
住吉蒔絵文台

平成19・20年度修復事業



所蔵：ヴィクトリア・アンド・アルバート美術館（イギリス）

住吉蒔絵文台

松本 達弥

修復品名	住吉蒔絵文台
所蔵美術館	ヴィクトリア・アンド・アルバート美術館（イギリス）
制作年代	17世紀 江戸時代
修復品寸法	35.5cm×59.5cm 高さ9.8cm
修復期間	平成20年6月～平成21年3月（10ヶ月間）
修復場所	東京文化財研究所 漆修復アトリエ

1. 概要

文台は甲板両端に筆返を付け、4脚には刳型が付く。筆返の両端には八双金物、甲板木口や角には金具、脚には銀製の覆輪を付ける。裏面には素地の反りや割れを防ぐための2本の端喰がある。

甲板には、鳥居、太鼓橋、社殿、塩屋のある海浜風景を描き、空には雲のかかった満月を配している。水辺の土波や岩山には、松、楓、銀杏、菊などが生え、秋の景を描いている。

甲板の空には薄蒔きの梨子地とし、土波は金銀の研出蒔絵、波文様は金地に付描を付ける。社殿や岩山は下地上げの高蒔絵に極込、極付を交える。松や楓、岩には切金、金具を置き、月、鳥居、太鼓橋などは鉛板で表現されている。裏面は淡蒔きの金梨子地で、木口や脚の外側は金の消粉蒔絵である。

2. 損傷状態

所見

文台の甲板面の蒔絵部分は紫外線や経年変化により劣化し、塗膜表面が黒ずんで見える事により、後世修理で塗料が塗られた形跡が窺えた。また、甲板の反りを防ぐための端喰部分や脚部分に亀裂を生じていた。脚部分の亀裂は、素地構造の問題や覆輪をつけた際に打たれた釘の影響で亀裂を生じたものと考えられた。尚、修復前の損傷部分の詳細は下記に記す。

- ・文台の甲板面は、紫外線や経年劣化により蒔絵部分の艶が無く、蒔絵粉が剥き出しの状態であった。
- ・文台の表裏の塗膜は、後世修理の際に塗られた塗料が劣化し、塗膜面に滲みや斑文があり、蒔絵部分は黒ずんで見えた。
- ・文台の甲板右下、松の木周辺にある亀裂は、素地に節のある材が使われていたと思われ、裏面にも同じような亀裂を生じていた。
- ・甲板裏面に素地の狂いを止めるための端喰が2本使われているが、素地の収縮の違いが原因となり亀裂や塗膜の剥離を生じていた。
- ・脚部には素地からの亀裂が入り、一部の脚は甲板との接合部にも亀裂や剥離を生じ、後補されていた。
- ・蒔絵部分に使われた金具は殆どが剥離状態であり、一部捲れ上がった部分があった。

- ・甲板、右上の蒔絵部分には、輸出される前に漆で修復された形跡があった。
- ・文台に付けられた金具や覆輪は、金属の錆化がみられた。
- ・文台裏面に、白書きの所蔵番号と作品購入の際の情報を記した紙片が付けられていた。

3. 修復仕様

修復は現在、文化庁の指導のもとで行われている「今ある文化財を、現状を損なうことなく保存し、永く後世に伝える」という、漆工文化財保存修復の原則に則り、現状維持修復を基本に行う。修復中問題が生じた際は、東京文化財研究所の担当者、所蔵美術館の担当者と協議し、修復作業を遂行した。

4. 修復の特徴及び留意点

文台甲板の表面塗膜は経年劣化や塗られた塗料の影響で黒ずんでいる為、クリーニングでその黒ずみを取り除き、劣化した塗膜に漆を含浸し強化する事で本来の艶に近づけるものと考えられる。しかし、銀や鉛の錆化した部分は時代性を考慮し、現状のままで仕上げる。

脚部の亀裂は、覆輪を止める釘穴周辺の損傷が多いことから、修復の際は覆輪を取り外し、先ず木地構造の補強を行い亀裂部分の修復を行う。また、蒔絵部分に亀裂がある為、仕上げは金色を施し目立たないような仕上げにする。

5. 修復作業工程

1) <現状調査及び作業工程確認>

蒔絵文台（以後、本資料と呼ぶ）の素地構造、下地、加飾と現状の傷みを調査記録し修復作業工程を確認した。

2) <修復前の記録写真>

修復前と修復後の比較が出来るよう写真撮影を行った。

3) <設置台の制作>

修復品を安全に修復作業を進められるよう設置台及び作業台を制作した。

4) <仮止め養生>

本資料の亀裂部分の塗膜周辺は、作業中剥落しそうな危険な状態にあるため、細かく切った雁皮紙を糊貼りし塗膜の剥落防止を行った。

5) <分析>

本資料の修復作業を進めていく前に、X線透過写真撮影と蛍光X線の金属分析を行い、今後の作業の参考にした。

6) <クリーニング>

クリーニングは本資料の表面を覆っている埃を取り去り、僅かに水分を含ませた木綿布にて汚れを除去した。尚、本資料の蒔絵部分にある金具は捲れ上がり、接触するだけで剥落しそうな危険な状態である為、クリーニングは充分注意し必要最小限に止めた。

7) <剥離金具の接着>

塗料除去作業の前に剥離した金具の接着を行った。蒔絵部分にある金具は殆ど剥離状態にあり、捲れ上がった部分もあった。捲れ上がった金具や剥離した金具は丁寧に戻し、膠を含浸し接着した。金具の圧着は、竹ヒゴの弾力を利用した芯張り方法で安定させた。

8) <後補塗料の除去>

本資料は、ヨーロッパでの修復の際に塗料が塗られ、紫外線や経年変化により塗料の塗膜が劣化していた。また、漆塗膜も劣化し大変脆くなっている為、塗料除去は細心の注意を払った。

