
花鳥紋章蒔絵楯

平成19・20年度修復事業



所蔵：アシュモリアン美術館（イギリス）

花鳥紋章蒔絵楯

松本 達弥

修復品名	花鳥紋章蒔絵楯
所蔵	アシュモリアン美術館（イギリス）
修復品年代	17世紀
修復品寸法	53.5cm×54.0cm 高さ6.5cm
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

円形の楯。素地は動物の皮に布張り（表面と縁のみ）、漆下地（裏面は膠下地）を施し、黒漆地に金銀の平蒔絵、薄肉高蒔絵に付描を付ける。

楯表面の中央には紋章とその上部に人物を配し、それらを中心に左右シンメトリーにロココ風唐草を金蒔絵や朱漆塗りで表す。黒漆地には四季の花と5羽の鳥を交互に配する。縁には金地に薄肉高蒔絵で花唐草を表し、裏面は淡蒔きの銀梨子地である。

この楯は中央の紋章により、1667年11月～1668年10月にかけて出島商館長を務めたコンスタンティン・ランストか、1686年11月～1687年10月にかけて同商館長だったコンスタンティン・ランスト2世の所持品と考えられる。

2. 損傷状態

所見

楯の素地に使われた皮の収縮により、形は大きく変形し、漆下地や漆塗膜にダメージを生じていた。また、漆塗膜には経年劣化や紫外線による損傷があり、塗膜表面はヨーロッパにおいて塗料が塗布されていた。尚、修復前の損傷部分の詳細は下記に記す。

- ・楯の表面塗膜は、紫外線や経年劣化により塗膜表面の艶に斑を生じていた。
- ・楯の表裏の塗膜には、後世修理の際に塗られた塗料が劣化し、塗膜面には滲みや斑文があり、蒔絵部分は黒ずんで見えた。
- ・楯の表裏の縁部分には、素地の収縮や打損による漆塗膜の欠損が多く見られた。
- ・塗膜の欠損部分の周辺塗膜は剥離し、触るだけで剥落しそうな状態であった。
- ・表面左側の塗膜に4cmほどの亀裂があり、その周りの塗膜は剥離していた。
- ・裏面の塗膜面には、素地の収縮が原因と思われるひび割れを生じていた。
- ・裏面には塗膜が大きく剥離し、数回付けた膠下地が確認できた。
- ・裏面の梨子地塗に使われた銀粉が錆化していた。

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。また、修復工程の変更や問題点が生じた際は、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

桶の塗膜表面は、手にするだけで塗膜が剥落しそうな危険な状態であった為、安全に作業を遂行できるように設置台を設け、修復作業を進めた。

表面塗膜に塗られた塗料はできるだけ除去を行ったが、蒔絵の部分に損傷を与えそうな危険な部分は注意し作業を行った。

漆下地の欠失した部分を補修した際の仕上げは、現状の雰囲気や周辺塗膜との調和のとれた仕上げにした。

裏面の大きく剥離した部分には、膠下地が層になって剥がれていた。この様な制作当初の下地の様子が確認できるのは貴重な資料になる為、所蔵美術館の担当者や当研究所の担当者と協議した上で、一部分を今後の資料として現状保存する事にした。

5. 修復作業工程

1) <現状調査及び作業工程確認>

蒔絵桶（以後、本資料と呼ぶ）の素地、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>

修復品を損傷なく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>

本資料の欠損部分や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、本資料の縁部分周辺の塗膜は剥落しそうな危険な状態である為、クリーニング作業は充分注意し必要最小限に止め、塗膜の安定を計った上で再度行うことにした。

7) <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塗膜が劣化していた。また、塗料下の漆塗膜も劣化し大変脆くなっていて、加飾部分にある塗料の除去は細心の注意を払った。塗料除去に使用する溶剤は、劣化した漆塗膜に影響を与えない溶剤を選択した。

塗料除去は、無水エタノールに30%~50%の蒸留水を調合し、綿棒や柔らかい布に含ませて丁寧に除去した。

8) <亀裂及び剥離塗膜の圧着>

本来の修復であれば漆塗膜に漆固めをした後、剥離部分の圧着をするが、本資料は触れないぐらい縁部分の漆塗膜や下地が脆くなっている為、先に圧着し安定を計ることにした。

亀裂部分や欠損部分の周辺塗膜は剥離状態で、安全に作業を行う上で裏面の剥離塗膜から圧着する必要があった。剥離部分の接着は、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。

先ず、麦漆をリグロインで希釈しスポイトにて剥離塗膜下へ含浸し、リグロインの揮発を待って再度希釈濃度を変えた麦漆を含ませた。圧着作業は、形状の異なった数種類のクランプを使い分けて剥離塗膜の安定を計った。

尚、裏面の今後の資料として現状保存する箇所の塗膜圧着には、制作時の下地に使われた膠で接着を行った。

9) <表面塗膜の漆固め>

塗膜の塗料除去や剥離塗膜が安定した後、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。

漆固めに使用した漆は、木地呂漆+梨子地漆+生正味漆を5:4:1の割合で配合し、石油系溶剤のペトロールで4倍~6倍に希釈し漆固めを行った。漆固めは表裏2回行い、刻苧や際錆作業が終えた後再度行うことにした。

