A hint of Orient in an Americana collection: Investigations into Chinese export furniture at Winterthur Museum

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This paper discusses an ongoing treatment and research project focused on a group of black lacquer furniture created in China during the late eighteenth and first half of the nineteenth centuries, now in the Winterthur Museum collection in Delaware, USA. Funding from the Institute of Museum and Library Services (IMLS) allowed for a two-year collaborative project encompassing treatment and analytical study of a selection of six objects, of which three are illustrated here. Data from pyrolysis gas chromatography–mass spectrometry revealed a hitherto undetected separate urushiol lacquer–lacket layer applied on top of a lacket layer on a center table and a six-panel screen.

Keywords: Asian lacquer, Chinese export, Furniture, Winterthur Museum, Py-GC-MS, Urushi, Laccol

Introduction

Winterthur Museum, founded in 1951 by Henry Francis du Pont (1880–1969), houses nearly 90,000 decorative and fine arts objects made or used in America between 1640 and 1860. Du Pont’s collection includes a variety of Asian material displayed throughout the museum’s rooms in the form of black lacquered furniture, objects with gilt decoration, ceramics, and wall papers. In the 1960s, du Pont specifically designed two rooms to feature Chinese export artifacts: the China Shop and the China Trade Room. In July 2011, Winterthur Museum’s conservation staff initiated the survey of 33 pieces of black lacquer furniture and objects created in China during the late eighteenth and first half of the nineteenth centuries. The survey revealed that the lacquer on almost all had suffered significant deterioration and exhibited, in varying degrees, a dull surface, cracked and lifting lacquer, losses and past repairs, fills and inpainting. Six objects in the group were prioritized for treatment and study based on condition, rarity of form, and the existence of an American China trade provenance for specific pieces. An Institute of Museum and Library Services (IMLS) grant [no. MA-30-13-0010-13] funded treatment of the pieces in the worst condition and the associated analytical work necessary for a better understanding of these complex finishes.

This paper discusses condition issues associated with Chinese lacquered furniture thought to have been made for the western market, treatment options, and the analytical data that have led to a better understanding of the nature of these surfaces. Case studies illustrate the study of three pieces: a well-preserved screen, which provides valuable information in regard to its manufacture, a dressing table and a center table, both in poor condition.

Historical context

When the ship The Empress of China made the first voyage to Canton in 1784–1785, the new American republic officially entered the lucrative China trade. Such trade had been the sole domain of European powers such as Portugal, the Netherlands and England, whose ships first arrived in Canton, South China in 1517, 1601, and 1637, respectively. Elaborately decorated and exotic pieces including small items and furniture were imported for the families of investors, ships’ captains and friends, or for retail sale. Winterthur’s group of Chinese export furniture comprises historically and artistically
significant examples of these objects, some with prove-
nances connecting them to specific China trade mer-
chant families.

**Chinese lacquer: manufacture and condition issues**

The poor states of conservation of Chinese export lacquer pieces is believed to be closely related to man-
ufacturing techniques and to the method used to con-
struct the surface decoration. Export lacquer ground
layers, lacquer layers, and final decorative layers were
all modified in comparison to traditional, domestic
Asian lacquerware techniques to hasten the manufac-
turing process and to ensure products were available
for different types of consumer (Webb, 2000). The con-
sequences of this practice, which included using both
different materials and manufacturing methodologies,
are visible in the present state of preservation of a con-
siderable number of pieces from the late eighteenth
century to the first half of the nineteenth century.
The substitution of a protein-based binder for Asian
lacquer in the ground layers often results in poor cohe-
sion of ground layers and weak adhesion between
these and the lacquer layers, particularly in conditions
of fluctuating relative humidity (Schellmann, 2011).
The application of fewer, yet more thickly applied
lacquer surface layers compromised the drying
process and seems to be responsible for creating
unstable films that tend to crack and delaminate
(Kumanotani, 1985). Finally, a survey of several
examples and their associated cross-sections, all of
which have similar provenance and date to the same
period, seems to indicate the lack of a clear protective
finish over the gold decoration (Petisca et al., 2011).
This allows for the decoration to be easily abraded
and, consequently, the red lacquer below is frequently
exposed. Photodegradation of an existing protective
layer might also be the cause for its absence (Yamashita & Rivers, 2011). These degradation pat-
terns were found in several pieces from the Winterthur collection.