塗料の除去に使用する溶剤は充分テストを行い適切な溶剤を選択した。

塗料除去は、無水エタノールに50%ほどの蒸留水を混合し、綿棒や柔らかい布に含ませて、除去を行った。波部分の汚れは特殊な綿棒を使用し、付描に沿って丁寧に塗料や汚れを除去した。

甲板裏面の塗料除去は、表面に使用した溶剤で行った。

9) <紙片剥がし>

甲板裏面にある紙片は、本資料の購入時の事を書いてあり資料として貴重なものである。しかし、紙片の下には、亀裂があり修復作業を進めていくうえで取り除く必要があった。所蔵美術館の担当者と当研究所の担当者と協議した結果、取り剥がし別保存することになった。また、白書きされた所蔵番号は除去し、修復終了時に同じ場所、同じ字体で書くことに決まった。

10) <表面塗膜の漆固め>

表面の塗料除去後、剥き出しになった漆塗膜の強化と今後の作業中の漆染みを作らないために溶剤で希釈した漆で固め作業を行った。漆固めは、それぞれ損傷状態に合わせた漆を調合し使用した。

甲板の梨子地部分の漆固めは、梨子地漆+木地呂漆+生正味漆を7:2:1の割合の漆に石油系溶剤のペトロロールで4倍~6倍に希釈し漆固めとした。漆の拭き取りは劣化した塗膜に浸み込ませ、表面の蒔絵や高蒔絵の際に残らないよう丁寧に拭き取った。

甲板の波文様部分の漆固めは、空の梨子地部分と違い金地である為、できるだけ色調の変化しない漆の調合にした。梨子地漆+木地呂漆を4:1の割合で調合し溶剤で希釈し漆固め作業を行った。

11) <脚部、亀裂部分の圧着>

圧着の前に覆輪を取外し、本資料の設置台や押さえ治具の準備を行い作業に取り掛かった。亀裂部分の接着は、接着力を強くするためグルテンの量を多くした麦漆を使用した。

左前の脚の覆輪を取り外したところ、脚はグラグラの状態で4本の釘で補強されていた。この部分は何度か修理されていて、接合部分は荒れた状態であった。よって、接着は、麦漆に少量の木粉と麻布の繊維を混ぜ合わせた、透間の充填を兼ねた接着剤を使った。尚、圧着は数種類のクランプを用いて安定させた。

12) <甲板亀裂部分の圧着>

甲板裏の亀裂は、亀裂部分から希釈した麦漆を含浸し、竹ヒゴを用いた芯張り方法で圧着を行った。また、周辺塗膜も同時に圧着を行った。

13) <塗膜欠損部に刻苧充填>

亀裂部分の戻しきれない隙間や塗膜の欠損部分には、麦漆に木粉や麻の繊維を混入した刻苧を充填し形態を復元した。刻苧の充填は必要に応じて荒さを変えて数回に分けて行った。

14) <際錆>

接着した塗膜や刻苧で充填した亀裂部分に、錆漆を施し再剥落の防止とした。錆漆は、漆が多めの麦漆に微粒子の地の粉(砥の粉より細かな粒子)を調合し際錆とした。

15) <漆固め>

漆塗膜面の強化と艶を取り戻すために、溶剤で希釈した漆を数回吸わせ漆固めを行った。尚、蒔絵部分の漆固めは塗膜だけに漆を含浸し、蒔絵の表面に残った漆はリグロインで丁寧に拭き取った。

甲板面や裏面の漆固めは、それぞれ4回行った。

16) <補修部分の色合わせ>

補修した部分の仕上げは、周辺塗膜と調和の取れた仕上げを行った。蒔絵部分の補彩として、細かな金粉を付けて目立たないようにした。

17) <桐保存箱及び包布の制作>

修復した本資料を永く後世に伝えるために桐製の保存箱や包布を作った。本資料をより安全に出し入れが出来るよう桐箱の構造製図を作成し、専門家に制作を依頼した。

18) <記録写真及び修復記録のまとめ>

修復後の写真撮影を行い、修復工程の記録をまとめ修復作業を終了した。



图1 修復前 (全景)
Fig. 1 Before restoration (overview)



图2 修復前 (甲板表面)
Fig. 2 Before restoration (top board)

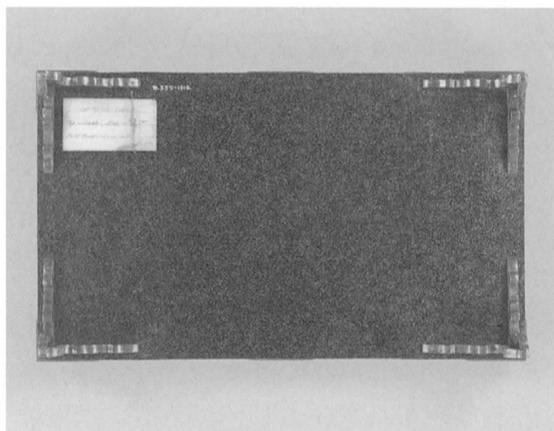


图3 修復前 (甲板裏面)
Fig. 3 Before restoration (underside of the top board)

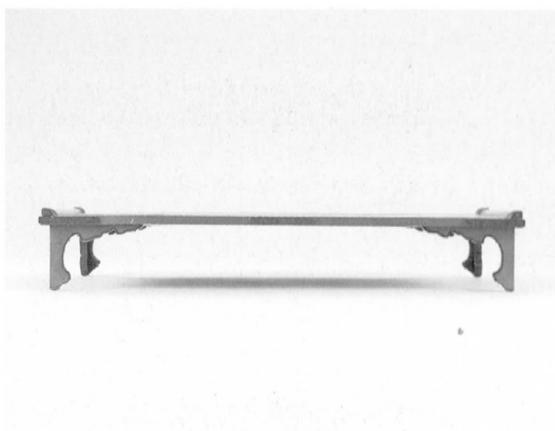


图4 修復前 (側面)
Fig. 4 Before restoration (side view)