10) <欠損部分の刻苧充填>

塗膜の欠損部分や亀裂部分の戻しきれない隙間には、麦漆に木粉や麻の繊維を混ぜ合わせ、珪藻土を焼いた地の粉を加えた刻苧を充填し形態を復元した。刻苧での形態復元はオリジナルの漆塗膜面よりやや低めとし、充分乾燥した後、砥石で刻苧肌を研いで整えた。

11) <際錆>

刻苧で形状復元した部分や亀裂の透間には、刻苧面の保護と手擦れによる再剥落を防ぐため際錆を行った。際錆は、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）を混ぜ合わせた漆錆を使用した。

12) <漆塗膜の復元（漆固め）>

漆塗膜の艶復元や保護を目的に漆固めを行った。

漆固めに使用した漆は、木地呂漆+梨子地漆を3:7の割合で混ぜ合わせ、溶剤で5倍ほど希釈し塗膜や刻苧部分に漆を吸い込ませた。尚、高蒔絵部分や刻苧部分に余分な漆が残らないよう丁寧に拭き取った。

13) <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と包布を作った。本資料をより安全に出し入れが出来るよう桐箱や包布の構造製図を作成し、専門家に制作を依頼した。

14) <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 (表面)
Fig. 1 Before restoration (outer side)



图2 修復前 (裏面)
Fig. 2 Before restoration (reverse side)



图3 修復前 (表面) 塗膜龟裂部分
Fig. 3 Before restoration (outer side), part of the coating film with a crack



图4 修復前 (表面縁)
Fig. 4 Before restoration (rim on the outer side)

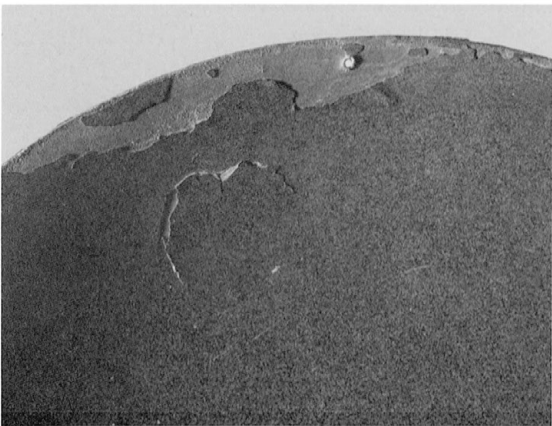


图5 修復前 (裏面) 塗膜 剝離剝落部分
Fig. 5 Before restoration (reverse side), part with lifted and missing coating film

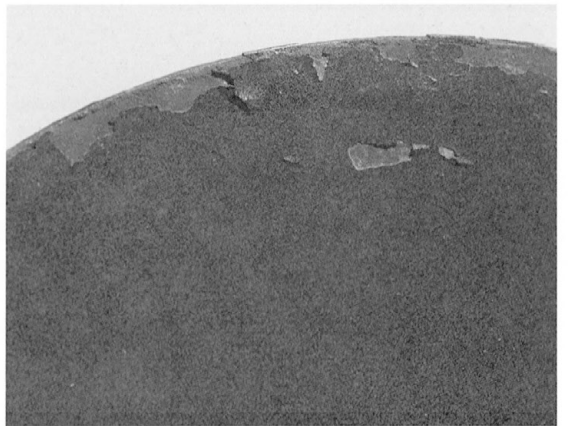


图6 修復前 (裏面) 塗膜 剝離剝落部分
Fig. 6 Before restoration (reverse side), part with lifted and missing coating film

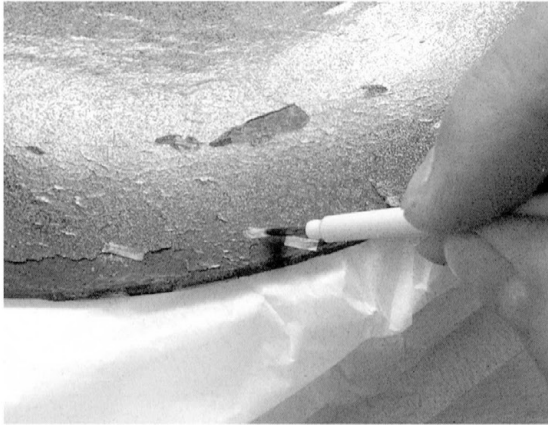


図7 養生
Fig. 7 Facing

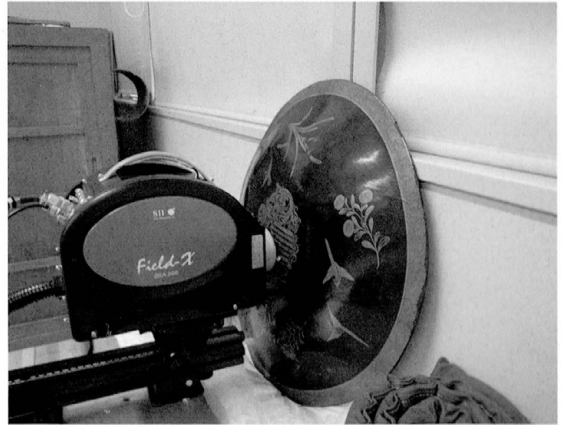


図8 蛍光X線分析
Fig. 8 X-ray fluorescence analysis



図9 後補塗料 除去作業中
Fig. 9 Removing coating material from previous restorations



図10 塗膜表面 漆固め
Fig. 10 Surface of the coating film, consolidation



図11 塗膜表面（裏面）漆固め
Fig. 11 Surface of the coating film (reverse side), consolidation

