table: An evolution

Cynthia Moyer

Abstract

This paper discusses the conservation treatment of a 1825 Deming and Bulkley attributed New York City pier table with a decorative gilded surface. The nature of the gilded decoration on tables of this genre includes stamped and freehand oil gilded patterns sandwiched between resin layers. Therefore, the successful conservation treatment of the gilded decoration can only be achieved while often cleaning and concurrently visually saturating the resin layers.

The paper will discuss the evolution in approach in treating comparable furniture with similar surfaces. The author draws upon her experience in treating six related tables over the course of the past twenty five years using various methodologies. More recently, others have reported success in the use of acrylic resins in solution for the re-saturation of finish coatings. This treatment employs low molecular weight aliphatic resin.

Introduction

A very fine New York City pier table from about 1825 attributed to the firm of Deming and Bulkley was brought to the conservator's studio in 2000 in order to preserve the finish coating and original decorative gilding. One of the distinctive characteristics of this piece and of pieces of furniture from this region and period is the elaborate decorative gilding work used to ornament the surface. These layers of oil size and gold leaf using freehand and stamped gilding techniques are embedded within the surface coating, essentially sandwiched between layers. It is therefore imperative to preserve the coating in order to preserve the gilding. The surface of the pier table had been made to appear presentable for the auction market when it was purchased privately. The decoration was largely intact on the face of the frieze and plinth but the transparent coating was considerably deteriorated. The front feet were damaged and the pilaster bases missing. In the past the author tackled the problem of a deteriorated finish encapsulating decorative gilding with several different solutions with varying degrees of success. Drawing from her own body of work the author refers to several other treatments which informed her decision making, which are similar to this one, that she performed on tables in the past. She then describes this treatment for comparison.

Description of the Maker

This New York City firm was located at 56 Beekman Street and was established by two cousins, Brazilia Deming (1781-1854) and Erastus Bulkley (1798-1872). They expanded and opened a retail business on King Street in affluent Charleston, South Carolina, introducing their designs by holding a raffle of a suite of drawing room furniture. They successfully supplied furniture to the high end market from 1820 to the 1840s, after trade embargoes earlier in the century had curtailed importation of luxury goods from Europe and the taste for furniture from Philadelphia and Providence had declined. Their pieces incorporated elaborate carving, exotic imported hardwood veneers and skillfully executed decorative gilding, often using bold gilded freehand and border patterns. Their merchandise compared favorably with the best imported European furniture which had previously set the tone for furnishing urban interiors for so-

phisticated Charlestonians. After taste for their designs waned, in 1852 Bulkley went on to become partners with the German émigré Gustav Herter. Here, the quality of craftsmanship only continued to excel.[1]

Description of the Pier Table and its Condition

The table is typical of the form: the frieze, plinth and mirror frame are comprised of a softwood substrate with veneer, incorporating rosewood with mahogany banding. The joinery is dovetailed and mortise and tenoned. The molding beneath the top and the pilaster capitals and bases are made of mahogany and oil gilded. The top, columns and pilasters are made of white and gold veined black Portor marble with imported French fire-gilded brass capitals and bases mounted on the columns in front. The frieze has an elaborate freehand gilded decoration in the center flanked by raised veneer blocks at the outer edges featuring bird-headed lyre form decoration. A black and gold stenciled border continues around three sides of the bottom edge on a raised mahogany veneer band. Gilt striping outlines the pilasters on the back. The plinth base is decorated on its face with a bold repeating gilded anthemion motif with a gilt and black stripe above and below. The table rests on turned and carved melon acanthus form feet in front and turned feet in back, both gessoed, gilded and painted black. The front feet are attached to the plinth by three dowels. (fig. 1)

The client had purchased the pier table at auction. It was delivered to the conservator's studio in the following condition: where the mirror frame joins the frieze and plinth the carcass had been disassembled and reassembled using PVA glue, prohibiting dismantling. The marble columns had old repairs, misaligned at old breaks with extensive adhesive flow-out and the marble pilasters and their bases were missing. There were minor veneer losses to the rosewood on the plinth. The finish had severely degraded and was no longer saturated, seemingly detached from the wood. It had distinct light spots overall and appeared yellowed and crazed. (fig. 2) There was UV light damage and bleaching on the table's proper right hand vertical sides of the frieze and plinth and extending in about four inches on the top surface on the plinth. The decoration was in very good condition in that there were few losses, mostly where severe light damage had taken place. Improperly reattached and oriented, the proper left front foot had severely degraded gesso in the front only which, when turned around and properly oriented, would result in being located in the back. The surface appeared to be covered with a great deal of brown dirt, which was particularly evident in the gesso losses. Upon examination and solvent testing this material turned out to be reddish brown wax, perhaps applied both to integrate the appearance of the gesso losses and to slightly saturate the appearance of the finish surface. It served to hide the true condition of the piece, perhaps even making it more salable in the auction market where this piece had been purchased.

Case Studies 1979–1992

The author has treated other New York City pier tables and card tables in the past which are possibly even attributable to this maker and which resemble this table in form as well as in the techniques used in construction, surface finishes and decoration. Due to the degradation of the coating and the resultant loss of optimum optical properties they all had to have their finish surfaces treated. Drawing on the experience provided by these case histories from her own archives as well as on the advice in consultation with colleagues helped the author to decide on very different courses of treatment for all of these tables.

The following are six brief examples the author undertook which range in character from the radical intervention of a twenty six year old to the conservative restraint of someone fast approaching mid-century. In description they include complete removal of the finish coating and refabrication of the decoration, removal of the finish coating adjacent to the original decoration, mechanical removal of the finish coating on top of the decoration, cleaning and reforming the original coating and finally cleaning and re-saturating the original coating.

Figure 3. Roper House New York pier table, after treatment.

The first example dates from a treatment undertaken in 1979.[2] It is a New York City pier table from about 1825 attributed perhaps to Joseph Meeks's workshop. (fig. 3) The finish was severely degraded and at the time the author felt that a complete restoration was the only course of action. After documenting the decorative bronze powder stencil pattern, both photographing and tracing it in order to copy it, the surface coating was removed from the frieze and the plinth and rebuilt using a shellac-type French polish, leaving only the decorative freehand gilding and border pattern on the frieze. The bronze powder stencil decoration was reapplied on this newly-polished surface and sealed with polish on a pad. The end result is a mahogany veneered surface from which the finish has been completely removed and newly-applied adjacent to the original freehand gilded lyres and border decorations. This technique results in an abrupt step in the surface thickness at the edge of the sections of original decoration that were saved.[3]

The next treatment took place in 1983, coincidentally the year the author first attended an AIC meeting and started cultivating greater awareness (and guilt) about restoration. This New York pier table from the same period illustrates the result of having had the finish removed around the elaborate freehand-gilded decoration and being French polished. (fig. 4) This approach saves the original decoration and reveals the figured veneer but loses the original coating. Like the

Figure 4. Roper House pier table, after treatment.

Figure 5. Edgewater New York pier table after treatment.

previous treatment, it, too, has a stepped appearance.[4]

Another approach involves a New York City pier table circa 1825 delivered to the conservator's studio in 1985 which had a darkened, degraded finish coating which had already been treated. It had been roughly cleaned off in some areas on the frieze and a coat of fresh shellac had been applied over it. The losses in the gilt decoration had been inpainted with bronze powder paint. The author removed the new shellac from the degraded finish from the freehand gilded decoration using thinned shellac, rolling it off with a saturated swab and mechanically removed the bronze powder paint. The author then removed the finish adjacent to the decoration with a commercially available paint remover. The losses were ingilded using oil size on a French-polished shellac surface and etched in the shading lines with a sharp tool. The author then toned the new gilding and French polished the surface overall. The end result is mixed. (fig. 5) The wood and decorative gilding are clearly visible but upon close examination one sees a stepped effect where new finish transitions to original decoration which is embedded within thicker old finish.[5]

The next example is a treatment completed in 1987. This New York pier table closely relates to the two previous tables. Its decorative gilding work is related to the work found on both Meeks and Deming and Bulkley attributed tables but has an ebonized mahogany veneered surface. It, too, has a central bronze powder stenciled pattern with flanking freehand gilded lyres and stenciled border on the frieze. A gilt border pattern frames the mirror and striping frames the stone pilasters. The plinth has an inner locking ring pattern on its face. In this case the untreated finish was very dark and poorly adhered. (fig. 6) After no success with the results from solvent testing, the author gently sanded through the powdery, dark finish to the point where the decorative gilding appeared bright and then saturated the ebonized surface with ethanol. She lightly sanded the surface smooth and French polished with shellac as a final coat. When she saw the table several months later, disappointingly, the ebonized surface had slightly blanched.[6]

Figure 6. Ebonized New York pier table before treatment.

Figure 7. New York pier table, one of a pair, after treatment.

Figure 8. Deming and Bulkley card table before treatment.

The following illustration draws from a pair of New York pier tables the author treated for a private collector in 1991. Both of them have an indented arched frieze with a central floral ormolu mount and a delicate stenciled border pattern with an oil-gilded double reed molding below. The plinth shelf has an extraordinary freehand gilded decoration on the top which reflects in the mirror in back. They both had an extremely degraded finish but evidence of the original, clear, highly glossy varnish could be found under the mirror frame when the table was disassembled. In consultation with Christine Thomson the author cleaned the clear coating using an acetone gel cleared with mineral spirits. She then reformed the finish with a commercial product called Qualarenu, a mixture of ethanol, isobutyl isobutyrate, propylene glycol monoethyl ether, naphtha, methanol and toluol which according to the MSDS sheet may cause dizziness, loss of balance and coordination, unconsciousness, respiratory failure and even death. It seemed to saturate the finish, however. Application of this product left a somewhat swelled, irregular surface after it evaporated which was then lightly sanded and finally French polished with shellac. The end result is a reformed original finish which is saturated and through which the appearance of the decorative gilding and mahogany veneer is enhanced. (fig. 7)

The final comparative illustration is a from a treatment the author undertook in 1992 on a Deming and Bulkley attributed card table in a private collection in the Miles Brewton House in Charleston, SC which boasts some of the most accomplished carving, choice of exotic woods and decorative gilding work ever to be incorporated in one piece. The top is veneered in rosewood and has a satinwood cross-banded perimeter within which is a freehand gilded grapevine pattern. There are gilded motifs on the center front and on the chamfered sides of the frieze. Spiral-turned support columns are in back with alternating oil gilded and verte antique twisted reeds. The front is supported by carved dolphins with oil gilded and verte antique surfaces. The lower plinth shelf has a central motif on the top and a laurel pattern on its face, both executed in freehand gilding. It rests on four carved dolphin feet again coated in gilt and verte antique. It retains its tooled velvet playing surface and chip pocket lining. Its entire surface coating was very dark when the author first examined it for treatment in 1992. (fig. 8) Most of the surface cleaned beautifully with acetone gel cleared with mineral spirits except for the top of the plinth. For this area, on the advice of Joe Godla the author used a xylene, water and Triton X-100 mixture cleared (theoretically) with xylene. The border pattern on top was cleaned by abrasion. To the top and

Figure 9. Detail of face of frieze, after resaturation.

the top of the plinth surface the author applied Qualarenu to reform the finish. She applied a dilute Soluvar gloss barrier coat overall and then lightly French polished the surface with shellac. As they were found to be too time consuming and cost prohibitive to clean, the carved elements were barrier coated or overpainted with reversible or chemically exclusive materials to visually recreate the original oil gilded and verte antique surfaces. [7]

Treatment

When approaching the Deming and Bulkley pier table treatment which took place from 2000 to 2001 the author, by chance, discussed this finish conservation problem with Arlen Heginbotham. He had successfully treated degraded surface coatings with Acryloid B72 in Cyclosol 53, a very slow evaporating, 100% aromatic solvent manufactured by Shell. Using the slow drying properties of the solvent it allows the resin to penetrate deep within the surface. The author became very optimistic about this new option. Arlen's WAG presentation in 2001 covering the optical properties of a varnish coating and methods of achieving a resaturated appearance with this method can be reviewed in the 2001 WAG Postprints.[8]

The first phase of the treatment was to clean the reddish brown wax from the surface using Shellsol 340 ht and Stoddard's in succession; both have very low aromatic content. Three applications, washed on with large cotton swabs until clear in color removed the visible wax but may have also driven some wax further within the very degraded and cracked finish. Tests with a 15% B-72 solution dissolved in Cyclosol 53 resulted in no change of appearance after evaporation. Instead, drawing upon the property of a low molecular weight synthetic resin, and one which the author felt would be more compatible with any wax residue left after cleaning, she tried a fully-saturated alicyclic hydrocarbon resin soluble in petroleum distillates: 15% Arkon P90 in Stoddard's solvent. It had been studied by René de la Rie and introduced to the author through the Getty paintings conservation lab and suggested and used by Joe Godla on several furniture treatments in the early 1990s.[9] It successfully saturated the coating. (fig. 9) After securing loose veneer and repairing veneer losses the author brushed on approximately seven successive coats of the resin formula and wiped off any excess which did not penetrate, allowing each application to dry, sometimes over night, to observe the effect. The final coats were padded on. Afterward it felt dry to the touch. Aware of the fact that this resin has a fairly low glass transition point and remains soft and when exposed can even be pulled of with the application of wax, the author made two to three passes over the surface with a shellac pad to seal it. Studies by Hans Piena on Regalrez, a synthetic resin closely related to Arkon P90, published in *JAIC* in 2001, distinguishing between types of

Figure 10. Deming and Bulkley pier table after treatment.

