樹下鳥獣蒔絵螺鈿洋櫃　*"Jukachoju Makie Raden* Coffer"

図64　樹下鳥獣蒔絵螺鈿洋櫃（修理後）
Coffer (after restoration)

図65　樹下鳥獣蒔絵螺鈿洋櫃（修理前）
Coffer (before restoration)

フランス・ギメ美術館所蔵

樹下鳥獣蒔絵螺鈿洋櫃

（平成11年度・12年度）
財団法人　芸術研究振興財団補助事業

品名：樹下鳥獣蒔絵螺鈿洋櫃
所蔵：ギメ美術館　フランス
品質構造：品質構造：木製黒漆塗り、蒔絵、螺鈿
所蔵番号：ＭＡ５１５４
時代：16世紀末

請負者　　目白漆芸文化財研究所
修理担当者　　山下　好彦・松本　達弥・奥村　公規
原稿執筆　　山下　好彦

はじめに

在外日本古美術品修復協力事業（工芸）のうち、フランス・ギメ美術館所蔵「樹下鳥獣蒔絵螺鈿洋櫃」一合の保存修理が、財団法人芸術文化振興財団の助成のもと、平成11年度、12年度の２ケ年に亘り、東京国立文化財研究所第一修復アトリエで行われた。

この報告書は、保存修理の概要をまとめたものである。

保存修理は漆工を山下好彦、松本達弥、金工を奥村公規が担当した。

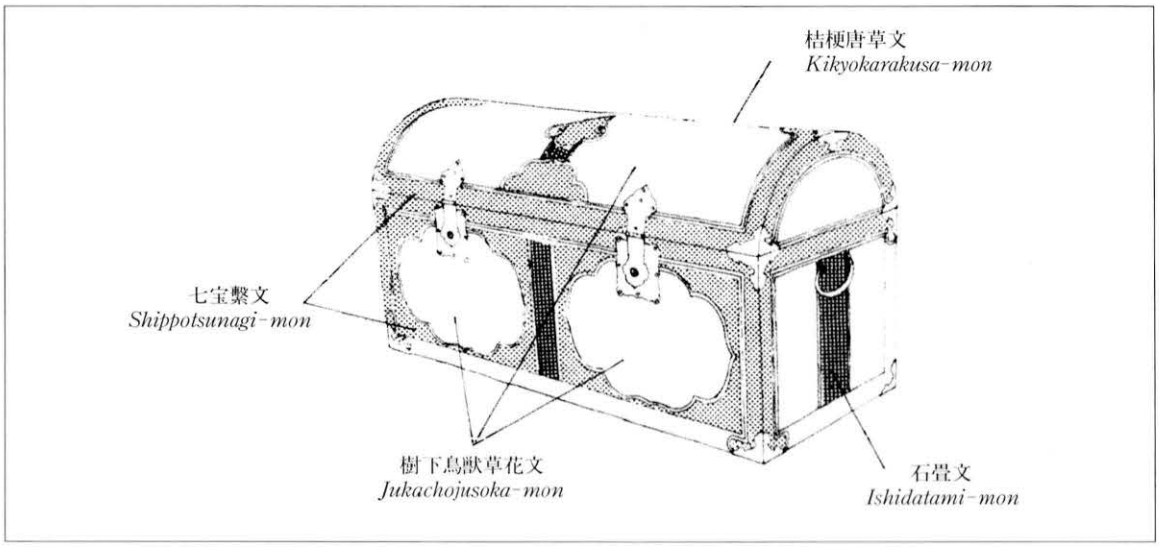
現資料の保存修理にあたり、各種分析調査を東京国立文化財研究所の諸氏の協力のもと行った。蛍光Ｘ線分析はの平尾良光氏、早川泰弘氏、赤外線吸収スペクトル分析、元素分析や鉱物分析は早川典子氏、朽津信明氏が行った。クロスセクションは早川典子氏の協力を得た。また、Victoria and Albert MuseumのMs. Shayne Rivers　に合成修復材料の資料提供と助言を頂いた。