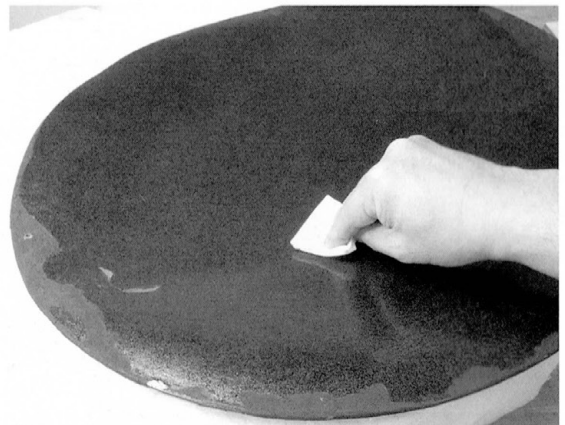


図12 漆固め 拭き取り
Fig. 12 Consolidation, wiping off urushi

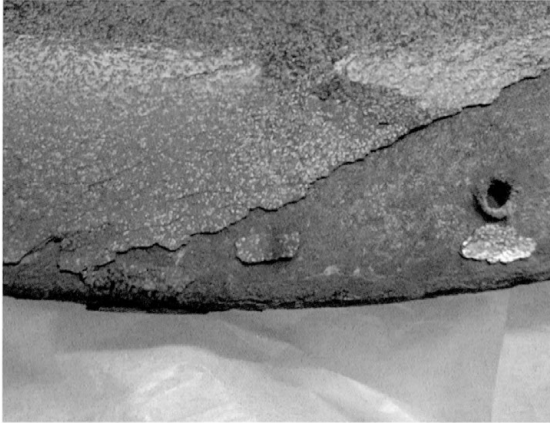


図13 裏面縁 損傷部分
Fig. 13 Rim on the reverse side, damaged portion

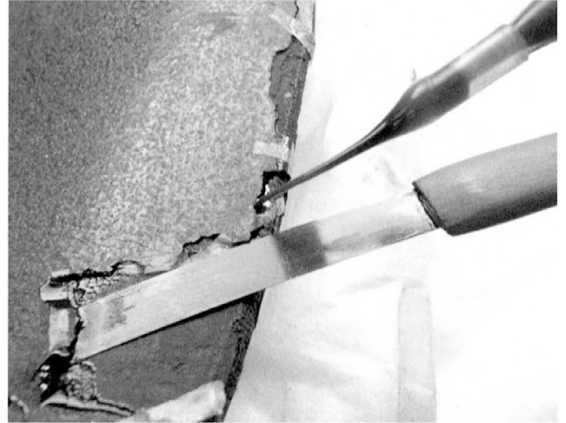


図14 剥離部分に麦漆含浸
Fig. 14 Impregnating *mugi-urushi* to a part with lifted coating film

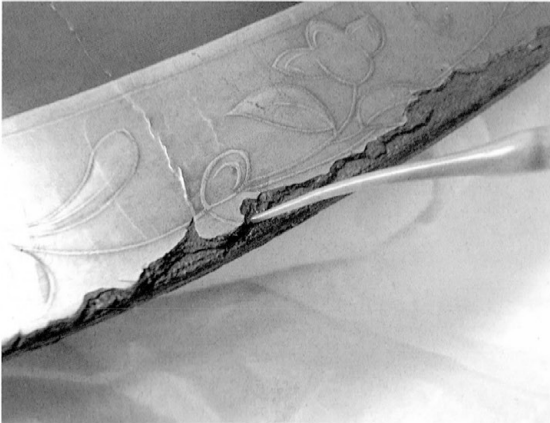


図15 剥離部分に麦漆含浸
Fig. 15 Impregnating *mugi-urushi* to a part with lifted coating film



図16 麦漆含浸後 クランプ圧着
Fig. 16 After impregnating *mugi-urushi*, press-stabilizing with clamps