图5 修復前 (右側面)
Fig. 5 Before restoration (right side)



图6 修復前 表面 梨子地部分
Fig. 6 Before restoration (top board, nashiji portion)



図7 修復前 塗膜 亀裂部分
Fig. 7 Before restoration, coating film, cracked portion



図8 修復前 脚 亀裂部分
Fig. 8 Before restoration, leg, cracked portion

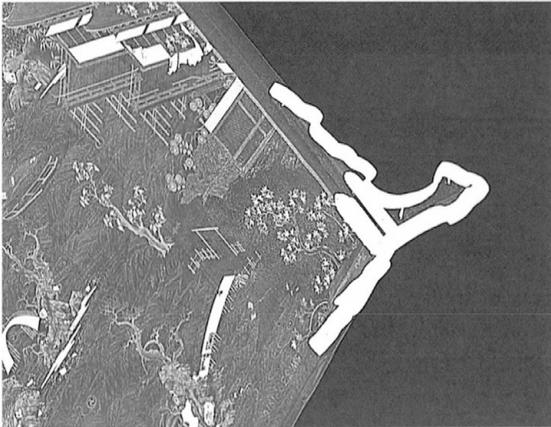


図9 X線透過写真画像
Fig. 9 X-ray radiograph



図10 蛍光X線
Fig. 10 X-ray fluorescence analysis



図11 岩部分 切金、極込、極付
Fig. 11 Rock portion, kirikane, kimekomi, kimetsuke



図12 塗料除去
Fig. 12 Removing the coating material



図13 塗料除去 波部分
Fig. 13 Removing the coating material, wave portion



図14 塗料除去 (左 除去前、右、除去後)
Fig. 14 Removing the coating material (left: before removal; right: after removal)



図15 剥離金具の圧着
Fig. 15 Press-stabilizing the lifted *kanagai*



図16 漆固め 表面 梨子地部分
Fig. 16 Consolidation, top board, *nashiji* portion



図17 漆固め 裏面 梨子地部分
Fig. 17 Consolidation, underside, *nashiji* portion



図18 脚部分 覆輪取り外し
Fig. 18 Leg, removing the rim cover



図19 脚 損傷部分
Fig. 19 Leg, damaged portion

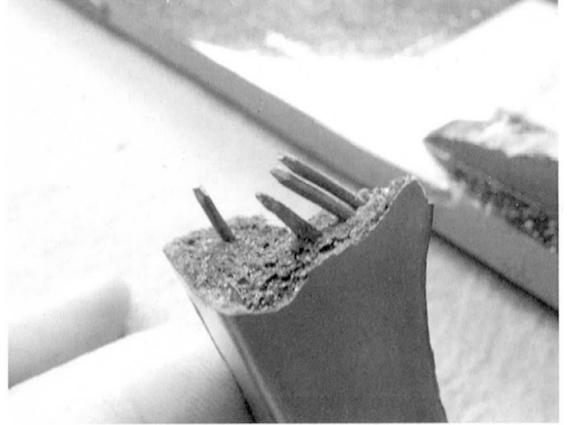


図20 脚 後補の釘
Fig. 20 Leg, nails from a previous restoration



図21 接着用刻苧の充填
Fig. 21 Filling with *kokuso* for adhesion

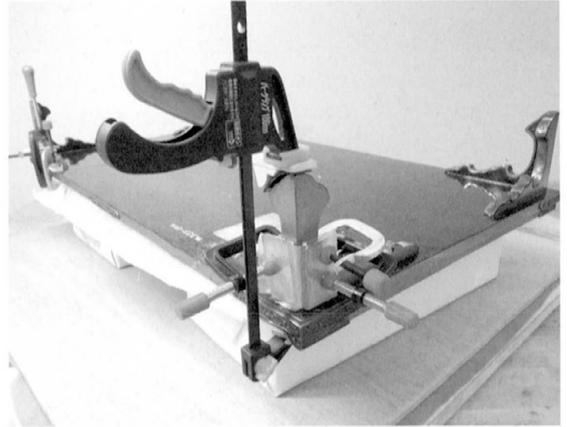


図22 クランプ圧着
Fig. 22 Press-stabilizing with clamps

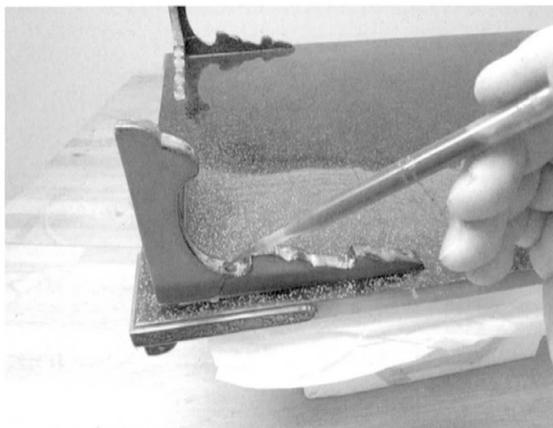


図23 亀裂部分 希釈した麦漆含浸
Fig. 23 Cracked portion, impregnating diluted *mugi-urushi*



図24 後補材の除去
Fig. 24 Removing western restoration material from a previous restoration