**Case studies**

The dressing table (2004.0030.001) was donated to
Winterthur by Violet S. Thoron in 2004 (Fig. 1).
Curatorial investigation shed light onto its prove-
nance: it is thought to have been first owned by
William Ward, a well-known Salem, Massachusetts,
USA, merchant (1761–1827). It is possible the dres-
sing table was brought to Salem by Captain William
Gray (1750–1825). William Ward worked for
William Gray prior to becoming president of the
State Street Bank in Boston, and he took Gray’s
sister, Joanna Chipman of Marblehead, as his second wife. The piece was then passed down
through the family: first to his son, the shipping
agent Thomas Wren Ward (1786–1858), his son
Samuel Gray Ward (1817–1907), his daughter Anna
Barker Ward (1841–1907) and son-in-law Joseph
Thoron (1828–1901), to son Ward Thoron (1875–
1938), to son Benjamin W. Thoron (1897–1975) and
finally to his wife, Violet Thoron (1906–2008). This
dressing table is an especially rare form of Chinese lac-
quered furniture. A closely related table is in the collec-
tion of the Peabody Essex Museum in Salem,
Massachusetts, and is also thought to have been
brought from Canton to Salem by Captain William
Gray. The Winterthur example consists of two
blocks of three convex drawers flanking three recessed
central drawers. The top is made of two leaves that
open to reveal 12 square compartments, each closed
with a lid, and two larger lateral rectangular compart-
ments with hinged lids. A dressing glass with an arched
top slides out from the back panel of the table.
Microscopic identification of the wood identified
Asian swamp cypress, *Glyptostrobus pensilis*, as the
main construction wood. The drawers are dovetail
jointed while the case sides are connected to the base
and feet with multiple through tenons. Panels are
made of small boards that are edge joined using
wooden pegs.

The six-leaf screen (2004.0030.002) (Fig. 2) was
donated to Winterthur by Violet S. Thoron in 2004,
suggesting a similar provenance through the Ward
and then Thoron families. Microscopic identifica-
tion of the wood again identified Asian swamp cypress,
*Glyptostrobus pensilis*, as the main construction wood.

The circular center table (1963.0096) (Fig. 3) came
into Winterthur’s collections in 1963 as a gift of Mrs
G. Brooks Thayer, wife of Eugene V.S. Thayer Sr., who
built Fairlawn mansion, now the ‘White House’ at
Atlantic Union College in Lancaster, Massachusetts.
The center table consists of a circular tilt-top mounted onto a turned stand, attached to a three footed base with a double-through tenon. Microscopic wood identification of the base identified camphorwood, *Cinnamomum camphora*. The table top comprises six boards edge joined using wooden pegs, with two cleats attached underneath, perpendicular to the length of the boards. X-radiographs revealed the use of numerous forged iron nails to attach the table top to the cleats as
well as to reinforce the tenon connecting the two boards forming the base.

All three objects are decorated with gilding on black lacquer. The manufacturing process can be described in general terms as follows: the wood substrate would be smoothed, covered with coarse ground layers that could be reinforced with paper or fabric. The final ground layer would be abraded flat and lacquer layers would be applied on top. For gold decoration, the artisans transferred the motif they wished to reproduce using a pierced outline design on paper. The paper was placed on the object to be decorated and a powder applied through the holes, transferring the outline of the drawing to the black lacquer surface. The use of vermilion and orpiment to outline these motifs is a documented craft practice (Rondot, 1848). The artisans would then scratch the lines with a sharp pointed tool, and the complete motif would be painted in repigmented lacquer, to which gold dust would be adhered before it had dried completely (Petisca et al., 2011).