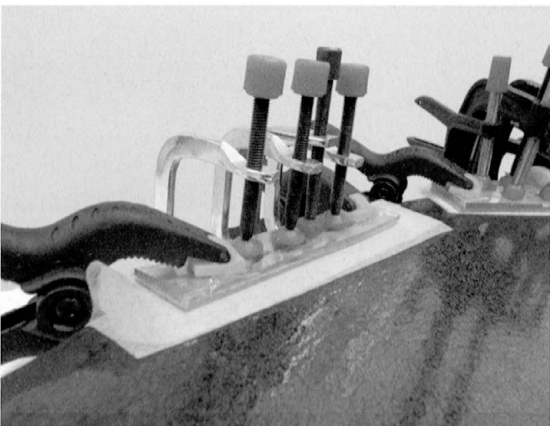


図17 クランプ圧着
Fig. 17 Press-stabilizing with clamps

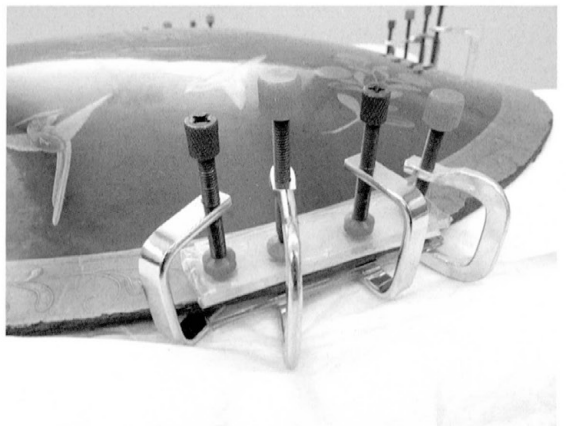


図18 クランプ圧着
Fig. 18 Press-stabilizing with clamps



図19 膠含浸(裏面)
Fig. 19 Impregnating animal glue (reverse side)



図20 膠含浸後 クランプ圧着
Fig. 20 After impregnating animal glue, press-stabilizing with clamps