図25 刻苧付け
Fig. 25 Applying kokuso



図26 刻苧面の研ぎ
Fig. 26 Polishing kokuso



図27 金錆部分の研ぎ
Fig. 27 Polishing gold sabi-urushi

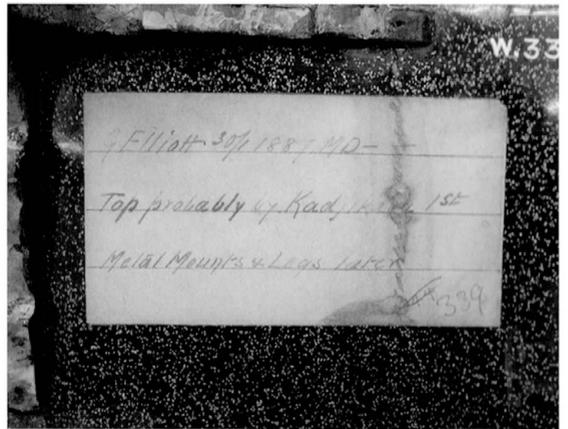


図28 作品購入時のラベル
Fig. 28 Label with information about the purchase of the object



図29 ラベル剥がし
Fig. 29 Removing the label

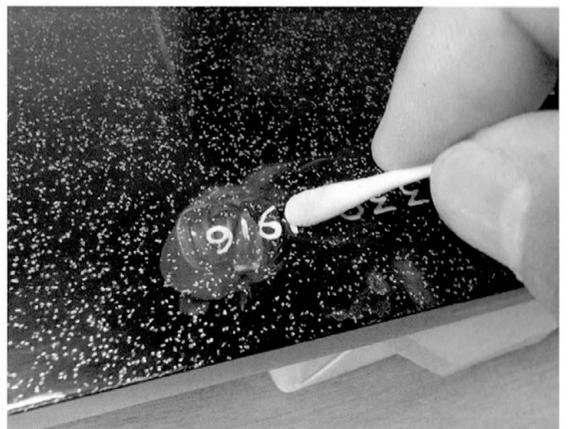


図30 所蔵番号の除去
Fig. 30 Removing the inventory number

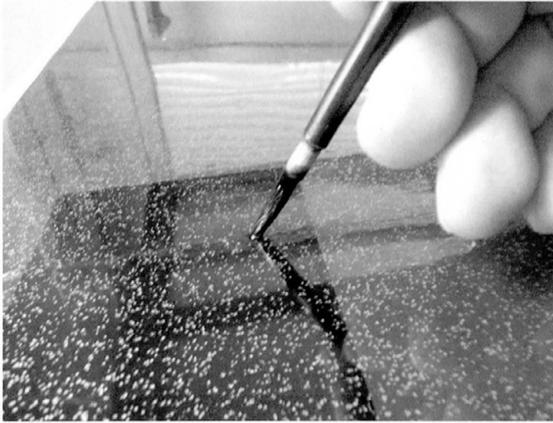


図31 亀裂部分に麦漆含浸
Fig. 31 Impregnating *mugi-urushi* into a crack

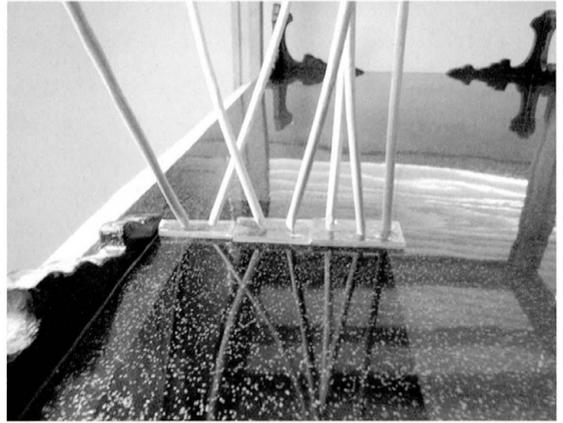


図32 剥離塗膜の圧着
Fig. 32 Press-stabilizing a lifted coating film



図33 裏面 漆固め
Fig. 33 Underside, consolidation



図34 金錆
Fig. 34 Gold *sabi-urushi*



図35 金錆付け
Fig. 35 Applying gold *sabi-urushi*



図36 金錆付け後
Fig. 36 After application of gold *sabi-urushi*

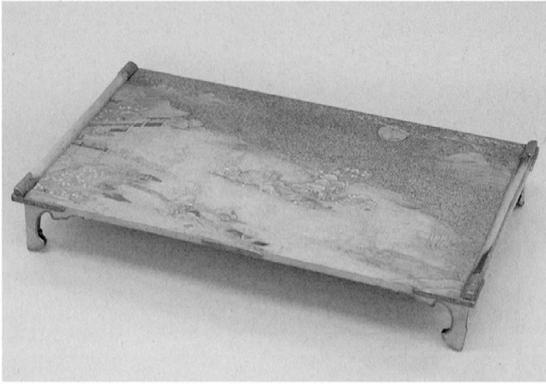


图37 修復後（全景）
Fig. 37 After restoration (overview)