１．修理概要

現資料は16世紀末、桃山時代に日本で作られ、当時日本と交易のあったポルトガル向けに輸出したいわゆる輸出漆器の一つである。洋櫃はポルトガル人の注文によって彼らの好みに合わせて数多く作られた。洋櫃の加飾は、当時、日本で流行していた高台寺蒔絵の手法と螺鈿を併用しており、たいへん華やかな意匠に特徴がある。輸出された当時、同じ形状の洋櫃は小さいものから大きいものへ入れ子にされ、船に積み込まれた事が知られており、現在でも現資料と同じ形の洋櫃がヨーロッパの宮殿や美術館、博物館に数多く保管されている。ヨーロッパにある漆資料は、漆の艶が消える度に家具修理と同じように西洋で使われる塗料を何度も表面に塗布しているものが多い。現資料は作後400年以上が過ぎ、ヨーロッパに於て何度も修復が行われ現在まで伝えられたものである。金具は錠金具を含む多くの金具がヨーロッパ製の後補であり、蓋の広い面積にヨーロッパに於ける金のドローイングが入っていた。洋櫃の表面にはシェラックが４～５回以上の塗り込まれ、茶色く変色していた。

２．品質構造及び法量

木製黒漆塗り、半円筒形の蓋の付いた大型の洋櫃で、両側面に提鐶を付け、錠金具・蝶番・角金具を打



Parts of the coffer

つ。背面を除く各面を螺鈿で区画、正面は窓枠を設け、橘、紅葉、桔梗、松、藤、椿、桔梗等の草木や虎、孔雀、獅子等の鳥獣を螺鈿と金の平蒔絵で表し、その他の部分を石畳文、家文入七宝繋文で埋める。甲板正面中央に雲型の幾何文が付くほか、背面から甲板にかけては桔梗唐草を廻す。素地は檜の厚い板を矧ぎ、側板は組手接ぎ、底板は木釘で側板に裏側から打たれる。蓋甲板は８枚の板を矧ぎ合せ蓋側板と組む。蒔絵技法は銀の絵梨子地風な表現と金の平蒔絵の併用であり、一部に描割りが見られる。文様には鮑の中厚貝をふんだんに使用しており、初期の輸出漆器の特徴を示す。本来の金具は銅製の金鍍金であるが丁番と錠金具、角金具の約三分の一が後補である。

法量（mm）

総体　　縦　５６５　　横　１３１２　　高さ　６５２

３．損傷状態

①資料全面に汚れの付着が見られたが、特に、角金具周囲の汚れが著しく、各所に綿くずが付着していた。

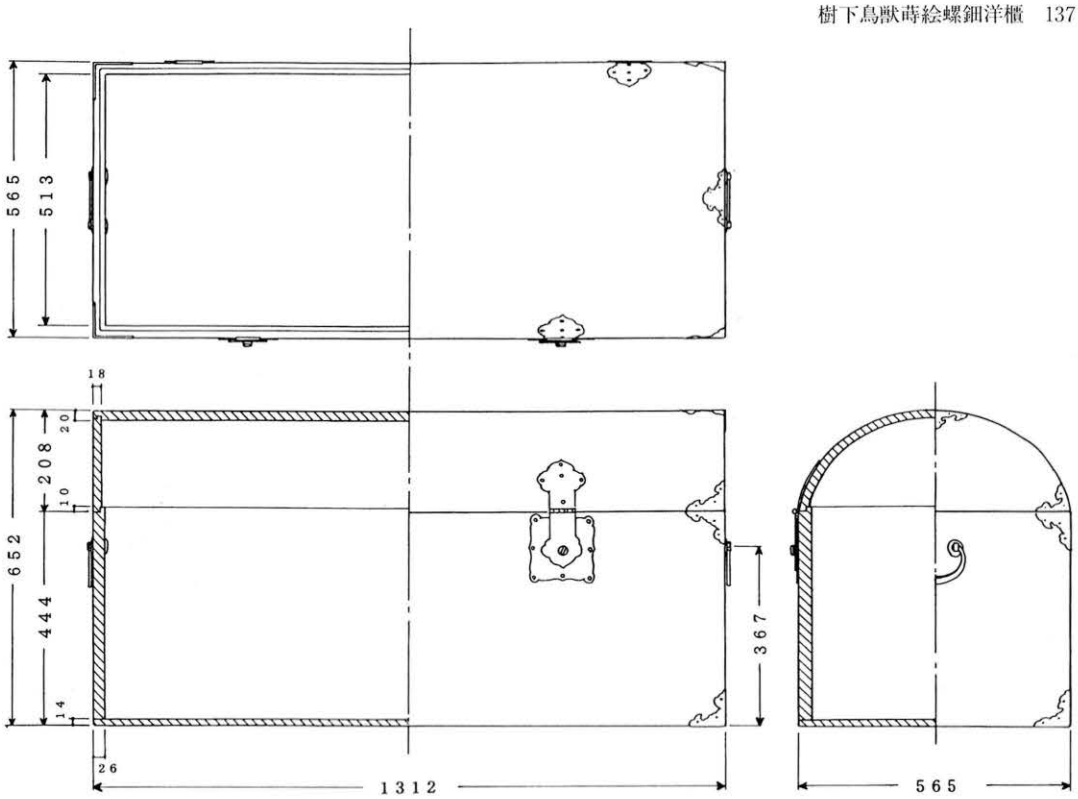
②ヨーロッパで施された修復塗料が表面全面に被り、茶色く変色し、黒漆面や蒔絵面にむらを作っていた。また、右側面では塗布された材料が劣化し、細い断文が入ることで表面が白濁化していた。塗料は一部で剥落していた。