図21 刻苧 材料
Fig. 21 Materials for kokuso



図22 刻苧材料 調合
Fig. 22 Making kokuso



図23 刻苧
Fig. 23 Kokuso



図24 刻苧付け
Fig. 24 Applying kokuso



図25 刻蒔付け
Fig. 25 Applying kokuso



図26 刻蒔付け 裏面縁
Fig. 26 Applying kokuso to the rim on the reverse side

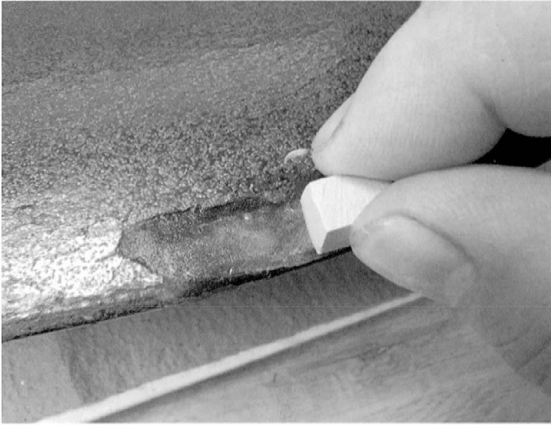


図27 刻蒔部分 研ぎ
Fig. 27 Polishing the part where kokuso has been applied

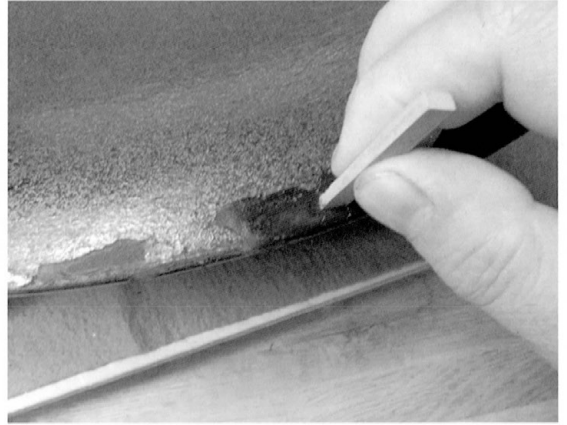


図28 刻蒔部分 研ぎ
Fig. 28 Polishing the part where kokuso has been applied



図29 中間視察
Fig. 29 Interim inspection



図30 際錆 縁部分
Fig. 30 Kiyasabi, rim



図31 際錆 裏面
Fig. 31 *Kiwasabi*, reverse side



図32 際錆後
Fig. 32 After *kiwasabi*



図33 漆固め
Fig. 33 Consolidation



図34 漆固め 拭き取り
Fig. 34 Consolidation, wiping off urushi



図35 包布
Fig. 35 Wrapping cloth

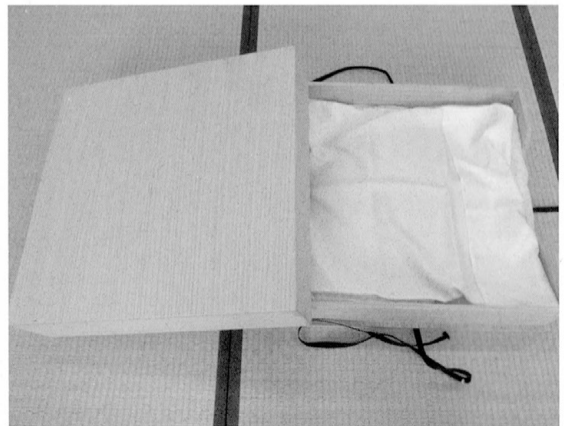


図36 桐製保箱
Fig. 36 Paulownia box for storage



図37 修復後
Fig. 37 After restoration

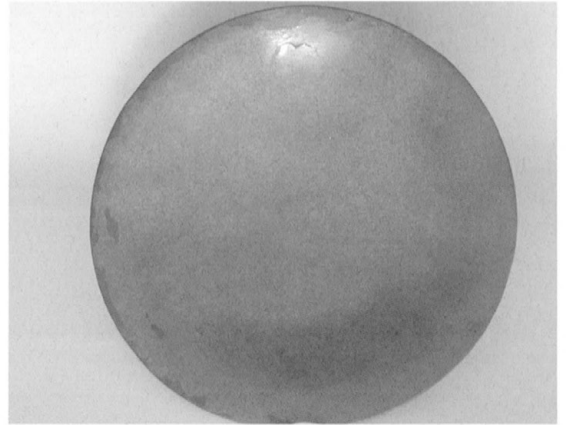


図38 修復後 裏面
Fig. 38 After restoration, reverse side



図39 修復後 亀裂部分
Fig. 39 After restoration, part of the coating film with a crack



図40 修復後 縁部分
Fig. 40 After restoration, rim

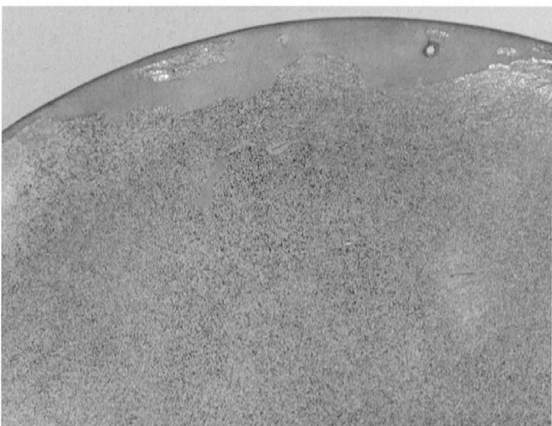


図41 修復後 裏面
Fig. 41 After restoration, reverse side

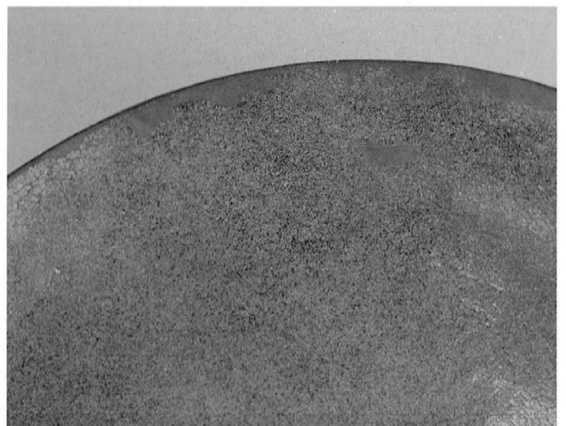


図42 修復後 裏面
Fig. 42 After restoration, reverse side

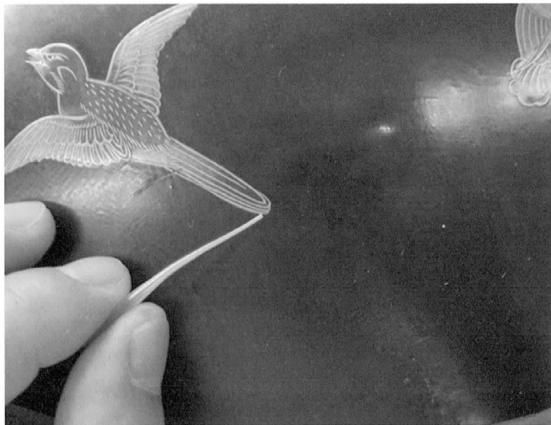


图43 放大画像部分
Fig. 43 A design in detail

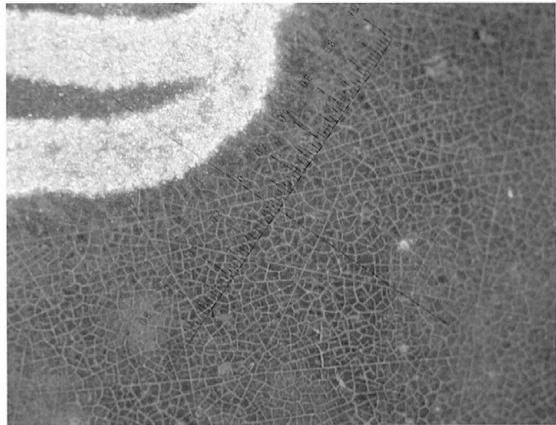


图44 修復前×50
Fig. 44 Before restoration, x50

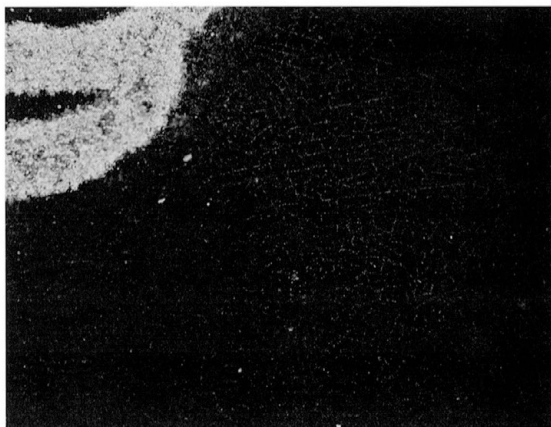


图45 修復後×50
Fig. 45 After restoration, x50



图46 放大画像部分
Fig. 46 A design in detail



图47 修復前×50
Fig. 47 Before restoration, x50

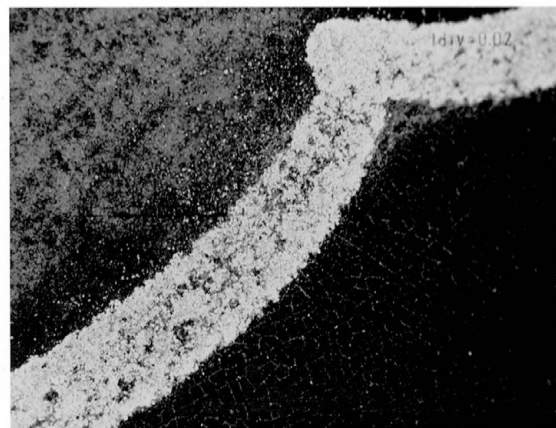


图48 修復後×50
Fig. 48 After restoration, x50

アシュモリアン美術館 (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】** アシュモリアン美術館 花鳥紋章蒔絵桶
- 【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。

アシュモリアン美術館 花鳥紋草葺絵楯 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	金 Au-L β	水銀 Hg-L β	金	銀	銅
1 金	15.0	7.4	0.1	99.7		97	1	2