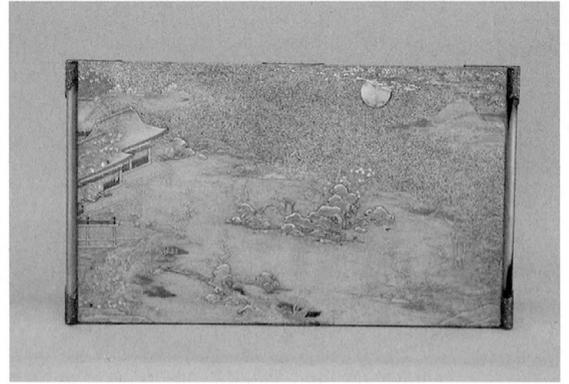


图38 修復後（甲板表面）
Fig. 38 After restoration, top board

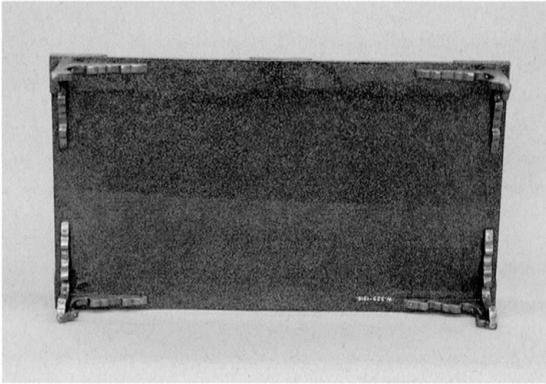


图39 修復後（裏面）
Fig. 39 After restoration, underside

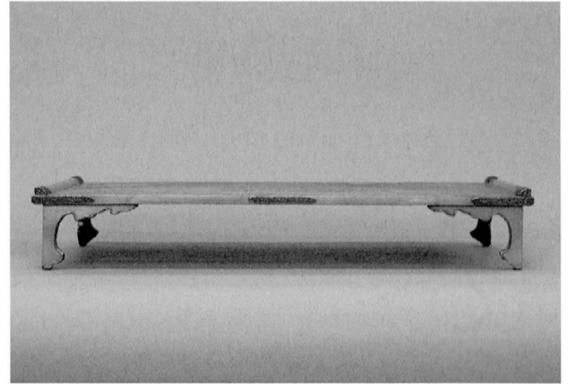


图40 修復後（正側面）
Fig. 40 After restoration, front side view

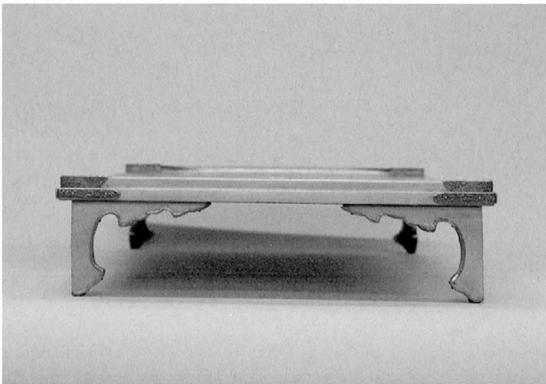


图41 修復後（右側面）
Fig. 41 After restoration, right side



图42 桐製保存箱 包布
Fig.42 Paulownia box for storage and wrapping cloth



图43 修復前 (甲板表面)
Fig. 43 Before restoration (top board)

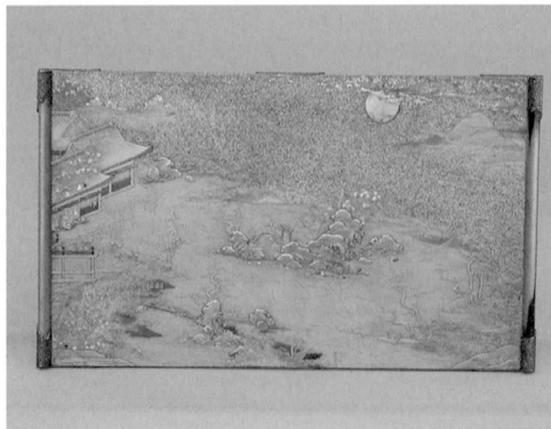


图44 修復後 (甲板表面)
Fig. 44 After restoration (top board)



图45 修復前 (龟裂部分)
Fig. 45 Before restoration (cracked portion)



图46 修復後 (龟裂部分)
Fig. 46 After restoration (cracked portion)



图47 修復前 (脚龟裂部分)
Fig. 47 Before restoration (cracked portion of the leg)



图48 修復後 (脚龟裂部分)
Fig. 48 After restoration (cracked portion of the leg)

ヴィクトリア・アンド・アルバート美術館 (イギリス)
在外日本古美術品の蛍光X線分析結果

早川 泰弘

- 【調査資料】** ヴィクトリア・アンド・アルバート美術館 住吉蒔絵文台
- 【調査日時・場所】** 2008年7月31日保存修復科学センター 漆修復アトリエ
- 【調査日時・条件】** 装置：ポータブル蛍光X線分析装置 SEA200 (セイコーインスツルメンツ)
X線管球：Rh (ロジウム)
管電圧・管電流：50kV・100 μ A
X線照射径： ϕ 2mm (Al 40 μ mフィルタ付きコリメータ)
測定時間：200秒
測定雰囲気：大気
装置ヘッド～資料間距離：5-10mm
- 【分析結果】** 別紙参照
- ・得られた蛍光X線強度と、その結果から算出した化学組成を表に示した。
 - ・今回の測定結果に関しては、下記事項を十分考慮した上で、測定結果の解釈が必要である。
- (1) 今回の測定では、有機物 (主元素C, N, O, H) や染料などの検出は行えない。
有機物であっても、軽元素 (例えばAl, Si, S, Clなど) の検出は行えない。
 - (2) 得られた蛍光X線強度は表面からある深さまでの組成情報である。
(金属銅の場合：数10 μ m程度)
 - (3) 単一部位の測定結果だけからは、複数の元素が混合されているのが、それらが層状に存在しているのかの判断はできない。