Regalrez, cite this low glass transition problem and recommend Regalrez 1126 with its higher molecular weight and higher glass transition point for use on objects in the public sector.[10]

During the course of treatment the author realized that during a previous restoration the front feet had been rotated when reattached, with their back sides toward the front. The actual fronts had been protected and were in much better condition than the rear. Carving losses were built up on the two front feet with Araldite carvable epoxy and were completed incorporating traditional gesso fills and water gilding on the feet. Pilaster bases were replaced and were fabricated out of mahogany using a pattern from another pier table whose molding profile conformed to the shadow left by the originals. They are oil gilded and patinated. The marble columns were cleaned of excess glue and the stone surface waxed and buffed. (fig. 10)

Conclusions

In retrospect and upon reflection the author can say that she might have done things differently. This succession of treatments parallels her awareness of the potential and pitfalls of saving an original finish on furniture of this type. A coating on classical furniture should function and appear as it was originally intended and should be transparent in order to enhance an exotic wood or reveal gilt decoration. With these synthetic resins as tools at our disposal we can utilize their properties and come closer to achieving this goal as required by the dictates of the piece or client. These approaches to treatment even at their best still bring to mind the philosophical discourse regarding reversibility in light of the debate between reforming and saturation of a finish coating. As long as our field continues, the choices of the conservator will always remain open to question.

Melissa Carr and the author are currently collaborating on a project and Melissa has been achieving some remarkable results using solvents to reform severely degraded coatings. Let us all hope that her presentation is forthcoming and that the dialog will continue.

Acknowledgments

Many thanks to Joe Godla, Arlen Heginbotham and Christine Thomson for their suggestions and insights in helping execute these treatments. Many thanks to Carlie and Lori Berlin for their support during this project and the kind permission of Richard H. Jenrette.

Notes and References

1. See McInnis, Maurie D. and Leath, Robert A. "Beautiful Specimens, Elegant Patterns: New York Furniture for the Charleston Market, 1810–1840" in *American Furniture*, edited by Luke Beckerdite, Hanover, NH: University Press of New England for the Chipstone Foundation, 1996, pp. 137-174, for a description of the firm, its furniture products and the market and taste in Charleston that supported it.

2. This table is in the collection of Richard H. Jenrette and is located in the William Roper House in Charleston, SC.

3. See Moyer, Cynthia "Conservation Treatments for Border and Freehand Gilding and Bronze-Powder Stenciling and Freehand Bronze" in *Gilded Wood: Conservation and History,* edited by Deborah Bigelow, Madison, CT: Soundview Press. 1991, pp. 335-336 for a complete description of the technique used to reproduce the stencil pattern.

4. This table is in the collection of Richard H. Jenrette and is located in the William Roper House in Charleston, SC.

5. Ibid., pp. 337-338 for a complete description of the technique used to clean and polish the surface and ingild the freehand gilded pattern. This table is in the collection of Richard H. Jenrette and is located in Edgewater in Barrytown, NY.

6. Ibid., pp. 336-337 for a complete description of the surface treatment. This table was owned by a New York City antiques dealer, Anthony Ingrao, Inc. and later purchased by Carswell Rush Berlin, Inc.

7. This table, which descended in the Alston Pringle family, is illustrated in the McInnis/Leath article cited above, fig. 1, p.137 and fig. 22, p.160. My husband, Joe Godla, has since discouraged me from using Qualarenu which is more in keeping with my low toxicity/low tech approach to conservation I have tried to develop.

8. See Heginbotham, Arlen "What's Old is New: B-72 and the Treatment of Degraded Furniture Finishes." in *2001 Wooden Artifacts Group Postprints* of the American Institute for Conservation, pp. 41-56.

9. See Rie, E. René de la and McGlinchey, Christopher W. 1990 "New Synthetic Resins for Picture Varnishes" in *Cleaning, Retouching and and Coatings*, ed. J.S. Mills and P. Smith. London: International Institute for Conservation of Historic and Artistic Works, pp. 168-173.

10. See Piena, Hans 2001 "Regalrez in Furniture Conservation" in *Journal of the American Institute for Conservation* 40: pp. 59-68.

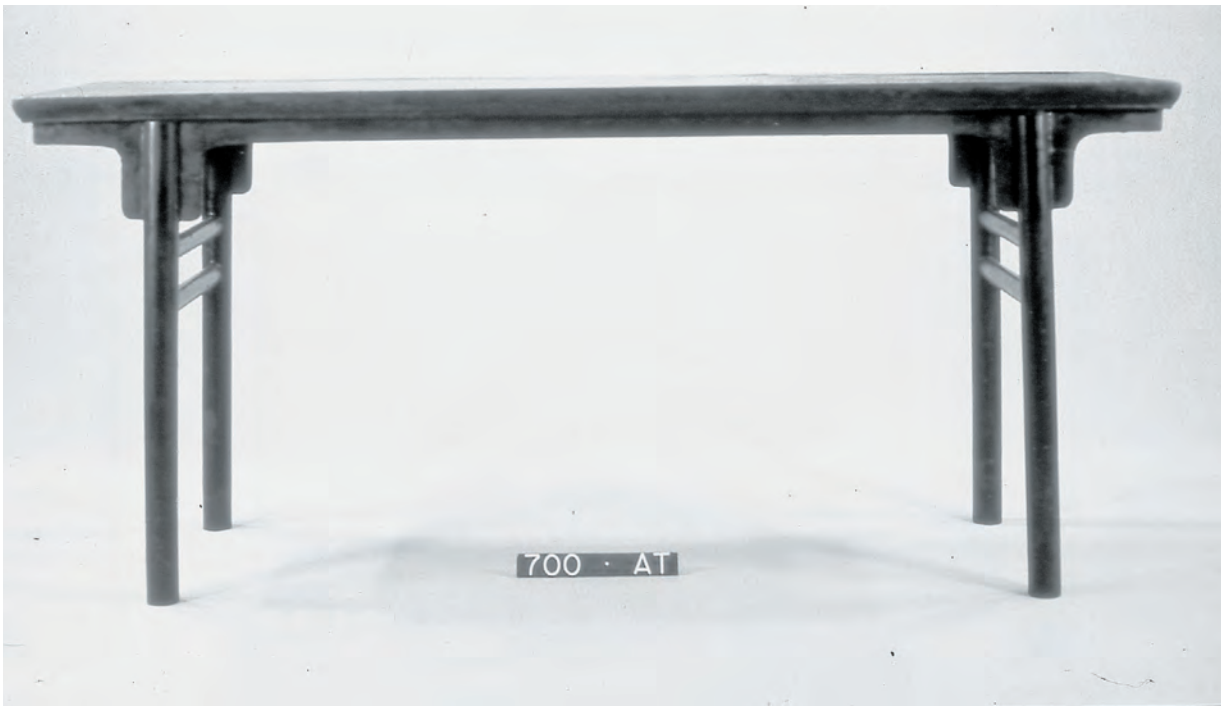

Figure 1. Lacquer table from the Ming dynasty, c. 15th century.

Figure 2. Export lacquer card table, c. 1800.

Lacquer Loss Compensation Revisited: More Big Holes in the Top

Melissa H. Carr

Abstract

This paper presents the treatment of a Chinese export lacquer card table (1800–1815) with uninterrupted provenance in one home and family. The table is one of a pair owned by the Society for the Preservation of New England Antiquities (SPNEA) and its treatment was designed and executed with the intention that the second table would be similarly treated at a later date. The paper focuses on the consolidation of the lacquer and the compensation for the multiple large losses on the top, including the losses to the decorative images. Details on the preparation of the proposal and treatment estimate are included.

Introduction

Chinese lacquer furniture goes back much further than Chinese export lacquer furniture. Figure 1 illustrates one such earlier example, a black lacquer table from the Ming dynasty, c. 15th century, in a classic Chinese furniture form.

In the 18th century, 300 years after that table was made, China opened up to trade with the West. When it did, Chinese craftsmen began to make lacquer furniture using European furniture forms for export to the new Western markets. The furniture was luxury cargo, shipped along with porcelain and silk to wealthy Europeans and Americans furnishing their homes in the latest style, with the finest goods.

One such wealthy buyer was Theodore Lyman, a Massachusetts merchant who furnished his c. 1800 home with the best that money could buy. Some of what his money bought was a pair of card tables, one of which is pictured in figure 2.

Treatment Goals

In the 200 years since the tables were made, they suffered severe losses to the lacquer and decorative scheme on their tops. One table was selected for exhibition in the SPNEA traveling exhibit *Cherished Possessions,* prompting its arrival in the conservation lab. The goals of the treatment for the table were straightforward: stabilize the lifting lacquer, remove as much of the surface grime as possible, and compensate for the losses to the lacquer and decoration in such a fashion that the table could be appreciated as an intact representative of the best Chinese export furniture. Furthermore, the treatment should be designed and executed with the intent that the second table could be similarly treated at a later date.

Why Old Lacquer is Difficult and Labor Intensive to Treat

Lacquer starts out as a perfectly smooth, well-adhered coating. It is also durable, being insensitive to heat, oil or water. But as lacquer ages it oxidizes, cracks, and delaminates, and as a consequence loses its smoothness, adhesion and durability. (fig. 3)

Lacquer oxidizes when exposed to light. The surface gets a little rough and looks dull, and it becomes sensitive to everything that it wasn't sensitive to before. Heat from a hot dish or hot knife will change the color permanently. Hand oils, as in a fingerprint, will remain etched in the surface. Water, if not removed

Figure 3. Contrast between exposed and protected lacquer surface.

immediately, will change the color and also dissolve the lacquer.

Lacquer cracks because it is a rigid coating on a moving substrate. Cracks are nature's way of relieving stress. Wood moves and lacquer doesn't, and therein lies the stress. There are different patterns of cracking varying in shape, size, orientation, and distortion from the plane. This is important to remember when it comes to loss compensation because a fill will not be believable if it fails to account for all of the variables that make up the cracking pattern.

Lacquer delaminates for the same reason that it cracks. Lacquer goes on as a viscous liquid, but once it has hardened it is useful to think of it as a rigid, incompatible veneer. Veneers come loose because the substrate moves differently than they do, and the same is true of lacquer.

Preparation of the Estimate

The estimate for the treatment was based on the author's experience with other lacquer treatments and the condition of the surface. Timed tests were conducted to see what would work to consolidate and clean the lacquer, and how long it would take to make the fills look good. Simple multiplication and division, with a bit of intuitive fudging, were then applied to calculate the overall totals.