2 赤	9.9				147.3			
3 茶	18.6		1.0		32.8			
4 茶	47.2				13.6			
5 金	14.6	8.8	0.2	101.8		97	1	2
6 銀黒	29.6		1.4		6.5			
7 黒漆地	51.3							
8 茶	26.4	1.8	1.3	11.5	14.4			
9 薄赤	24.8	1.3			30.7			
10 金	28.9	4.5	0.0	42.9		97	1	2
11 裏面 銀梨地	31.7	3.7	2.8					

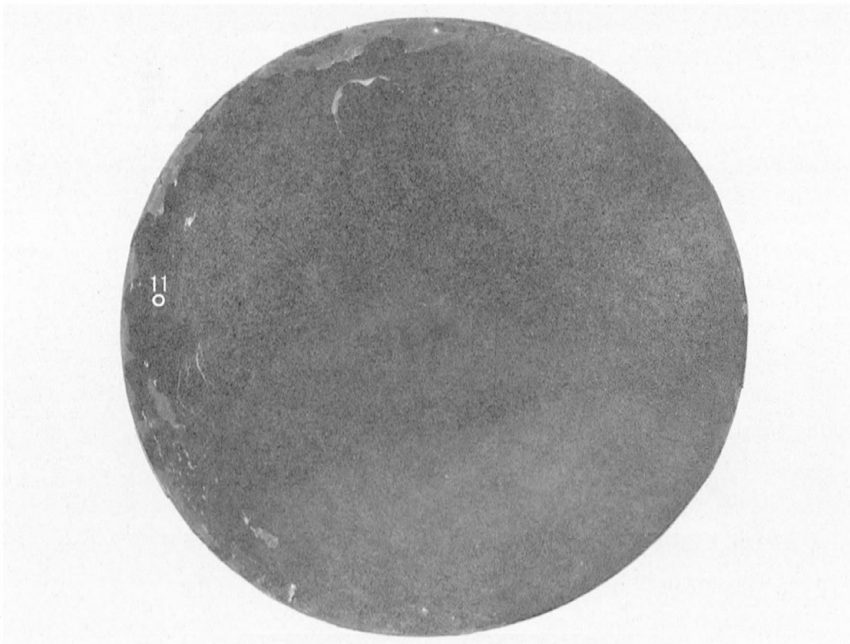
〈分析結果に関するコメント〉

- ・金色部分 (1, 5, 10) の材料はAu97-Ag1-Cu2 wt.%とほぼ同じ化学組成である。
- ・茶色部分 (3, 4, 8) からはFeとHgが比較的多く検出されており、Fe系材料とHg系材料が併用されていると考えられる。

花鳥紋章蒔絵楯 蛍光X線分析位置
Points for X-ray fluorescence analysis



表面
Outer side



裏面
Reverse side

On the Restoration of *Leather Shield*

Tatsuya Matsumoto

Name of the object: *Leather Shield*

Collection of The Ashmolean Museum (UK)

Date of manufacture: 17th century

Dimensions (cm): 53.5 x 54.0 x 6.5

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

Place of restoration: Restoration Studio (Urushi)

National Research Institute for Cultural Properties, Tokyo

1. Description

A round shield. The substrate is animal skin covered with cloth (outer side and around the rim only) to which urushi foundation has been applied (animal glue foundation for the reverse side). It is decorated with gold and silver *hiramakie* on a black urushi ground and *tsukegaki* on thin *takamakie*.

At the center of the shield is a crest with a figure standing at the top. A rococo-style arabesque design in gold *makie* and vermilion urushi is arranged symmetrically to the right and left of this crest. Flowers of the four seasons and five birds are arranged alternately on the black urushi ground. The rim of the shield is decorated with a floral arabesque in thin *takamakie* on a gold ground. The reverse side of the shield is decorated with sparsely sprinkled silver *nashiji*.

From the crest at the center of the shield, it is assumed that the shield belonged to either Constantin Ranst who was the head of the Dutch Trading House at Dejima from November 1667 to October 1668 or to Constantin Ranst II who held the same position from November 1686 to October 1687.