The screen is in good condition, which facilitates gathering valuable data regarding its manufacture. The dressing table and center table are both in poor condition and show evidence of previous restorations. Their condition provides additional understanding of the materials and their deterioration processes, as well as information about past restoration approaches for lacquered surfaces. There are two primary conservation issues with the two tables (and objects with similar manufacture and provenance): the extreme fracture of the lacquer coating and the degradation of varnishes and/or resins that had been applied in previous restorations with the intent to saturate the dull, aged lacquer surface.

**Conservation treatments**

Peeling and cupping of the lacquer coating is the most noticeable conservation problem affecting both the dressing and the center tables. Data from pyrolysis gas chromatography–mass spectrometry (Py-GC–MS) confirmed that ground layers contained a mixed oil and protein binder, which is common for pieces of this type (Webb, 2000). The protein components all contain marker compounds for blood and animal glue. An adhesive (BT&C Brooklyn Tool & Craft™ hide glue, 192 g strength) compatible with the original was used with gentle pressure to adhere the lifting lacquer. In areas where the stiffness of the lacquer required softening in order to avoid more cracking, the injection of the adhesive was preceded by the introduction of a minimal amount of a 1:1 (v/v) mixture of water and ethanol. Where the lacquer was thicker and its surface covered by a Western varnish, a few drops of the water and ethanol mixture were introduced with a syringe while the area was warmed using a cloth bag filled with steel shot to soften the area that was to be glued. The varnish layer helps to protect the underlying lacquer from potential unwanted color change due to moisture and heat exposure (Webb, 2001). Different areas of the same piece may not tolerate the same treatment methodology; therefore, sensitivity tests were performed throughout the consolidation treatment phase. After the adhesive was injected into the cracks and under all areas of detached lacquer, pressure was applied to the surface by means of a frame with sliding metal beams built to provide support for clamps (Fig. 4). The effectiveness of the treatment was dependent on the correct combination of both adhesive and clamping system.

The center table had a three millimeter split along a join that spanned the entire table top, although all the original lacquer and gold decoration were preserved. Hence it was preferable to close the gap and avoid the use of either fill and/or inpainting materials on the piece. An X-radiograph revealed numerous nails (in addition to glue) that had been used to secure the cleats to the table top. A fill material (probably gypsum) applied in a previous restoration treatment was removed along the cleats to provide access to the nails. Removal of the nails without damaging the lacquer coating would have been impossible, so all the nails were cut in situ. Releasing the cleats from the table top allowed the split to be closed; both the split and cleats were glued simultaneously using fish glue (Artcolle™). The original decoration was preserved and neither a fill nor inpainting were necessary.

The application of a varnish or resin coating to return gloss to a dull lacquer surface was a common restoration practice on such pieces in the past. Shellac and sandarac were identified by GC–MS as the coatings applied in previous restoration treatments to the center table and dressing table, respectively. In both cases color alteration of the restoration coatings had drastically changed the original appearance of the pieces, however their states of preservation are very different: the shellac on the center table surface

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**Figure 5** Top of the dressing table showing the degraded and darkened sandarac layer before treatment. Courtesy of Winterthur Museum. Gift of Violet S. Thoron (2004.0030.01). Image: Jim Schneck.
is stable and well adhered to the original lacquer coating, while the sandarac coating on the dressing table is extensively delaminated from the original lacquer, creating losses that reveal a highly photodegraded surface. In addition, color change in the sandarac layer on the upper leaves is so disruptive that the original gold decoration is not visible (Fig. 5).