For surface cleaning and consolidation:

- The total surface area was 3478 sq. inches: 3478
- Approximately 50% of that surface was not delaminated, so subtract 1739 sq. inches 1739
- It took roughly one hour to clean and consolidate four sq. inches, so divide 1739/4 435 hrs

The working estimate for cleaning and consolidation was 435 hours

For loss compensation

- There were eight large losses requiring duplication of the aged surface and decoration, at approx. 10 hrs. per site 80
- There were multiple smaller losses not needing texture or decoration 16

The working estimate for loss compensation was 96 hours

Consolidation

With the assistance of Marianne Webb's *Lacquer: Technology and Conservation,* the choice of con-

Figure 4. Consolidant testing.

solidating agent for the delaminated lacquer on this table was made with the following criteria in mind:

• ability of the solvent carrier to "relax" the tented lacquer where necessary so that it would lay flat
• adequate adhesion of the lacquer to the wooden substrate
• nominal penetration of the adhesive into the substrate to maintain an adequate resin coat between the lacquer and wood
• good penetration of adhesive to areas not directly accessible (the "wicking" factor)
• no damage to oxidized lacquer surface in application of adhesive or removal of excess adhesive

With those criteria in mind, the consolidant possibilities were narrowed to Aquazol and fish glue. These were then tested on both flat and tented areas of loose lacquer. (fig. 4) For areas where the lacquer was loose but flat, the following protocols were tested:

1. Dilute fish glue[1] (2 ml + 5 drops H2O + 2 drops EtOH) injected under loose but not tented lacquer, pressure overnight.

2. 10% Aquazol[2] 50/200 1:1 in EtOH/H2O 3:1 injected under loose but not tented lacquer, pressure overnight.

3. 10% Aquazol, then 20% Aquazol in EtOH/H2O 1:1 injected under loose but not tented lacquer, pressure overnight.

For the delaminated lacquer that was also tented, the following protocols were tested:

4. Dilute fish glue injected under tented area, no pre-flattening or pre-hydration.

5. EtOH/H2O 1:1 injected under tented areas and pressure overnight to flatten (no adhesive). When flat and dry, injected with dilute fish glue and weighted overnight.

6. Same as #5, with small amount of EtOH/H2O solution injected again before injection of fish glue to improve penetration to inaccessible areas.

The Aquazol mixture proved to be inadequate as an adhesive. Increasing the concentration improved its adhesive ability but reduced its penetration to the point where it was not satisfactory. The fish glue proved to be a good choice, provided that the lacquer and wood were appropriately prepared and "primed." To that end, protocols #1, 5 & 6 were used as needed.

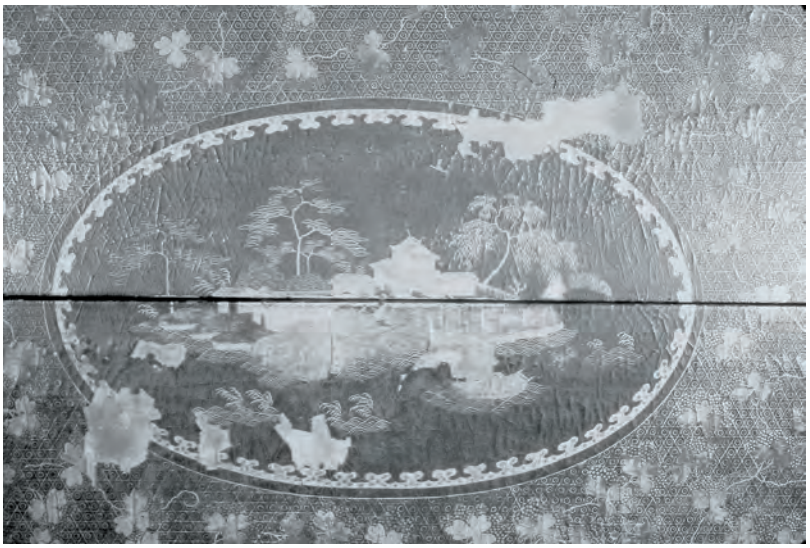

Figure 5. Detail of large losses on exposed top.

Figure 6. Mold locations for different cracking patterns.

The consolidation of the delaminated lacquer with water-based adhesives was necessarily a cautious one to avoid discoloration. Substantial oxidation on the top and legs made it essential that any excess water or adhesive be removed almost immediately. To that end, each time an area was injected and weighted, the weights were removed after a minute or so and any excess material removed with a swab. This was repeated at least twice for each delaminated area.

The application of pressure to the loose lacquer while the adhesive dried required its own variations to ensure adequate weight where needed. On especially flat areas a Plexiglas caul was placed directly over the area to be weighted and pressure applied. On more irregular areas, a sandwich of silicone-release Mylar,[3] Pellon and a Plexi caul were placed over the area to ensure that the low areas also received pressure while drying.

Loss Compensation

Compensation for the losses in the lacquer and decoration varied with the size of the loss and the degree of aging of the surface. Small losses (no larger than the diameter of a pencil) could be filled with pigmented wax, Modostuc,[4] or any one of a number of filling materials that could be leveled and toned to be unobtrusive. With larger losses (fig. 5) the surface quality of the old cracked lacquer needed to be duplicated, including the color, gloss and decoration. For these losses, a simple flat fill of Modostuc or wax was not acceptable.

To duplicate the surface quality of the old cracked lacquer, the first step was to "copy" the old surface with a silicone mold. On this table there were at least three distinctly different cracking patterns in the areas of loss. Silicone rubber[5] molds of intact surfaces in each area were made so that losses in those areas could be compensated with casts of the same pattern. (fig. 6)

The second step was to make casts from the molds, effectively creating synthetic veneers that could be fitted into the areas of loss. The synthetic lacquer casts were made from a bulked epoxy[6] toned with dry pigment[7] (iron oxide black) to shift the color towards the original surface. The amount of pigment relative to the epoxy was by eye, so there was some variation in the final grey color of the casts. Pencil rubbings outlining the losses were then glued onto the epoxy casts in the appropriate

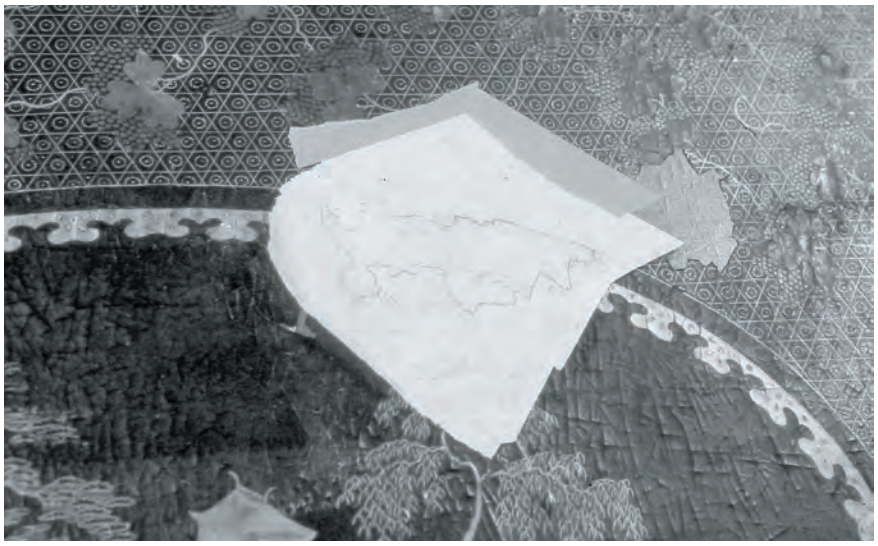

Figure 7. Replacement lacquer veneer cut to fit irregular loss.

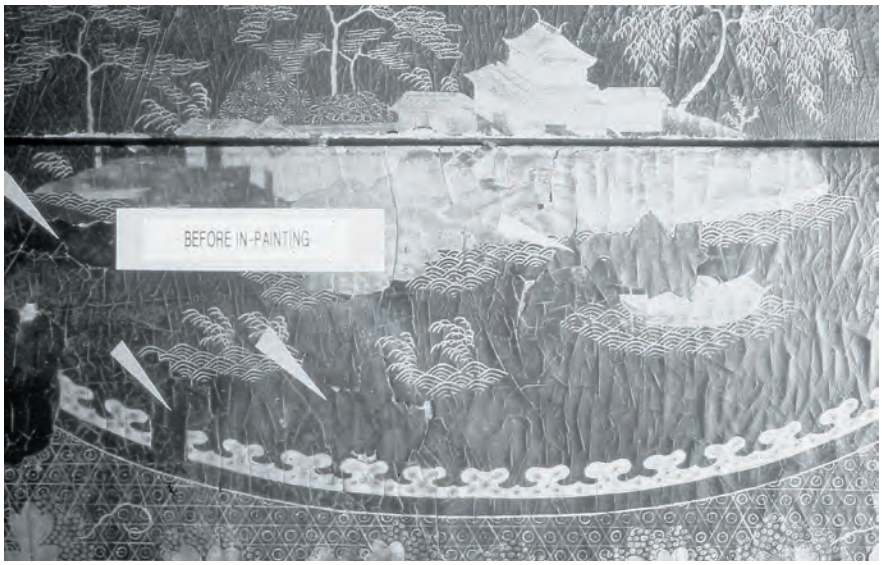

Figure 8. Toning background color of replacement lacquer before in-painting decoration.

orientation, and cut out with a back-bevel using a jeweler's saw. (fig. 7) The thickness of the cast was adjusted with coarse sandpaper. The fills were adhered with liquid hide glue,[8] and the small seam gaps filled with pigmented beeswax.

Once the replacement "lacquer" was in place, the next step was to color it to match the brown-black of the original lacquer. Prior to coloring it, the oxidized original surfaces were coated with 10% B-72[9] in Cyclosol[10] to restore saturation. The replacement lacquer was then air-brushed to match. (fig. 8) As needed, surfaces were polished with bone black pigment and Stoddard solvent to adjust gloss.

Decoration

The final step in loss compensation was to reproduce the missing decoration of leaves, flowers, part of a boat, and the diamond grid line. This involved replacing the missing or incomplete images, and also duplicating opacity, color and wear patterns. Initial attempts with traditional in-painting techniques and a hare-brained effort with colored pencils were all deemed unacceptable. Ultimately, the best result was achieved with a variation on oil-gilding.

The decorative leaves and shapes were sketched on with pencil and sized with a tinted quick oil size. (fig. 9) The oil size was tinted red, green or

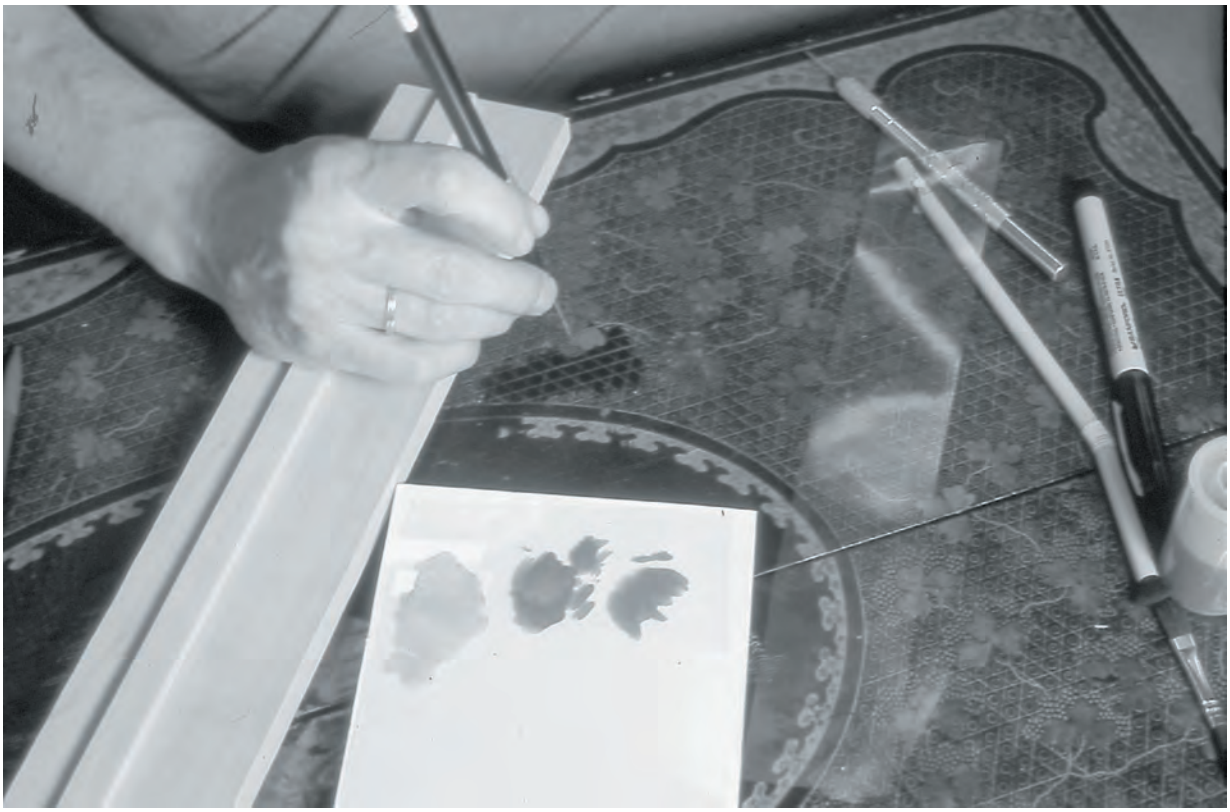

Figure 9. Sizing the missing decorative images with quick oil size.