ヴィクトリア・アンド・アルバート美術館 住吉蒔絵文台 蛍光X線分析結果

No. 測定箇所	蛍光X線強度 (cps)						化学組成 (wt.%)				
	鉄 Fe-K α	銅 Cu-K α	銀 Ag-K α	スズ Sn-K α	金 Au-L β	鉛 Pb-L β	金	銀	銅	スズ	鉛
1 銀色 月				12.9		115.7				56	44
2 金色 山 オリジナル部分	3.5	6.4	0.1		152.6		99	1			
3 金色 後補部分	8.7	12.3	0.1		171.5		98	2			
4 梨地 金色	36.4	6.6	0.1		73.1		98	2			
5 銀黒		3.2		13.1		147.4			50	49	
6 金色 露玉			4.4		234.5						
7 黒色玉		22.9	50.2		16.9						
8 金色 露玉	8.4	3.7	4.0		179.0						
9 黒色玉		24.3	54.5								
10 金色				12.0		118.5			54	46	
11 銀黒	26.8	13.7	10.6								
12 枠金属 銀黒		1.8	82.7		5.2						
13 裏面足裏 銀黒	0.1	909.4	60.6								
14 裏面 足		0.1	66.3		3.8						
15 裏面梨地	93.2				5.5						

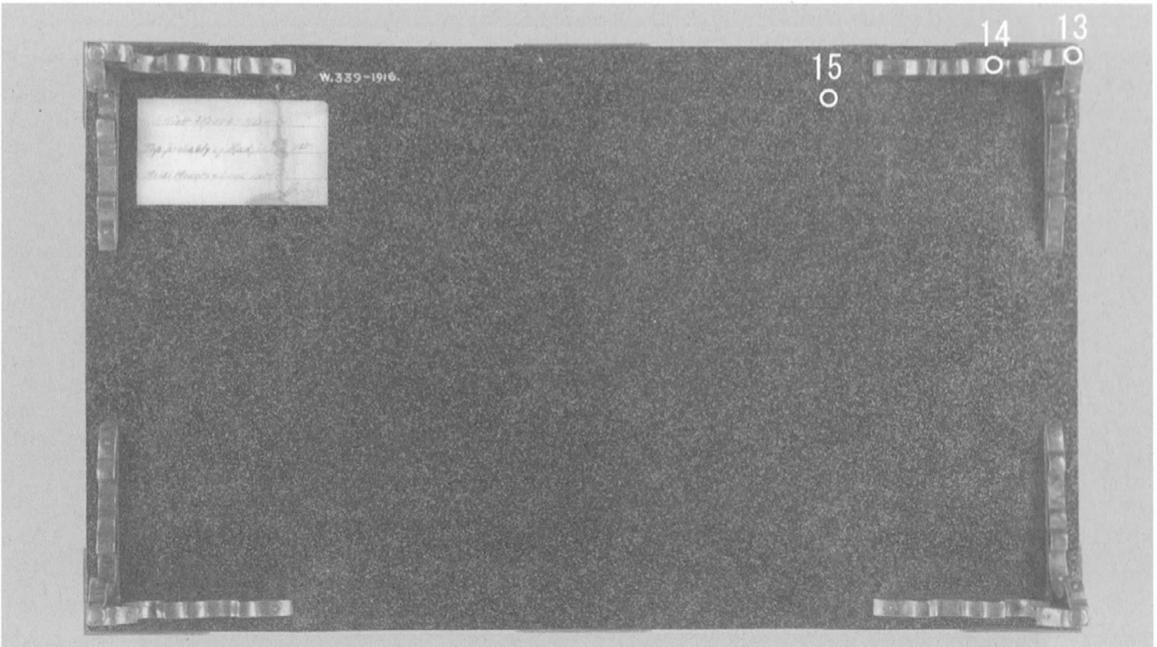
〈分析結果に関するコメント〉

- ・金色部分 (2, 3, 4) の材料はAu-Cu合金と考えられる。
- ・銀色部分 (1, 5, 10) はSn-Pb合金と考えられる。
- ・黒色玉部分 (7, 9) からは銀と銅が検出される。

住吉蒔絵文台 蛍光X線分析位置
Points for X-ray fluorescence analysis



表面
Top board



裏面
Underside of the top board

On the Restoration of *Writing Table (Stationary Stand)*

Tatsuya Matsumoto

Name of the object: *Writing Table (Stationary Stand)*

Collection of The Victoria and Albert Museum (UK)

Date of manufacture: 17th century, Edo period

Dimensions (cm): 35.5 x 59.5 x 9.8

Period of restoration: June 2008 – March 2009 (10 months)

Place of restoration: Restoration Studio (Urushi)

National Research Institute for Cultural Properties, Tokyo

1. Description

On the left and right ends of the writing table are brush stoppers. The four legs are decorated with carvings. There are metal fittings on the ends of the brush stoppers and on the sides and corners of the top board; a silver rim cover is found on the legs. There are two reinforcement bars on the underside of the table in order to prevent the substrate from becoming distorted or cracked.

The design on the top board is that of a seaside landscape with a *torii* gate, an arched bridge, a shrine and a salt-making hut. In the sky is a full moon with a cloud. On the bank by the water and on the rocky hills are pine, maple, and ginko trees as well as chrysanthemums, suggesting an autumn landscape.

The sky on the top board is expressed with lightly sprinkled *nashiji*; the river bank is in gold and silver *togidashi makie*; the waves are expressed with *tsukegaki* against a gold ground. The shrine and the rocky hills are expressed by inlaying metal plates into a portion of *takamakie* that has been lowered (*kimekomi*) or laying them on a *takamakie* (*kimetsuke*). *Kirikane* and *kanagai* are used for the pine and maple trees as well as the rocks. A lead plate is used to express the moon, *torii* gate and the arched bridge. The underside is decorated with sparsely sprinkled gold *nashiji*, while the sides of the table and the outer side of the legs are in gold *keshifun makie*.

2. Condition of damage

Visual inspection

The *makie* on the top board of the writing table had deteriorated due to the effect of ultraviolet ray and the passage of time. In addition, the surface of the coating film had darkened, suggesting that a coating material had been applied in previous restorations. There were also cracks on the reinforcement bars, which were attached in order to prevent the top board from distortion, and the legs. The cracks on the legs are believed to have appeared either because of a problem in the structure of the substrate or because of the nails that were used to attach the rim covers. Damages observed before restoration are noted below.