③紫外線による漆塗膜の劣化が塗膜表面にみられ、細かい断紋が入っていた。漆膜は各所で剥離し、剥離部分の周辺で塗膜が剥落していた。

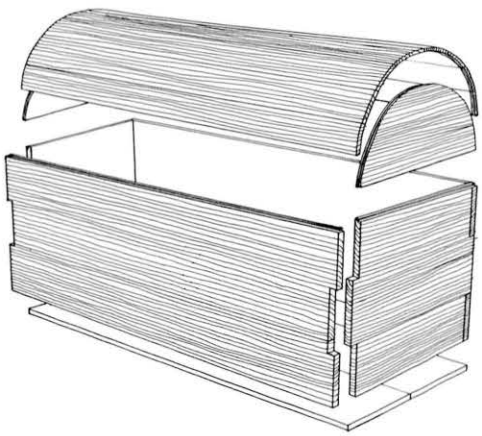
④木地の収縮や経年変化によって素地の歪みが生じ、素地の矧ぎ目や接合部分周辺に亀裂が入っていた。櫃の内側は木地の矧ぎ目部分周辺に亀裂が入り、周囲に剥離が広がり、一部で剥落が見られた。

⑤素地の収縮で螺鈿の剥離し、表面より突出していた。螺鈿周囲の漆塗膜も同様に剥離していた。多くの貝がすでに剥落していた。

⑥洋櫃の周辺部と甲板の四分の三にはヨーロッパに於ける後世修理が入っていた。修復部分は白色の下地に、黒色の塗料を塗り込み、一部に金線を書き加えていた。底面と内面は全面黒色の塗料で塗り直



108　洋櫃の平面図（上図）と素地構造図（下図）
Plan of the Coffer (above) and structure of the substrate (below)



されていた。
⑦正面の石畳文の螺鈿剝落部分に新しい貝が嵌入されていた。
⑧螺鈿の一部に後世修理の跡があり、白色の下地で剝落した貝の部分を埋め、表面を銀色の塗料で加筆していた。
⑨後世の復元部分に亀裂や剝離があり、白色の下地が露出していた。また、底面の塗膜は剝離が著しく、広い面積に亘って、剝落していた。
⑩各所に打損があり、下地や木地が露出し、一部に塗膜の陥没があった。
⑪各所に擦れによる傷があり、蒔絵に傷みがあった。
⑫蒔絵部分に金属粉の銹化による変色が見られた。
⑬角金具の上に修復の塗料がかかり、各所に修復のための金属粉が金具の上と周囲の塗膜の上に付着していた。角金具の裏側が錆び、緑青が付着していた。
⑭側面下の角金具に歪みがあり、釘が緩んでいた。正面右の錠金具のねじ頭が一本切れ、金具が一部で外れている。錠金具に歪みが見られた。
⑮本来の貝がいったん取り外され、異なる位置に貼り戻されていた。
⑯かなりの面積にデザインの変更が行われていた。

4．修理仕様

現資料は、ヨーロッパにおいて長い間保管され、広い面積に亘って何度も修復されてきた。修復の表現には蒔絵に似せた金色のドローイングが見られる事から、ヨーロッパに輸出された美術工芸品というばかりではなく歴史的な資料でもあると判断した。

修理は、保存修理を基本に行い、現状維持を目的とし、ヨーロッパにおいて行われた後世の修復部分も保存の対象とした。漆部分の修理には伝統的材料を用い、後世の修復部分にはヨーロッパの美術館等で現在修復に使用されている合成樹脂を使うものとした。素地の欠損部分は形状のみを復元し、周辺の塗膜に表情を合わせた。後世に塗布された表面の塗膜は溶剤で出来る限り除去した。ヨーロッパで描き加えられた部分の塗りや金線、銀色の塗料は除去せずにそのままとし、オリジナルの蒔絵や貝に被っている箇所のみを取り除いた。劣化し艶の消えた漆塗膜には漆固めを行い、強化した後、摺漆をかけ艶をある程度復旧し、後補の部分との艶を調整した。傷んだ金具は一部を取り外し、歪みを修正した後、元の位置に取り付けた。錠金具の破損したねじは取り外し、形状を復元した新しいねじをもとの位置に取り付けた。