Figure 10. The top after treatment.

yellow depending on the final color desired. The sized image was then "gilded" with mica pigments. After the gilding, the fine lines of the grid were easily trimmed with a sharpened bamboo skewer to thin the line width.

Gilding on the surface with mica pigments was not an ideal substitute for the original technique of embedding gold powder between lacquer layers. The mica pigments were somewhat transparent, their reflectivity varied with angle of viewing, and the palette was limited. Nonetheless they were deemed acceptable.

Conclusion

The result of this treatment was a table that appeared to be old but well-maintained, with its surface secure and complete and the decoration largely intact. (fig. 10) The treatment of the second table at a later date should proceed along the same lines, with the necessary adjustments for differences in surface sensitivity and intended use.

The author thanks the following colleagues: Nancy Carlisle, Michaela Neiro, Holly Salmon, Jessica Chloros, Tania Wilcke, Cynthia Moyer, and most especially, Joe Godla, Director of Conservation at SPNEA.

Materials Used

1) 3110 RTV Silicone Rubber®. Dow Corning Corporation (mfr), Midland, MI 48540;
Essex Group, Fort Wayne (distr), IN, 800-774-4643.

2) Aquazol® (poly(2-ethyl-2-oxazoline), water- and alcohol-soluble resin, available in mw=50, 200, 500). Conservation Support Systems, P.O. Box 91746, Santa Barbara, CA 93190-1746

3) Araldite® 1253 (aromatic epoxy bulked with titanium dioxide, amorphous silica, iron oxide, and phenolic resin). Ciba Specialty Chemicals Corporation of North America (mfr.), East Lansing, MI 48823-5691, 517- 351-5900; Plastic Tooling (distrib., special order), 800-328-8788; Industrial Sales Assoc. (distrib., kits only, minimum of 24 kits), 978-851-9494, or for individual 5 oz. tube kits ($9.50): RNS Direct, 770-844-1748.

4) B-72, Paraloid® (a copolymer of ethyl methacrylate and methyl acrylate). Rohm and Haas (mfr.), Pittsburg, PA; Conservation Resources International, L.L.C., 8000-H Forbes Place, Springfield, VA 22151, 800-634-6932.

5) Cyclosol 53 (slow drying aromatic solvent blend, including trimethyl benzene). Guard-All Chemical Co., P.O. Box 445, Norwalk, CT 06856, 203 838-5515; (To obtain product literature from manufacturer: Shell, 3200 Southwest Fwy., Ste. 1230, Houston, TX 77027, 800 457-2866).

6) Dry pigments. Pigments are selected on the basis of long term stability and colorfastness. Various suppliers and manufacturers including: Kremer Pigments, 228 Elizabeth Street, New York, NY 10012, 212-219-2394, Mohawk Finishing Products, Inc., Rt. 30 North, Amsterdam, NY 42010 (518) 843-1380, and Conservator's Emporium, 100 Standing Rock Circle, Reno, NV 89511, (775) 852-0404.

7) Fish Glue (liquid). Kremer Pigments, Inc., 228 Elizabeth Street, New York, NY 10012, 212-219-2394.

8) Modostuc (PVA-based water-soluble putty). Peregrine Brushes & Tools, P.O. Box 200, 41 North Center, Wellsville, UT 84339.

9) Mylar® (polyester film), manuf. Dupont, optically clear, colorless, chemically inert (no plasticizers), dimensionally stable

10) Titebond® Liquid Hide Glue. Franklin International, Columbus, OH 43207, 614-443-0241.

Figure 1. Late 18th c. American chest of drawers. Primary wood is cherry. Private collection.

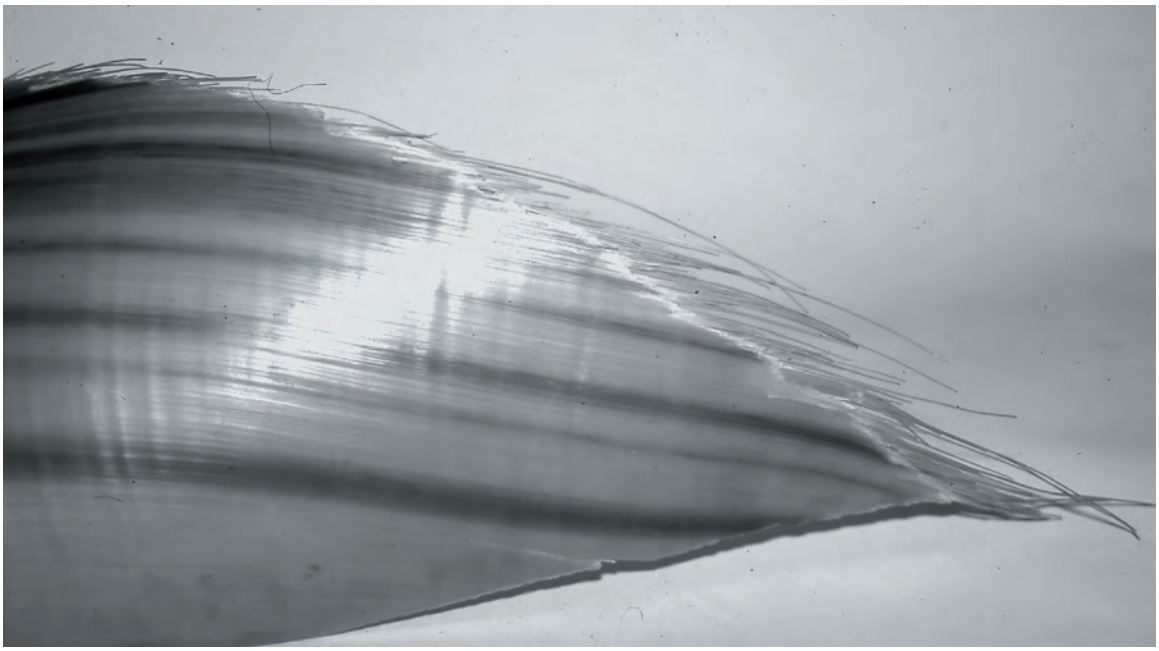

Figure 2. Baleen showing color variation and hair-like outer edge. Mystic Seaport Museum.

Baleen: Its Use as Line Inlay on an 18th century Chest of Drawers

Randy S. Wilkinson, Furniture Conservator, Fallon & Wilkinson, LLC

Abstract

Baleen was found as line inlay on an 18th century American chest-of-drawers. This paper focuses on baleen source, working properties, and historical use. The identification of baleen will be described, focusing on gross examination, microscopy, and physical properties. The paper concludes with a closer look at the chest on which the baleen was found, discussing how it was used and the particular construction details of the chest.

Introduction

In the summer of 2002 a graduated chest-of-drawers came into the lab for conservation (fig. 1). The chest arrived with four other objects that required treatment, all of which needed considerable conservation work. However, after initial examination, the chest required only minor compensation of several losses to the inlay and minor in-painting of the coating. The treatment seemed straightforward and little attention was paid to the chest until the actual treatment was started. Now under closer inspection of the line inlay, I noticed that the darker line appeared to be a semi-opaque green-colored wood that had a strange appearance. Looking more closely, I suspected that it was not wood. I had never seen baleen used as a line inlay on a case piece of furniture. My only exposure to baleen was while as an intern at the Mystic Seaport Museum in Mystic, Connecticut. During my time there, I was exposed to a very special class of materials that are often associated with nautical objects, one of them was baleen. At this point I was intrigued by even the thought of finding baleen on a case piece of furniture and even more interested in how it was bent into such tight radiuses.

Baleen

To get a better understanding of this material, a brief overview of baleen is in order. Baleen is a flexible, horn-like material from the upper jaw of the whale, that grows in plates. (fig. 2) There are two basic classes of whales, the difference between them is defined by their feeding mechanism. Toothed whales feed by tearing their food and baleen whales feed by the special filtration created by the baleen. Baleen grows in triangular sheets that can reach lengths of 10-14 feet. The flat surface of the baleen is smooth with visible ridges and looks like horn; the inner surface of the baleen resembles coarse hair. The color can range from black, grey, brown, pale green, to cream. The color can vary depending on the type of whale that it came from and the location within the mouth.

Baleen is a protein, specifically keratin. Keratin is a sulfur-containing protein that forms the horn-like tissues, such as fingernail, hoof, horn, and hair. This protein is unaffected by polar solvents, but is easily broken down by alkaline earth sulfides (Lauffenburger 1993). Keratin can be softened and then easily worked by boiling or soaking in hot water.

History

Historically, baleen has been used for centuries and more recently was a by-product of the whaling industry. It found its height in the American market in the mid 1850s. It was used as an early form of plastic because of its ability to be bent and when cooled, retain its shape. Therefore it was used for corset stays, buggy whips, combs, brushes, and in native Alaskan culture, it was used extensively for making baskets.

Figure 3. Whale bone, ivory, and baleen box, ca. 1900. Work of the King Island Eskimos. Mystic Seaport Museum.

Figure 3 is an example of a whalebone and walrus ivory box. It is the work of the King Island Eskimos and was made before 1900. The box has a wood substrate wrapped with baleen. The four long rectangles and four seals are of walrus ivory and are lashed to the box with baleen.

In the 19th century, baleen was processed and sold in strips. At the peak of the baleen market, the amount of baleen harvested could pay for an entire whaling voyage (Matthews, 1968). The price of baleen fluctuated dramatically from as much as $5.00 per pound in 1907 to as little as seven cents a pound in 1912 (Lee 1983).

Examination

Returning now to the line inlay on the chest, it was still only speculation on my part that the material used for this inlay was indeed baleen. My first step was to view the inlay under the stereo microscope and I saw no indication of the characteristic of wood. No rays, vessels, fibers, etc. My next thought was to probe the inlay with a hot needle and the odor of burnt hair was observed. Finally I received permission to sample the inlay. The sample was split into two sections. The first section was placed in a ceramic well, with the addition of sodium hyperchlorite. I observed that the sample slowly disintegrated. Both of these tests are simple ways of determining if a sample has a protein component.

The second section was embedded in epoxy resin and polished. I was also able to obtain a sample of baleen, courtesy of the Mystic Seaport Museum and embedded that sample as well, for comparison with the sample taken from the chest. The samples were then taken to the Conservation Department at the Metropolitan Museum of Art and viewed using a Zeiss Axioplan 2 compound light microscope equipped with two UV cubes.