- The *makie* on the surface of the top board had lost its luster due to deterioration caused by ultraviolet ray and the passage of time. The *makie* powder had also become exposed.

- Coating material other than urushi that had been applied on the surface and the underside of the writing table during previous restorations had deteriorated, causing stains to appear on the coating surface and the *makie* portion to become dark.
- The cracks near the pine tree on the right lower portion of the writing table seemed to have appeared since wood with a node had been used for the substrate. Some of these cracks had penetrated to the underside.
- Although two pieces of reinforcement bars are used on the underside of the top board in order to prevent the substrate from becoming distorted, differences in the shrinkage of the substrate had caused cracking and lifting of the coating film.
- On the legs were cracks that extended from the substrate. There were also cracks and lifting of the coating film on the joints of some of the legs and the top board. These had been repaired.
- Most of the *kanagai* used on the *makie* portion had become lifted; the edges of some had turned upward.
- On the *makie* decoration on the upper right part of the top board, there was a trace of restoration using urushi that had been done before the writing table was exported.
- Corrosion was observed on the metals used at the ends of the brush stopper and the rim covers.
- On the underside of the table, the inventory number was written in white on the coating film and there was a piece of paper with information concerning the purchase of the writing table.

3. Restoration specifications

It was decided to follow the guideline set by the Agency for Cultural Affairs concerning the restoration of urushi art objects, that is, "to preserve existing cultural properties without changing the present condition as much as possible and to transmit them to future generations." In other words, maintenance of the present condition was to be followed as a rule. In case changes would become necessary or problems arise in the restoration process, the matter would be discussed with the persons in charge at the Institute and at the Museum.

4. Special features of the restoration and points to note

Since the coating film on the surface of the top board had darkened due to the passage of time and the influence of the coating material that had been applied, it was believed that luster close to that of the original could be obtained by reinforcing the deteriorated coating film by impregnating urushi. However, the silver and lead portions that had corroded were to be left in the present condition, taking into consideration the antiquity of that portion.

As for the cracks on the legs, since there was much damage around the nails used to hold the rim covers, it was decided to remove the rim covers first and to restore the cracked portions after having reinforced the structure of the substrate. Furthermore, it was decided to apply gold color so as to make the cracks on the *makie* portion not so conspicuous.

5. Restoration procedures

1) Examination of the present condition and confirmation of the restoration process

The structure of the substrate, foundation and decoration of the *Writing Table* (hereafter, the object) as well as the condition of its damage were examined and restoration procedures were confirmed.

2) Photographing before restoration

Photographs were taken so that the object may be compared before and after restoration.

3) Making of a stand and a working table

A stand and a working table were made in order to execute the restoration work safely.

4) Facing

Since the coating film around the cracks was in such a serious condition as to become completely detached during restoration, thinly cut pieces of *gampi* paper were attached with paste in order to prevent the coating film from falling.

5) Analysis

X-ray photographs were taken and X-ray fluorescence analysis conducted before restoration. Data thus obtained were used as reference.

6) Cleaning

The object was cleaned by first removing the dust that covered the surface of the object and then using a slightly moistened cotton cloth to remove dirt. Since the *kanagai* on the *makie* portion of the object which had become lifted and turned up was in danger of becoming completely detached even with the slightest contact, extreme care was taken in executing minimum cleaning.

7) Adhesion of the lifted *kanagai*

The *kanagai* that had become lifted was adhered before removing the coating material. Most of the *kanagai* on the *makie* portion had become lifted and in parts even turned up. These were carefully returned to their original positions and adhered by impregnating animal glue. *Shimbari* technique using the resilience of bamboo sticks was used to press and stabilize the *kanagai*.

8) Removal of the coating material applied in previous restorations

Coating material had been applied to the object during past restorations in Europe, and this coating material had deteriorated because of the effect of ultraviolet ray and the passage of time. In addition, the urushi coating film had also deteriorated and become very fragile. For these reasons, the greatest care was taken in removing the coating material. The solvent used to remove the coating film was tested sufficiently to select the one most suitable for the purpose.

A mixture of absolute ethanol and 50% distilled water was used to remove the coating film. Cotton swabs and soft cloth were used. A special type of cotton swabs were used to remove the dirt from the wave design. Care was taken to work along the *tsukegaki* to remove the coating film and dirt.

The solvent that was used on the surface was also used to remove the coating material from the underside of the top board.

9) Removing the label

The piece of paper on the underside of the top board contains information concerning the purchase of the object and is valuable material. However, since there was a crack underneath the paper, it was necessary to remove it in the process of restoration. After having discussed the matter with the persons in charge from the Museum and the Institute, it was decided to remove this paper and to preserve it separately. It was also decided to remove the inventory number which had been written in white and to rewrite it in the same place and the same form of letters when restoration was completed.

10) Consolidation of the surface coating film

After removing the coating material, the exposed urushi coating film was consolidated with urushi that had been diluted with a solvent. This was done in order to reinforce the exposed urushi coating film and to prevent urushi applied during the remaining restoration procedures from becoming stains. Urushi was adjusted to meet the respective conditions of damage.

To consolidate the *nashiji* portion of the top board, *nashiji urushi*, *kijiro urushi* and *kijomi urushi* were mixed at a ratio of 7 : 2 : 1 and then diluted 4 to 6 times with a petroleum-based solvent, Petroleum (trade name). After

having made sure that this urushi had penetrated into the deteriorated coating film, it was wiped off carefully so that none would remain on the *makie* portion or along the edges of the *takamakie*.