In consultation with Winterthur’s furniture curator, a specific treatment was agreed for each of the objects. The absence or loss of an original protective coating above the gilded decoration in these pieces makes them susceptible to abrasion. This also complicates the cleaning operation due to the vulnerability of the surface to solvents (McSharry et al., 2011). With that in mind, it was decided only to clean off the accumulated grime on the shellac varnish of the center table. Although this altered the appearance of the piece somewhat (giving it a more yellowish tone), the varnish acts as a protective coating for the gold decoration. D4 silicone solvent (octamethyltetracyclosiloxane) was used to protect the varnish surface and prevent the migration of the solvents through the cracks on the lacquer coating during the cleaning operation. Cleaning was carried out using a silicone based emulsion prepared with a 15% (w/w) solution of Shin Etsu KSG™-210 in a 1:1 mixture of isopropanol and acetone. This procedure made the gold decoration more visible with a more even appearance over the entire piece.

A partial removal of the sandarac coating is in progress on the dressing table. Starting with the upper leaves, where delamination and losses are most extreme, the varnish is being significantly reduced with a Carbopol™-based benzyl alcohol gel used in conjunction with D4 silicone solvent. The gel softens the sandarac, allowing its partial removal without affecting the gold motifs. Cleaning is conducted under ultraviolet illumination to help control the extent of removal. The goal is to create a more even and readable surface between areas of loss and areas still coated with sandarac, and to reduce the brown color of the varnish. The outcome and visual aspect of these upper leaves will guide the cleaning treatment for the remaining surfaces of the dressing table where the sandarac is still fairly well preserved. Subsequent treatment phases are being developed for both objects.

### Analytical methods used in the study of Asian lacquer

The two primary analytical techniques used for this study were microscopic investigation of cross-sections viewed under visible and ultraviolet light to understand the stratigraphy of the lacquer coating and thus the construction of the surface decoration, and Py-GC–MS to identify the organic materials, specifically the lacquer species and other binding media and additives.

Microscopic examination of cross-sections of samples from the three objects showed a similar stratigraphy to finishes commonly found in Chinese export pieces: paper fibers adhered directly to the wood substrate, followed by two red-/brown-colored ground layers separated by a second layer of paper fibers. The second ground layer was followed by two lacquer layers (Fig. 6). Py-GC–MS using tetramethylammonium hydroxide for thermally assisted hydrolysis and methylation (THM-Py-GC–MS) was performed on the ground and lacquer layers using the RAdICAL protocol developed by the Getty Conservation Institute in Los Angeles for the characterization of Asian and European lacquers. Results indicate the binding medium in all the ground layers is composed of a mixture of protein and drying oil. Laccol, from the *Rhus succedanea* tree species, is the lacquer source for both lacquer layers on the dressing table. For the center table and screen, the first lacquer layer applied to the ground contains laccol but the second layer is composed of the more expensive urushiol from the sap of *Rhus vernicifera*. In all three objects, the peak areas indicate that the tree sap is a relatively minor component of the lacquer layer (6–16%), with a drying oil as the primary component (66–94% peak area). The use of urushiol mixed with thitsiol lacquer from the *Melanorrhoea usitata* and *Melanorrhoea lacca* trees in layered lacquer samples has been reported in Japanese export pieces (Heginbotham &...
Schilling, 2011), while a mixture of urushiol and laccol in layered lacquer samples has been reported in Chinese export objects (Petisca et al., 2011).

Conclusions
The result of a separate urushiol lacquer layer applied on top of a laccol layer, as found on Winterthur’s Chinese export center table and screen, is a new finding and underscores the importance of careful separation of lacquer layers for analysis. Further analysis of Chinese export lacquer in the Winterthur Museum collection as well as the Peabody Essex Museum collection, a partner in this project, will inform the extent of use of urushiol-containing final layers.

This group of objects represents Chinese cultural heritage and is also an invaluable testimony of the economic and cultural exchanges between East Asia and Western countries. Chinese lacquer objects for export, perhaps due to their perceived lower quality, have often been neglected in terms of study and conservation. These pieces require conservation care and maintenance plans. Understanding the methods of manufacture and materials used will yield more effective and longer-lasting treatments for these objects.

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