Figure 4 is of the baleen sample given to me by the Mystic Seaport. Notice the characteristics of a three-part structure: a central section of tubulars, a cementing mixture and the horny outer layer. This sample is particularly nice since it shows the tubular structure. Positive identification of baleen is made easier if the sample shows all three of these characteristics. Figure 5 is a photomicrograph of the sample of the inlay taken from the American chest. Notice it has the same characteristics of the sample from the Seaport (fig. 4) but lacks the presence of the tubular structure. If we now compare Figures 4 and 5 with that of a sample of ebony. (fig 6) I think it is now safe to say that the line inlay found on the chest-of-drawers in not wood, but rather baleen.

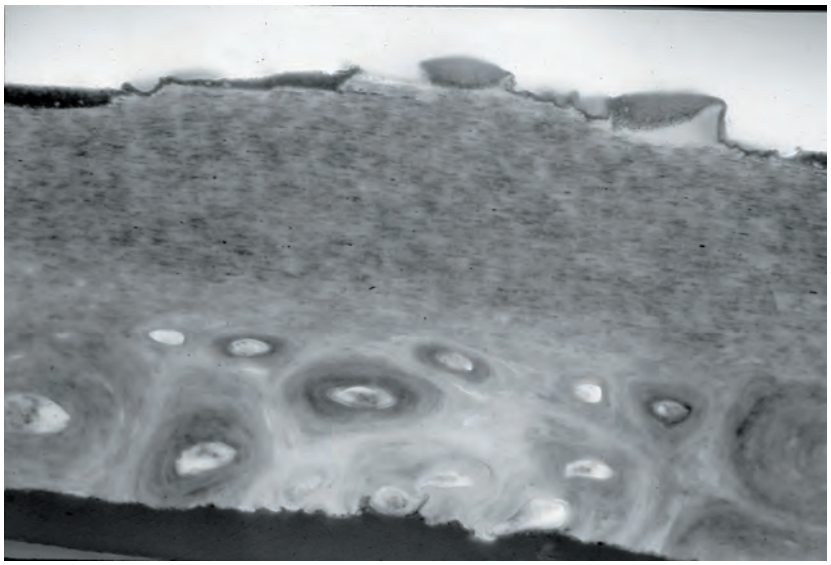

Figure 4. Baleen sample courtesy of the Mystic Seaport Museum (100X).

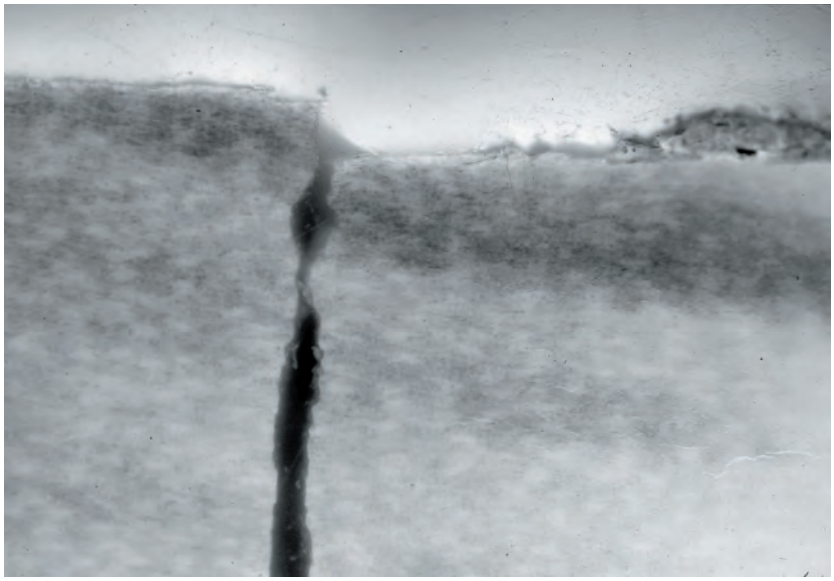

Figure 5. Baleen sample taken from the American chest of drawers in Figure 1 (100X).

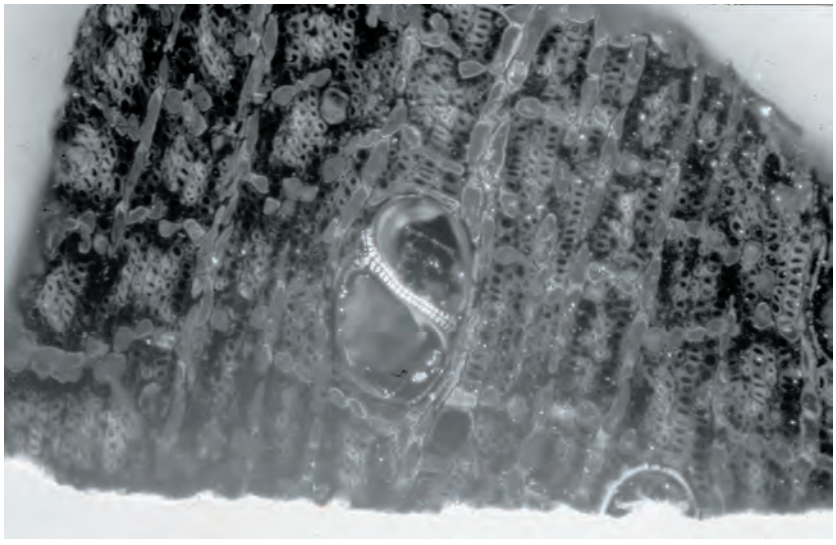

Figure 6. Ebony. Courtesy of Mechthild Baumeister, Metropolitan Museum of Art.

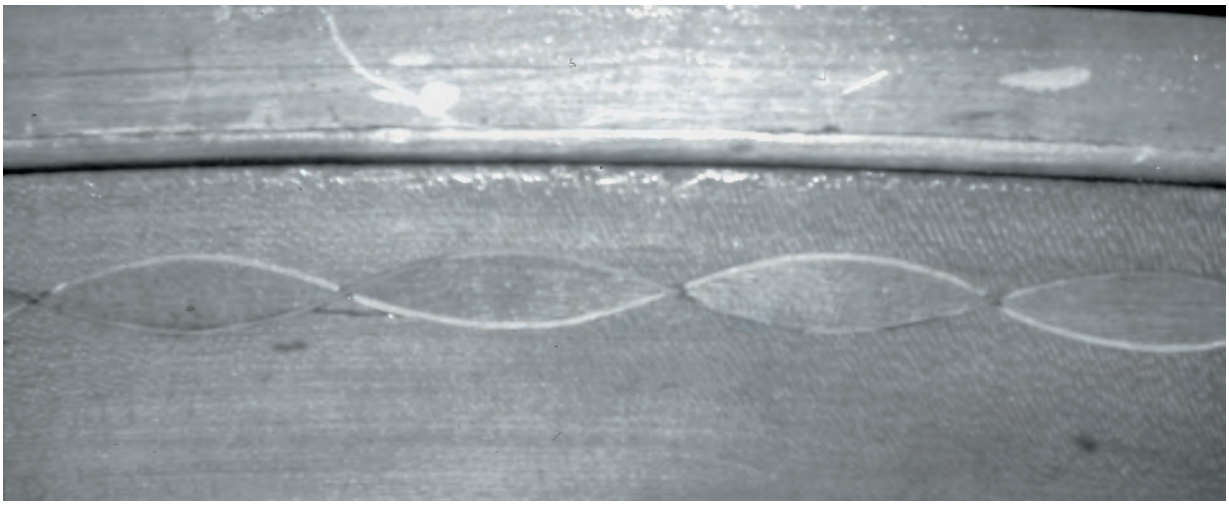

Figure 7. Line inlay wave pattern on the drawer fronts.

Before continuing with a discussion of the inlay found on the chest, I would like to make a few comments about identifying baleen. First of all, different colors of baleen auto-fluoresce differently. In this particular case, the sample of baleen taken from the Seaport was black in color and fluoresced a bright blue. The sample taken from the chest was grey-green in color and fluoresced white, similar to fingernails. Second, the length of the baleen can be the only positive way to differentiate it from horn. If the inlay in question is short, less than 12 inches, it could be horn. But if the inlay in question is long, in the case of the inlay on this chest, which was 20″–25″ in length, it rules out the possibility of horn. I did explore the option of having FTIR analysis performed on the sample but learned that it would only yield results consistent with keratin but not distinguish between horn and baleen. Finally, it can be particularly difficult to positively identify baleen by sight alone.

Figure 8. Shield detail inlayed into the front of the case of the chest.

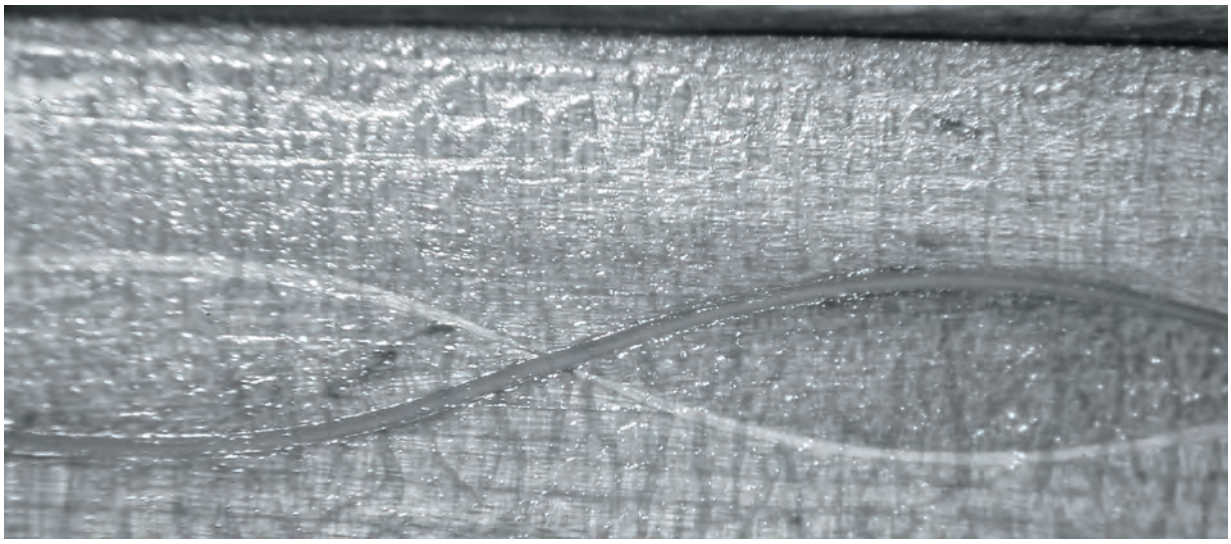

Figure 9. Detail of the quarter sawn cherry inlayed between the baleen and light wood.

Baleen on an American Chest of Drawers

Confident now that the line inlay was baleen, a closer look at its use on the chest is appropriate. The history of the chest is unknown and has no provenance. The owner of the chest lives in upstate New York and the chest descended down to her from her grandmother who lived in New York City. This is the only information I have about the chest's origin. The chest is made of cherry and has poplar and pine secondary woods. One of the first things that struck me about the chest was its unusual form. I believe the chest to be a transitional piece due to the ogee bracket base and the use of line inlays. Also of note is the shape of the drawer fronts, which are simply concave.

The baleen inlay was used both on the front of the chest sides, between the two inlayed shields and on the drawer fronts as line inlayed into a wave pattern. Most intriguing was how the baleen was bent and how the person who made this chest clearly knew it was easier to bend baleen into a tight radius than it was to bend wood. (fig. 7) The baleen was chosen to be used for the line inlay to conform to the shape of the shield. (fig. 8) Notice how tight the radius is and how the baleen tapers to almost nothing at the ends.

Equally intriguing are particular construction details of the chest. Notice the lozenge shapes between the line inlays. (fig.9) Although these pieces are cherry, they are not part of the drawer front, but rather are cut from quarter-sawn cherry and inlayed into the drawer front between the baleen and the light wood. This is a highly sophisticated technique. It would be difficult enough to do this on one drawer front, but remember, the drawers are graduated, so the period of the alternating wave pattern has to change to accommodate the difference in drawer height while still maintaining a consistent width.