2. Condition of damage

Visual inspection

The shape of the shield had become greatly distorted due to the shrinking of the leather used for the substrate. As a result, there was severe damage to the urushi foundation and the urushi coating film. The urushi coating film had also been damaged by the passage of time and ultraviolet ray. Coating material had been applied in Europe to the urushi-coated surface. Details of the damage observed before restoration are noted below.

- The lustrous surface of the coating film had become spotted due to the passage of time and ultraviolet ray.
- The coating material that had been applied to both sides of the shield in previous restorations had deteriorated, causing stains and blackening of the *makie* portion.
- There were many losses of the urushi coating film on the rim of the shield, both on the outer side and reverse side of the shield, caused by the shrinking of the substrate and impact.
- The coating film around the missing areas had become lifted so that there was risk of its falling just by contact.

- There was a crack about 4 cm long on the left side of the shield (outer side) and the coating film around this crack had become lifted.
- There were minute cracks on the coating film of the reverse side which are believed to have been caused by the shrinking of the substrate.
- The coating film on the reverse side had become largely lifted and several layers of animal glue foundation that had been applied were confirmed.
- The silver powder used for the *nashiji* ground on the reverse side had corroded.

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 surface of the coating film was so severely damaged as to become detached just by coming in contact with the hand, a special stand was made to execute restoration work safely.
- The coating material that had been applied to the surface coating film was removed as much as possible, but special care was given so as not to damage the original portions.
- When missing areas of the urushi foundation were restored, they were finished in such a way as to match the overall atmosphere of the object today and the surrounding coating film.
- Layers of animal glue foundation were exposed in areas on the reverse side where the coating film had become largely lifted. Since information regarding the original foundation is valuable material, it was decided, upon deliberation with the persons in charge at the Institute and the Museum, to preserve a part of it as such for future study.

5. Restoration procedures

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

The substrate, foundation and decoration of the *Leather Shield* (hereafter, the object) as well as the condition of its damage were examined and documented. 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 without damaging the object.

4) Facing

Since the coating film around the missing areas and 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 them from falling.

5) Analysis

X-ray photographs were taken and X-ray fluorescence analysis conducted before restoration, and data thus

obtained were used as reference.

6) Cleaning

In order to clean the object, dust covering the surface was first removed. Then a slightly moistened cotton cloth was used to remove dirt. Since the coating film around the rim of the shield was at risk of becoming detached, sufficient care was given in the cleaning procedure, limiting the work to the minimum necessary amount. It was decided to clean the object again after the coating film had been stabilized.

7) Removal of the coating material from previous restorations

Coating material had been applied to the object during past restorations in Europe, and this coating material had become deteriorated due to the passage of time and ultraviolet ray. Moreover, the urushi coating film underneath the coating material had also deteriorated and become extremely fragile. For this reason, extra care was given in removing the coating film from the *makie* portion. With regard to the solvent for removing the coating film, one that would not adversely affect the urushi coating film was selected.

In order to remove the coating material, cotton swabs and soft cloth moistened with a mixture of absolute ethanol and 30 – 50 % distilled water were used.

8) Press-stabilizing of cracks and lifted coating film

In an ordinary restoration, the lifted urushi coating film would be pressed for stabilization after it has been consolidated. However, since the urushi coating film and the foundation of the object around its rim was in such a serious condition that they could not be touched, it was decided to execute press-stabilization first.

The coating film around the cracks and missing areas had become lifted so that it was necessary to begin by press-stabilizing the lifted coating film on the reverse side of the shield in order to continue restoration safely. To adhere the lifted parts, *mugi-urushi* having a greater amount of gluten was used so as to increase adhesion.

First, *mugi-urushi* was diluted with ligroin and impregnated under the lifted coating film with a dropper. After the ligroin had evaporated, *mugi-urushi* diluted differently was impregnated again. Several types of clamps of different shapes were used to stabilize the lifted coating film.

9) Consolidation of the surface urushi film

Once the coating material had been removed from the coating film and the lifted coating film stabilized, the exposed urushi coating film was consolidated with a diluted solvent in order to reinforce it and to prevent staining with urushi during restoration.

The urushi used for consolidation was a mixture of *kijiro urushi*, *nashiji urushi* and *kijomi urushi* at a ratio of 5 : 4 : 1. This was diluted 4 to 6 times with a petroleum-based solvent, Petroleum (trade name). Consolidation was done twice each on the outer and reverse sides of the shield. It was also decided that consolidation would be done again after *kokuso* and *kiwasabi* had been applied.

10) Filling the missing areas with *kokuso*

Kokuso, made by kneading sawdust and hemp fibers to *mugi-urushi* and then adding *jinoko* (baked diatomaceous earth), was filled into areas where the coating film had been lost or to gaps in the cracks that could not be completely repaired. Reproduction of the shape by using *kokuso* was done in such a way that the area thus treated would be somewhat lower than the surface of the original urushi coating film. Once the treated area had hardened sufficiently, the surface of the *kokuso* was polished with a whetstone.