To consolidate the wave design on the top board, urushi was adjusted so that it would change color tone as little as possible since the gold of this part is different from the gold on the *nashiji* portion of the sky. *Nashiji urushi* and *kijiro urushi* were mixed at a ratio of 4 : 1 and diluted with a solvent.

11) Press-stabilization of the legs and cracks

Rim covers were first removed. A stand to place the object and tools for holding the lifted coating film were prepared. To adhere the cracked parts, *mugi-urushi* with more gluten was used for stronger adhesion.

When the rim cover of the front left leg was removed, it was found that the leg was in a very unstable condition and that four nails had been used to reinforce this leg. This part had been repaired several times and the joints were in a very bad condition. For this reason, a small amount of sawdust and hemp fibers were added to *mugi-urushi* which was used to function also as an adhesive to fill in the gaps. Several types of clamps were used for press-stabilization.

12) Press-stabilization of the cracks on the top board

Diluted *mugi-urushi* was impregnated into the cracked portions on the underside of the top board and press-stabilized with *shimbari* technique using bamboo sticks. Coating film surrounding the cracks was also press-stabilized.

13) Application of *kokuso* to parts with missing coating film

Gaps formed by cracks that could not be completely returned or parts with missing coating film were filled with *kokuso*, which was made by adding sawdust and hemp fibers to *mugi-urushi*, in order to reproduce the shape. The coarseness of *kokuso* was changed as necessary. *Kokuso* was applied in several steps.

14) *Kiwasabi*

Sabi-urushi was applied to the adhered coating film and cracks that had been filled with *kokuso* in order to prevent them from becoming lifted again. *Sabi-urushi* was made by adding *jinoko* with fine particles (finer particles than *tonoko*) to *mugi-urushi* with a greater amount of urushi.

15) Consolidation

In order to reinforce the urushi coating film and to revive its luster, urushi diluted with a solvent was applied several times for consolidation. To consolidate the *makie* portion, urushi was impregnated only to the coating film. Urushi remaining on the surface of *makie* was carefully wiped off with ligroin.

Consolidation of the top board and the underside was done four times, respectively.

16) Matching colors

The restored portions were finished by making these areas match the surrounding coating film. Fine gold powder was applied to the *makie* to make the restored parts less conspicuous.

17) Manufacture of a paulownia box for storage and a wrapping cloth

A paulownia box for storage and a wrapping cloth were made in order to transmit the restored object to later generations. The box was designed so that the object can be safely placed in and taken out of it. A specialist was commissioned with the manufacture of the box.

18) Photographing for documentation and compilation of the restoration report

Photographs were taken after restoration and a record of the restoration procedures was compiled.

Results of X-ray Fluorescence Analysis of
Writing Table (Stationary Stand)

Yasuhiro Hayakawa

Date and place of analysis

July 31, 2008

Restoration Studio (Urushi)

Center for Conservation Science and Restoration Techniques

Apparatus and conditions for analysis

Apparatus: Portable X-ray fluorescence spectrometer SEA 200 (Seiko Instruments Co., Ltd.)

Target: Rh (rhodium)

Tube voltage, current: 50kV · 100 μ A

X-ray radiation diameter: ϕ 2mm (Al 40 μ m filter attached)

Measuring time: 200 sec.

Measuring atmosphere: Air

Distance between the apparatus and the sample: 5-10mm

Analytical results (see attached)

X-ray fluorescence intensity obtained and the chemical composition calculated from the results are shown in a table.

The following points should be taken into careful consideration when interpreting the measured results.

- (1) It is not possible to detect organic substances (major elements C, N, O, H) or dyes in the measurement. It is not possible to detect light elements even if they are inorganic substances (ie. Al, Si, S, Cl).
- (2) The X-ray fluorescence intensity obtained shows an average composition from the surface to a set depth (for metallic copper, approximately several 10 μ m in depth).
- (3) It is difficult to determine only from a single measurement whether several elements are combined or whether they are in layers.

Results of X-ray fluorescence analysis

Measuring points	x-ray intensity (cps)						Chemical composition (wt.%)				
	Iron Fe-K α	Copper Cu-K α	Silver Ag-K α	Tin Sn-K α	Gold Au-L β	Lead Pb-L β	Gold	Silver	Copper	Tin	Lead
1 Silver, moon				12.9		115.7				56	44
2 Gold, mountain, original	3.5	6.4	0.1		152.6		99	1			
3 Gold, later addition	8.7	12.3	0.1		171.5		98	2			
4 <i>Nashiji</i> , gold	36.4	6.6	0.1		73.1		98	2			
5 Silver black		3.2		13.1		147.4			50	49	
6 Gold, bead-like decoration			4.4		234.5						
7 Black, bead-like decoration		22.9	50.2		16.9						
8 Gold, bead-like decoration	8.4	3.7	4.0		179.0						
9 Black, bead-like decoration		24.3	54.5								
10 Silver				12.0		118.5			54	46	
11 Silver black	26.8	13.7	10.6								
12 Frame, metal, silver black		1.8	82.7		5.2						
13 Underside, back of the leg, silver black	0.1	909.4	60.6								
14 Underside, leg		0.1	66.3		3.8						
15 Underside, <i>nashiji</i>	93.2				5.5						

Comments on the analytical results

The material for the gold portions (2, 3, 4) is assumed to be an alloy of Au-Cu.

The material for the silver portions (1, 5, 10) is assumed to be an alloy of Sn-Pb.

Silver and copper were detected from the black bead-like decorations (7, 9).

住吉蒔絵文台（ヴィクトリア・アンド・アルバート美術館）
Writing Table (Stationary Stand)
The Victoria and Albert Museum



修復前 全景
Before restoration, overall view



修復後 全景
After restoration, overall view



修復前 天板
Before restoration, top board



修復後 天板
After restoration, top board