There are other interesting construction methods used in the fabrication of the chest. The top of the chest is attached to the case sides by means of mortise and tenon. The top of the case sides has a series of tenons, 3/8″ wide x 13/16″ long, extending along the entire width of the side. The top was mortised to accept the small tenons and simply glued down. The drawer lips are unusual as well. One would expect to see an overlaid drawer front, typical of the Chippendale style, or cock beading, more typically found on Federal furniture, but true to form, this chest is unique in all its aspects and has a simple quarter round applied to all sides of the drawer front. The top of the chest is inlayed as well. It has a single line inlay with two of the same lozenge-shaped quar-

ter sawn cherry motifs inlayed into the front corners. Finally the back leg of the ogee bracket base is dovetailed to the side bracket.

The main point for calling attention to all of the construction details is to suggest that even though the form of the chest is unusual and might be considered a rural craftsman's attempt to duplicate a higher-style urban chest, the actual techniques used in constructing the chest are highly refined and took considerable skill.

Conclusion

In conclusion, it is my belief that baleen was used as a line inlay on the chest-of-drawers. My simple chemical analysis, along with the microscopy strongly suggest that the inlay was baleen. Furthermore, and probably more important in the identification, is the length. With sections in length of up to 25 inches, it almost certainly rules out the possibility of horn. It has been suggested that baleen has been used in the decorative arts for centuries. Its popularity grew a availability increased and thus reached its peak use during the height of the whaling industry. Baleen went from being used infrequently and being found only on nautical objects, to being processed, machined, and packaged for sale abroad.

In addition, baleen has excellent working properties, making it an almost perfect form of early plastic. Its color variation lends itself to be easily substituted for ebony, bone, and in this case, pale green wood.

Armed with all this information, that baleen has excellent working properties, was readily available, had nice color variation, could be worked in long lengths, it would be logical that baleen should be found quite frequently on American furniture, certainly on furniture made in the seaport cities. But logic does not always bear out the facts. To my knowledge, this is the only American piece of furniture having baleen used as a line inlay. I have polled curators, conservators, and collectors, and Robert Mussey was the only person who had even seen baleen used before. I believe he said that he had seen it on a chest in Bermuda.

My main goal for presenting this information is not to make anyone an expert on identifying baleen, but rather raise our profession's awareness to the possibility that some of the objects in our care or collections may indeed have baleen as an inlay. I suspect that it was used far more frequently used than we have discovered.

Acknowledgments

I would like to thank Dave Mathieson and the Mystic Seaport Museum for their support and allowing me to photograph objects from their collection. I would also like to thank Marin Manuels and Mechthild Baumeister from the Metropolitan Museum of Art for their generous assistance with the microscopy.

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About the Author

Randy S. Wilkinson is a 2000 graduate of the Smithsonian Institution Furniture Conservation Training Program, receiving his MA from Antioch University. A conservator in private practice, he specializes in the conservation of wooden artifacts and building reproduction furniture for museums and private clients. Address: Fallon and Wilkinson, LLC, 240 Scotland Road, Baltic, Connecticut.

Decorative and Functional Uses of Paper on Furniture

Angela Meincke, Chris White, Kim Nichols

In this article we will give an introduction to the wide variety of papers used on wooden surfaces and examples of examination and treatments which were undertaken at the Museum of Fine Arts, Boston. It is important to address the treatment of paper on wood surfaces because of the significant information, context and value that paper components add.

The presence of paper on wooden surfaces can pose unique challenges because of both its fragile nature and the relative infrequency with which it appears on furniture. The delicacy of paper requires conservators to take special care when treating a wooden object that includes a paper component. It is important to emphasize that any treatment of the object must consider the effect upon the paper portions in order to avoid exacerbating problems and to ensure the future stability of the paper. Solutions that improve the structural stability of the furniture but neglect to consider the paper components are incomplete. Careful consideration of the survival of paper components is an important aspect of furniture treatments.

Over the past few months we were able to study and treat several wooden objects with attached paper in the extensive collection of the Museum of Fine Arts, Boston. Once this project started we continued to investigate examples available in other museums and private collections. The opportunity to work on a large group of such objects has given us an understanding of the techniques of paper manufacture, decoration and typical types of damage.

Paper can be severely damaged when it is adhered directly to wood. Exposure to light and dust, unstable relative humidity, and wood acidity all contribute to the deterioration of the paper structure. The movement of wood in variable relative humidity can tear or distort paper. The considerations in handling delicate paper surfaces require an interdisciplinary approach involving knowledge and techniques used in both paper and furniture conservation.

We will discuss some different types of paper and their applications on furniture. In the second part we will present an overview of methods for examining papers, typical types of damage and treatment solutions, using a range of objects in the Museum of Fine Arts, Boston and private collections.

We will make a general distinction in the use of paper on furniture as being functional—such as labels, dustcovers or backing materials—or decorative, in which the paper is colored or decorated using techniques like printing, painting, pressing or covering with metal leaf.

Functional Use of Paper on Furniture

Labels, dust covers and linings

Original labels provide us with information about the manufacturer as well as the geographic area and the date of manufacture for a piece of furniture. Labels can be handwritten or printed, or both.

Dust covers or backing papers like those on mirror backs or on the tops of clocks are often made from

reused newspaper or stationery. These papers are sometimes overpainted to complement the wood color.

Linings of drawers or whole interiors are often not intended to be decorative. Plain, cheap papers, such as cartridge paper, were used. Even lining and backing papers that have been replaced or later additions can provide valuable information.

Straw marquetry

Paper is also used as a backing material for objects decorated with straw marquetry to support the individual straw pieces. The art of straw marquetry appears to have originated in the Far East in the 13th century. The technique developed in Europe in the 17th century and formed a highly fashionable trend in France, Netherlands, Italy and Russia in the 18th century, with makers including professional and religious workshops.

The technique was mostly applied to small cases, caskets or boxes, but in the 18th century several cabinetmakers created large-scale furniture beautifully decorated with straw.

Making the marquetry involved a number of techniques: pieces of straw were prepared with alum, placed in dye solutions, cut open, pressed apart and scraped out with a quill knife.[1] The dyed straw was then straightened and glued onto the paper backing. The paper backing holds the straw pieces together and increases the strength of the marquetry layer. Re-used writing paper was sometimes used as the backing paper.[2]

Wheat starch paste was usually used to attach the straw to the paper. The straw surface was generally unfinished. Varnished surfaces have been found but this is not mentioned in any of the historical descriptions of the technique.

Decorative Use of Paper on Furniture

For our purposes, the decorative use of paper can be divided into the following categories:

- Backing material for translucent materials
- Printed paper
- Paste paper
- Metal paper/pressed paper
- Lacca povera

Backing material for translucent materials

Paper was used as a colored background underneath translucent materials like tortoiseshell, parchment or thin horn or bone slices. This technique is frequently used on Boulle marquetry.

The paper backing for tortoise shell was most often painted red using pigments such as cinnabar or red lead to give the material a richer appearance. Plain, white paper, black-painted paper or even gilded paper was also used. The paper was usually adhered to the tortoiseshell using hide glue and both materials were cut together.

Colored papers

Furniture and wooden objects were often covered with multi-colored papers for decoration or to imitate precious materials.[3] This technique was most prominent during the 18th century when a variety of new manufacturing processes made the papers readily available. The decline of this technique's popularity coincided with the increasing industrialization of the 19th century.

The lining of interiors was very common, especially of drawers and boxes, but paper was also used to cover the show surfaces of smaller objects like boxes or chests. There was a wide variety of colored paper ranging from relatively inexpensive papers like the well-known marbled paper to more valuable papers like brocade paper. One can find signatures (as a kind of copyright and advertisement) indicating the maker's name and provenance on valuable types of paper, like brocade and bronze-varnish papers.

Colored or printed paper and wallpaper are related due to their parallel development. Prints on paper quires for wallpaper and stained paper were both made of rag in the same technique. They can be distinguished by the size of continuous length with repeated pattern—wallpaper gets its pattern

after assembling several quires—colored papers have smaller patterns, often with an accentuated central motif.

Many colored papers were used for stationery, bookbinding, the reverse sides of game cards, small box coverings, and chests or suitcases. The decoration of cabinets and commodes with paper began around 1600 and becomes common with the end of 17th century.

Techniques

The manufacture of printed papers developed in conjunction with printed textiles; the same type of wooden print models or stencils were used for applying color or varnish to paper. This technique has been known since at least the 1470s.

So-called paste papers were usually cheap patterned papers especially common in Europe since 1600. Paste papers faded from popularity around 1830.

The technique was originally based on a ground of gum tragacanth paste or starch paste. For additional decoration, watercolors with an addition of ox gall were used. The expense of tragacanth encouraged the transition to starch pastes as the binding medium. The paste was mixed with pigments or natural dyes and was applied to the sized paper surface. This provided a flexible medium for artistic expression, for example, the "fantasy papers" of the Herrnhuter fraternity in Saxonia, which contained lattice and cross decoration made with combs, rolling stamps with small carved wheels and cloudy shapes made by turning the thumb on the surface.

The manufacture of marbleized papers is common in Europe since the end of the 16th century. Marbleized papers are still widely used for the lining of boxes and small chests and as endpapers in books.

Colors are dropped onto a paste bath, they float and spread out, but don't intermingle. It is then possible to manipulate the colors using different tools to create a variety of patterns like floral, comb, wave and zigzag designs. The pattern is then picked up by laying the paper on top on the past bath. Every single sheet is unique. The design created cannot be fully controlled thus causing the inability to duplicate identical pieces of marbleized paper.

The process of bronze-varnish paper was also developed from techniques in the fabric industry. Wooden print models were used with white, monochrome or polychrome patterned paper. Instead of using the usual printing colors, a gold or silver varnish was used. The painted sub-surfaces were often streaky.

The peak of this technique was between 1695 and 1735; afterwards brocade papers, which allowed even more elaborate design in the time of high baroque, replaced this technique.

Pressed and brocade papers are considered the highest artistic level of paper production. The technique has been known since the early 16th century and reached its peak during the first decades of the 18th century. It developed from the embossed printing of leathers and parchments using gold leaf and brass punching tools. Engraved copper plates were used for the manufacture of brocade papers.

The paper was covered with metal leaf (usually brass or tin) and pressed with the engraved plate on a rolling press. The paper and metal leaf bonded under the high pressure, the metal leaf on unpressed areas was brushed off.

In a slightly different technique the paper was completely covered with metal leaf. The metal leaf was adhered to the paper with a weak adhesive such as animal glue size or egg white and pressed. The paper is then embossed evoking the effect of gold leather.

An excellent example of this kind of decorative paper can be found in the collection of the Museum of Fine Arts, Boston: a magnificient Herter Brothers cabinet, dated about 1880. Here additional flowers in a reddish-brown paint have been applied to the gilded paper surface, possibly with stencils.

During the Art Nouveau period, pressed papers again became popular. Often designers created whole room interiors, matching floral motifs of wallpaper, fabric and furniture paper, fabric or leather linings.

Lacca Povera or Decoupage

Lacca povera was intended to imitate Asian lacquer. A very high quality example of this technique is a Venetian secretary dated around 1730 in the collection of the Metropolitan Museum of Art in New York.[4] Lacca povera consists simply of prints that were cut out and adhered to a prepared and painted surface and varnished many times over. The many layers of applied varnish can make it difficult to distinguish between a lacquered surface and a lacca povera technique.

Lacca povera was probably first practiced toward the end of the 17th century and became especially popular during the 1720s in France, Italy and in other European countries, where it was used continuously throughout the 18th century. It was especially popular during the Rococo period with its fondness for chinoiserie.