11) *Kiwasabi*

Kiwasabi was applied to parts where the shape had been reproduced with *kokuso* and to the edges of cracks in order to protect the *kokuso* surface and to prevent the coating film from becoming detached again when in contact with a hand. *Sabi-urushi* used for *kiwasabi* was made by mixing *jinoko* with very fine particles (finer

than the particles of *tonoko*) to *mugi-urushi* containing a slightly more ratio of urushi.

12) Reproduction of the urushi coating film (consolidation)

Urushi was consolidated again in order to bring back the luster of the urushi coating film and to protect it.

For consolidation, a mixture of *kijiro urushi* and *nashiji urushi* at a ratio of 3 : 7 was used. This was diluted to about 5 times and applied to the coating film and the areas treated with *kokuso*. Excess urushi was carefully wiped off from the parts with *takamakie* and areas treated with *kokuso*.

13) Manufacture of a paulownia storage box and wrapping cloth

A paulownia box for storage and a wrapping cloth were made in order to transmit the object to future generations. Structural drawings were made of the paulownia storage box and the wrapping cloth that would make it easy to put in and take out the object. The box and wrapping cloth were made by specialists.

14) Photographing and compilation of a restoration record

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

Results of X-ray Fluorescence Analysis of *Leather Shield*

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 of *Leather Shield*

No. Measuring points	x-ray intensity (cps)					Chemical composition (wt.%)		
	Iron Fe-K α	Copper Cu-K α	Silver Ag-K α	Gold Au-L β	Mercury Hg-L β	Gold	Silver	Copper
1 Gold	15.0	7.4	0.1	99.7		97	1	2
2 Red	9.9				147.3			
3 Brown	18.6		1.0		32.8			
4 Brown	47.2				13.6			
5 Gold	14.6	8.8	0.2	101.8		97	1	2
6 Silver black	29.6		1.4		6.5			
7 Black urushi ground	51.3							
8 Brown	26.4	1.8	1.3	11.5	14.4			
9 Pale red	24.8	1.3			30.7			
10 Gold	28.9	4.5	0.0	42.9		97	1	2
11 Reverse side, silver <i>nashiji</i>	31.7	3.7	2.8					

Comments on the analytical results

The chemical composition of the material for the gold portions (1, 5, 10) is almost identical with that of Au97-Ag-1-Cu2 wt.%.

Comparatively large amount of Fe and Hg were detected from the brown portions (3, 4, 8). It is assumed that Fe-based material and Hg-based material were used in combination.

花鳥紋章蒔絵楯 (アシュモリアン美術館)

Leather Shield

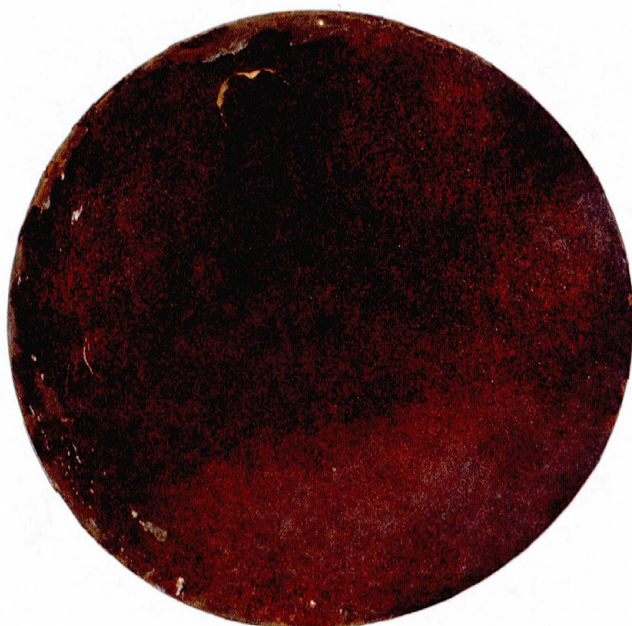
The Ashmolean Museum



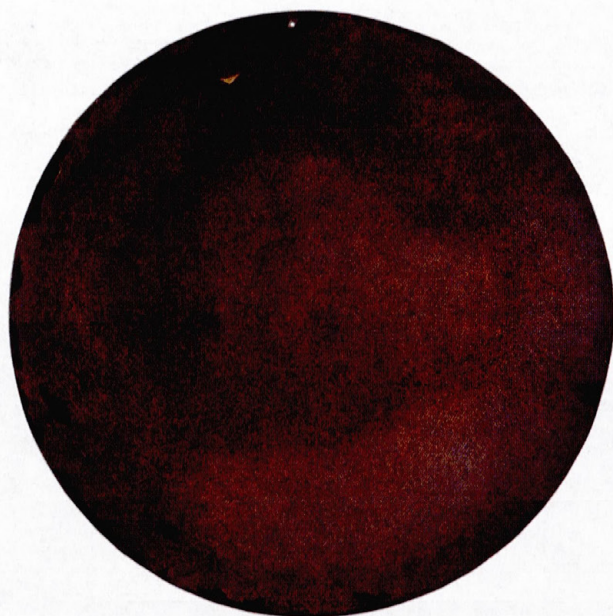
修復前 表面
Before restoration, outer side



修復後 表面
After restoration, outer side



修復前 裏面
Before restoration, reverse side



修復後 裏面
After restoration, reverse side