Nearly everything was decorated: screens, folding screens, wall hangings, ceilings, the tops of coaches and sedan chairs. Printed design sheets were produced and published specifically for decoupage. Amateurs may have decorated smaller objects, but larger pieces of furniture were mostly the work of skilled craftsmen. Historical manuals contain accurate instructions of this art form with exact lists of materials and how to use them. The instructions differ slightly in their preference for glue or varnish. The most common technique is probably the following: the wood surface was carefully prepared by smoothing and painting. The cut-out motifs were glued onto the paint layer with a fish-glue animal-sizing solution followed by an application of varnish. A minimum of eight to ten varnish layers were recommended.[5]

Examination

The identification of paper fibres and paper-making techniques can provide information about the origin and history of the furniture it decorates.

The technical examination of paper on furniture can be carried out using a variety of different tech-

Figure 1. Band box with paper covering.

niques. The use of low energy x-rays, beta radiography, and transmitted light are not particularly useful when paper is applied over wood. The density of any wood substrate presents a barrier of material that is more radio-opaque than the paper layer. The transmission of the low-energy radiation that has traditionally been used to gather information about the structure of paper is ineffective in these circumstances. These imaging techniques have been used to identify water marks and paper making processes.[6] Without the removal of paper from the object, these techniques cannot be used when wood is the substrate.

Microscopic fiber identification is a useful technique for the identification of paper on furniture. Transmitted, polarized light microscopy can distinguish between many different fiber types. While there are limits to the ability of the technique to distinguish between fibers, it can provide valuable information. The identification of cotton, bast, and certain Asian fibers can help confirm the identification of paper origins and may offer insight into when and how the paper was applied.[7]

Other common techniques such as ultraviolet fluorescence and infrared photography can aid in the detection of compounds and designs not visible to the human eye. Although ultraviolet fluorescence is not a quantitative technique, it can provide information to direct more thorough testing by highlighting areas of discontinuity that could hold information about production processes or previous treatments. It has proven useful in our examinations of several objects. The use of infrared photography allows us to capture images of printed text and designs that might otherwise be unavailable due to dirt accumulation or overpainting.

More advanced techniques such as infrared spectroscopy and gas chromatography/mass spectrometry can provide much more detailed information about pigments, binders, and other compounds present in the paper. These techniques require a significant amount of expertise to carry out and interpret. The results from these tests can provide invaluable information about paper, its components, and later treatments.

To illustrate the conservation of paper on wood objects, we have outlined the examination and treatment of several objects undertaken at the Museum of Fine Arts, Boston. These examples can provide an idea of the issues involved and how we chose to carry out the treatments.

Band Box

The treatment of a 19th-century band box covered with wallpaper (fig. 1) illustrates the damage frequently encountered in wood/paper systems. The object is a Shaker-style bentwood oval box and lid. The interior is lined with newspaper and the exterior is covered with a block-printed wallpaper. The wood substrate is an unidentified softwood.

The box suffered from widespread paper detachment, buckling and lifting due to wood shrinkage, and instability due to structural problems. Analysis of the paper and residues using infrared microspectroscopy suggested that a starch adhesive was originally used to attach it. This adhesive had failed at the edges of the sheets, allowing the paper to lift and exposing it to potential damage from poor handling.

The shrinkage of wooden elements caused buckling and detachment of the paper as the surface area of the wood decreased. The relative dimensional stability of the paper coupled with the tendency of wood to shrink as it loses moisture often leads to buckling and detachment of the paper in waves parallel to the grain of the wood.

This type of damage cannot be permanently corrected without removal of the paper to accommodate the dimensional changes. However, removal of the paper is an extremely drastic measure and should be avoided. Often the buckling, although unsightly, is stable. The problem can promote loss when detachment occurs at the paper edges. As fingers and clothing brush the partially-detached edges, they may snag, tearing the paper, detaching larger areas, or snapping off brittle edges.
In addition to the detaching paper, several of the bent wooden bands had breaks that resulted in lifting wood as the tension of the structure was released. These breaks left areas of tangentially

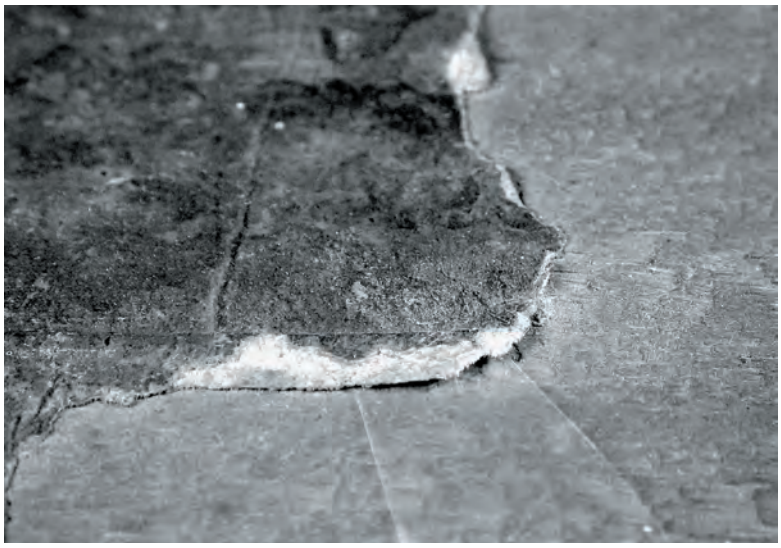

Figure 2. Lifting paper with a small Mylar barrier.

projecting wood splinters that could easily be detached in handling.

The stabilization of the box required addressing the breaks in the wood structure as well as the detaching paper. Cold-setting fish glue and clamps were used to secure the areas of lifting wood. Special care was taken to avoid applying the fish glue to areas that might transmit any water from the fish glue to the paper, potentially staining it.

The re-attachment of the paper required an adhesive that would secure the paper without allowing the migration of inks, dyes, or other soluble components. The greatest concern was the formation of tide lines within the paper or exposed wood areas as well as the possibility of changing the morphology of the paper surface. After consultation with paper conservators it was decided to use a very dry wheat starch paste adhesive.

We have found over the course of several object treatments that wheat starch paste provided the best adhesive to attach paper to a wooden substrate. We also noticed that the type of wheat starch used and the way it is prepared has a noticeable effect on how it behaves during treatment.

The staff of the Asian conservation lab makes a wide variety of wheat starch pastes for different applications. They provided us with the paste and the technique for producing the driest, most adhesive paste possible. This is the paste that the Asian lab uses to attach paper to wood in their own conservation treatments. They use precipitated wheat starch paste mixed in the ratio of four parts water to one part dry powder. This mixture can later be thinned with water to produce an appropriate adhesive. The result should be a smooth, thick paste.

One of the dangers of using any adhesive on paper is the tendency of the solvent to wick into the paper structure and saturate the surface, effectively consolidating any surface dirt and significantly changing the appearance of the treated area. We found that despite making the driest possible paste there was still the problem of saturating the paper surface. In order to remove additional water we first spread the paste on a cotton blotter.

We used Mylar strips as barriers between the paper and wood to avoid accidentally applying the paste to nearby surfaces (note the Mylar strip in figure 2). We then allowed the paste to dry further, wait-

Figure 3. Applying weight.

Figure 4. Box with straw marquetry in visible light (above) and ultraviolet light (below).

ing a minute or two before applying weights. (fig. 3) We used a piece of blotter paper with a Hollytex barrier to weight the area. Because the paste is so adhesive, very little was needed to adhere the paper to the wood. Any tiny amounts of paste that were pushed out by the weights did not stick well to the Hollytex.

Numerous areas over the surface of the box had lifting and detached paper. The extremely dry paste allowed us to lay down the paper without saturating it or causing changes in the surface color, texture or overall appearance.

Casket with straw marquetry

Another object which offered interesting results during examination was a 16th-century Italian straw marquetry chest (fig. 4, top). Its long and rectangular carcass with a domed, hinged cover is made of pine and covered on the show surface with a colored paper layer and straw marquetry. The straw marquetry shows a symmetrical, floral decoration with small birds in it. The main motif of the lid is a crowned eagle with wings outspread, escorted by two lions and two peacocks.

On this casket the straw doesn't cover the whole surface. The underlaying paper is colored red and is part of the decoration. Additional paper pieces were glued underneath the main straw motifs to raise them from the ground. This is an infrequent technique in straw decoration and gives the impression of a *pastiglia*. There are small paper squares colored in a light blue applied directly underneath the cutouts of the straw flower leaves, providing a nice decorative effect. Infrared analysis (FTIR) of the blue paint layer indicates it contained polyvinyl acetate, ultramarine blue and lead white. (Note: The object was apparently treated with polyvinyl acetate. The absorption bands for this polymer appeared in nearly every spectrum.)

Additionally we examined the front and the rear side of the carcass using X-rays. (kV20, mA2.7 to 3, t1.5min). The presence of the lead white is clearly visible as the darker, radio-opaque areas

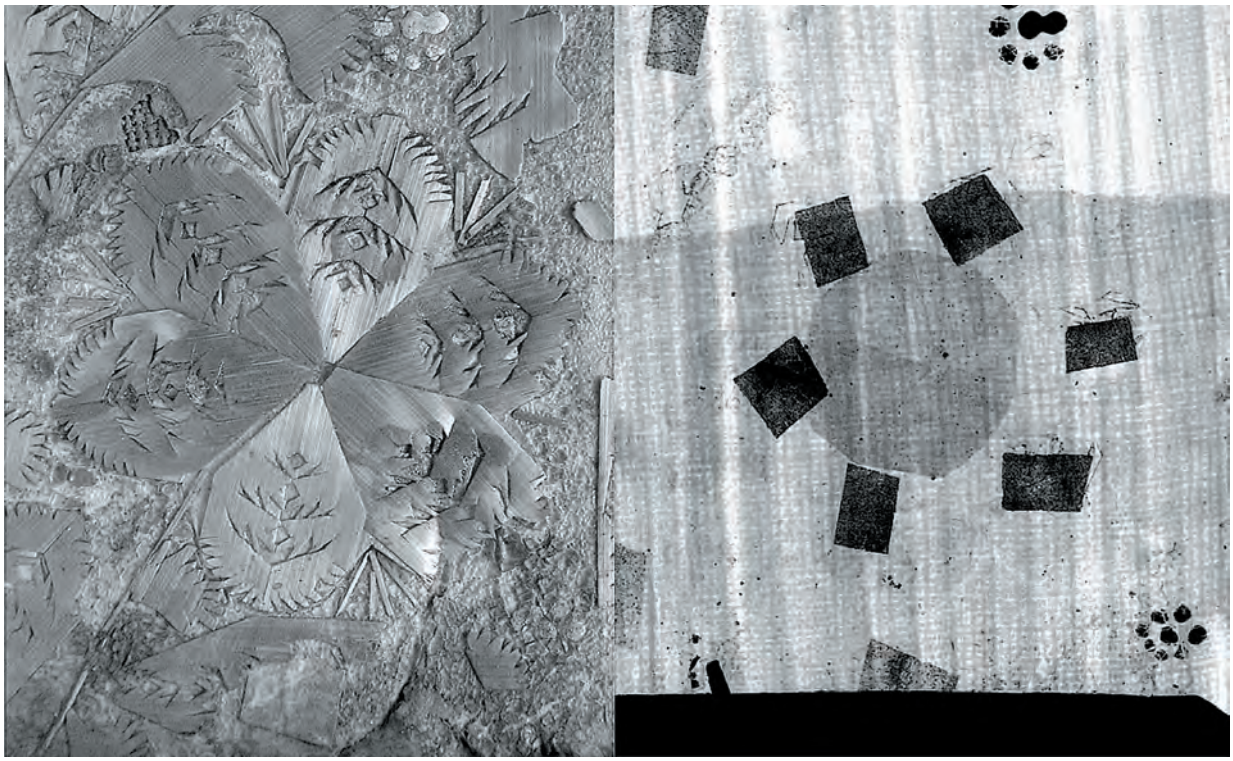

Figure 5. Detail from the front panel of the straw marquetry chest with a visible image on the left and X-ray image on the right.

of the X-ray (fig. 5). Finely painted dots applied using the same light blue color complete the floral pattern. Analysing the X-rays, we also discovered a doubled fabric lining at the front side behind the lock. We can also see the wood grain, but the most interesting part for us was to see the position of the paper squares underneath the straw. There were also paper shapes which were barely visible —like the round one on the right—that are actually unpainted paper squares glued on top of each other to raise the flowers.

The overall surface was examined using UV light (fig. 4, bottom). The red-sized paper had a very strong white fluorescence, suggesting the use of a proteineous adhesive. Wheat starch paste doesn't have a strong fluorescence, a sign that an animal glue was used to glue the straw marquetry onto the paper layer. This identification as a protein was confirmed by infrared microspectroscopy.

The interior of the casket is lined with a red painted paper. The paper itself is dark cream in color and of medium thickness. Identification of the structure and fibers using microscopic analysis can also be used by a paper conservator to help identify the date and origins of paper. This paper appears to consist of rag fibers. Laid and wove lines are visible on its surface, a sign that it has been made in a laid mold, typically referred to as laid rag paper. Laid rag paper is considered one of the earliest paper types produced in Europe. It was made as early as the eleventh century and has been continuously produced to this day. For this reason, it is not possible to assign a specific date to the paper based solely on the paper type. Wood pulp was not detected, which would have confirmed a later date—after 1841—as this is the earliest recorded date for the use of wood pulp in paper production. An extraneous, non-fibrous material found in the sample and identified using infrared microspectroscopy was most likely a protein-based adhesive, possibly hide glue used to attach the red-painted paper to the wood.

Watermarks on applied paper are often not visible without transmitted light. However, in this case a close visual examination revealed a circular

watermark on the interior paper. Watermarks are impressions on paper created by wires attached to the papermaking mold. The combination of watermark shape, positioning on the sheet and sewing dot pattern can be used to identify the manufacturer of the paper, the geographic area where it was produced, and the approximate date of manufacture. Because of considerable uncertainty inherent in this identification, watermark evidence can only provide clues, not precise facts. In this case the watermark could not be correlated to known examples collected in the most common catalogs.

Clock Hood

A final example is an interesting hood from a tall case clock from a private collection (fig. 6). The clock dates from the middle to late 18th century and has a brass leaf paper attached to the front decorative areas and a paper dust cover on top. The brass leaf paper was corroded in spots and detaching from a white, calcium carbonate gesso layer. The paper itself was coated with an orange bole layer bound with an oil/protein mixture over which was applied the metal leaf. The brass paper had corroded unevenly to produce a pattern of corroded dots.

X-ray examination revealed that these corroded dots corresponded to holes in the wood structure. (fig. 7) These holes were probably originally intended to be sound holes for clock bells, filled with a calcium carbonate gesso and the brass leaf paper applied over it.

The brass leaf paper on the face of the clock was very delicate. There were losses to the gesso and paper in areas where the wood substrate had moved. The remainder of the metal leaf surface had areas of flaking and tenting. To consolidate the surface we used a 0.25% solution of gelatin in a 9:1 mixture of water:ethanol. The alcohol helped the gelatin wick into the fine metal cracks and the surface could then be weighted using the Hollytex and cotton blotter technique used on the band box.

The dust cover on the top of the clock was extremely discolored and detaching from the wood of the clock hood. (fig. 8) The paper had been

Figure 6. Clock hood, showing the gilded paper in the pediment and the arch above the door.

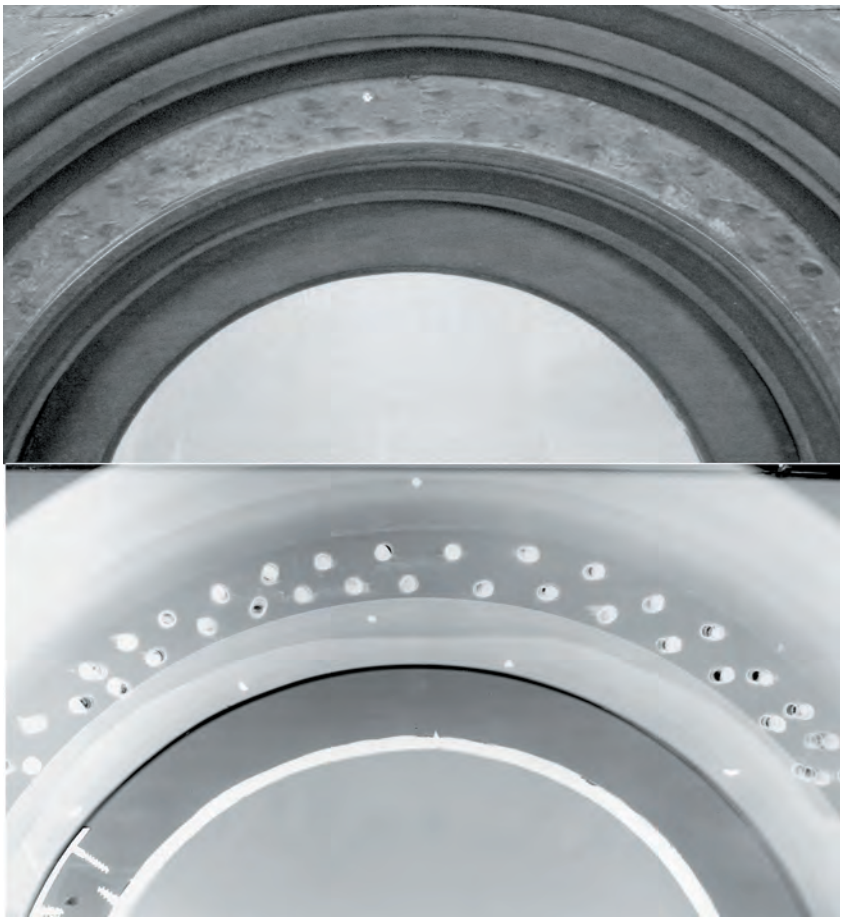

Figure 7. X-ray of front panel, revealing the presence of old sound holes beneath a layer of calcium carbonate gesso and brass leaf paper.

printed but was legible only in a few areas. The use of an infrared camera was able to greatly clarify the text. (fig. 9) The paper refers to the town of Newport and mentions, "the moderation and wisdom of the Count de Vergennee," possibly referring to the Count de Vergennes, the French minister of foreign affairs who strongly supported the American Revolution and who died in 1787.

We used wheat starch paste in a manner similar to that used on both the straw marquetry and band box. The use of an extremely dry wheat starch paste effectively secured the lifting edges of the paper, reducing the potential for loss without noticeably changing the appearance.

These treatments illustrate how the skills and materials of paper conservation can be effectively used in the treatment of paper on wooden objects. There are a wide variety of techniques for applying paper to furniture, only a few of which we have addressed. The application of a much broader knowledge of conservation and materials is needed to fully appreciate and adequately treat the wide variety of furniture with applied paper.

Acknowledgements

In conclusion we would like to thank:

The conservators of the Asian and Paper conservation labs at the Museum of Fine Arts, Boston, especially Kim Nichols who deserves high praise for her knowledge and skill.

The Scientific Department of the Museum of Fine Arts, Boston.

Mecka Baumeister, conservator at the Metropolitan Museum of Arts, New York.

Professor Hans Michaelsen at the University of Applied Science in Potsdam, Germany.

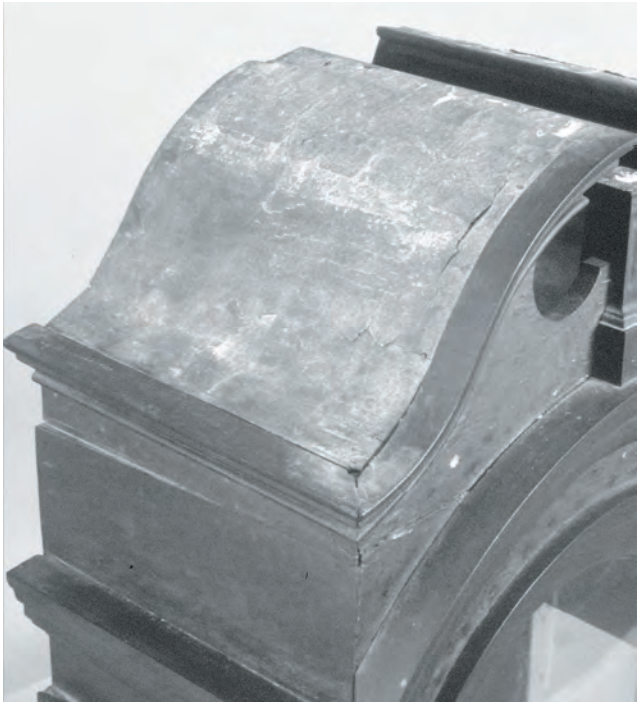

Figure 8. Clock hood showing the paper dust cover.

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About the Authors

Angela Meincke is Assistant Conservator in the Furniture and Frame Conservation Department at the Museum of Fine Arts, Boston. She finished her studies with a diploma in furniture conservation at the University for Applied Science in Potsdam, Germany in 2000.

Chris White is Mellon Fellow in the Furniture and Frame conservation lab at the Museum of Fine Arts, Boston. He graduated from the art conservation program at Queen's University in Kingston, Ontario with a specialization in objects in 2002.

Kimberly Nichols is Assistant Conservator in the Asian Conservation Department at the Museum of Fine Arts, Boston. She received her Master of Arts with a certificate of advanced study in art conservation from the State University of New York, College at Buffalo in 1999.

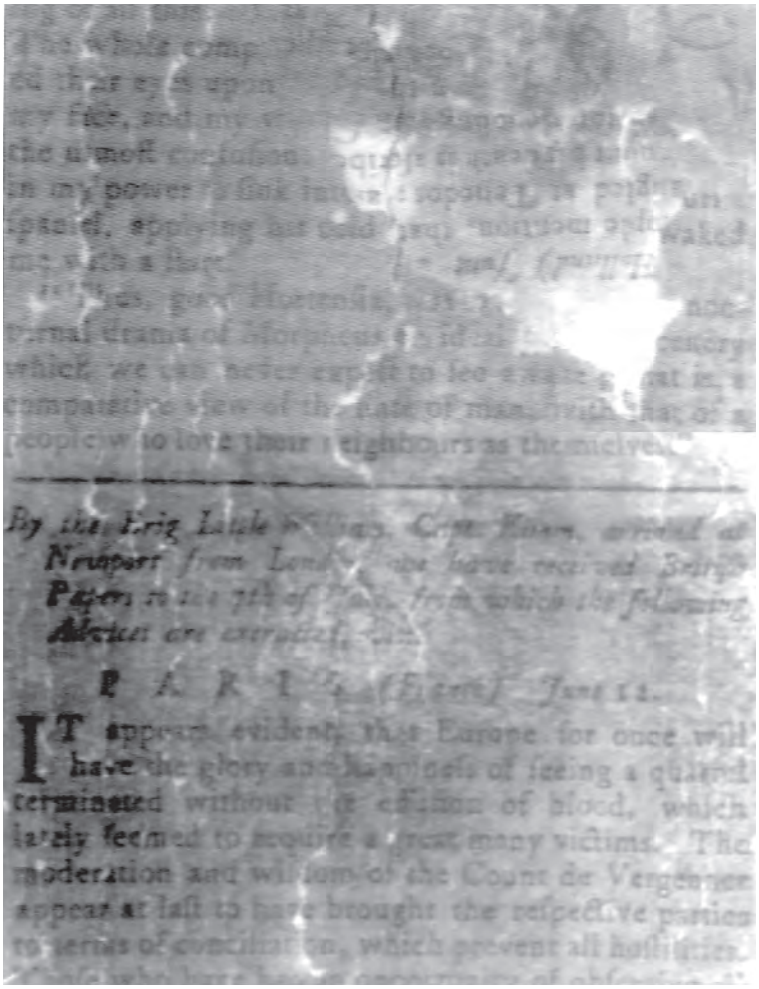

Figure 9. Infrared image of the paper dust cover on the top of the clock hood.

Endnotes

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