修理仕様を事前に定め、その内容の調整や変更については、所蔵館の担当学芸員Ms. Hélène Bayou、東京文化財研究所伝統技術研究室々長 加藤寛氏、修復担当者 山下好彦の三者で協議し、決定するものとした。

5．修理工程と内容

(1)調査および写真撮影

はじめに、現資料の素地、下地、塗り、蒔絵をそれぞれ技法の上から調査し、現在の傷みの現状を記録にとどめた。また、修理前の写真撮影をし、修理後と比較出来るようにした。

(2)金具外しと調正

正面右側の折れたねじは、ねじに切り込みを入れ丁寧に取り外した。側面下角金具の釘を外し、角金具の歪みを内側から叩いて調正した。錠金具の歪みは、いったん金具下の形状を樹脂粘度で型取りしその型をやに台で固定し、錠金具を置いて内側から叩いて調整した。

(3)掃除と養生

資料全面を覆っている埃や綿くずは、毛棒やピンセット等を使って取り去り、さらに、綿棒や洗いざらしの綿布に水を含ませ汚れを掃除した。表面に被ったシェラックの除去は主にエタノールを使用し、状況によって水とエタノールを混合した溶液およびアルコールとアセトンを混合した溶液を使用した。掃除には長方形に切ったゴムに綿布を包み、溶剤を少量づつ付けながら塗料を丁寧に取り除いた。塗料の厚みがある箇所は部分的に竹篦や鼈甲篦を使用して除去した。剝落の危険のある塗膜箇所に小片に切った雁皮紙を生麩糊で貼り、作業中での剝落を予防した。

(4)後世修理の除去

螺鈿や蒔絵の上の補彩された後世修理をアセトンとアルコール、アセトンのみを適宜塗布し、柔らかくなったところで竹篦で出来うるかぎり除去した。塗料の堅いところは切れ味を悪くした彫刻刀を用いた。

(5)漆固め

劣化した漆塗膜を補強するため漆固めを行った。蒔絵の明るさを出来うるかぎり変えないために、蒔絵部分と塗膜部分で異なる漆を使用した。漆は蒔絵部分には梨子地漆、透き漆と生正味漆、塗膜部分には透き漆と生正味漆を混合し、石油系の溶剤（クリーンソルG）で10倍程度に希釈し、蒔絵筆で塗布した。漆は、乾燥しないうちにリグロインで完全に拭き取った。漆固めの回数は、各面の劣化状態で異な

り、１回から５回行った。

⑹剝離螺鈿の接着

はじめに、現資料の形状や大きさを考慮に入れ、圧着のための木枠を制作した。木枠は直方体を三台をボルトで組み合わせ、一枚の厚いベニヤ板で床面を作った。各面には、溝を入れた角棒を圧着部分に合わせてスライドできるようにした。剝離した螺鈿には粒膠を使用したが、液体にした膠を3.5時間から７時間、超音波発生装置にかけ、浸透しやすくした。貝の際に塗料が入りこんでいた部分は、いったんアルコールを含浸し、柔らかくなった塗料を除去した。その後、20～25%の膠を貝の下に含浸し、アクリル板とビニール板を貝の上に置き、竹や木製のヒゴを用いて圧着した。膠が乾燥した後、余分な膠は水を含ませた綿布で拭き取った。

⑺剝離塗膜の接着

剝離した漆塗膜部分を抑えるため、接着用に調整した麦漆をリグロインで希釈し、筆で含浸した。塗膜表面に残った余分な漆を丁寧に拭き取り、リグロインが揮発した後、螺鈿と同じ方法で抑えた。錠金具下の剝離部分はクランプを使用した。ヨーロッパに於て完全に塗り直された身の内側や、底部分の塗膜剝離箇所は、パラロイドB72 10%溶液で剝落止めを行った。

⑻亀裂部の接着

素地接合部やその他の亀裂箇所に麦漆を含浸し、素地の接着と下地や塗膜の補強を行った。余分な漆はリグロインで完全に拭き取り、十分乾燥させた。

⑼下地欠失部の形状復元

下地の欠失した部分や打損等により木地にへこみが出来ていた部分に刻苧を充塡し、剝落の進行を抑えた。必要に応じて刻苧の上から下地をし周囲の塗膜に色を合わせた。

⑽際錆

剝離や剝落していた塗膜の際に極く少量の細かい漆下地を施し、触指による再剝落を予防した。下地は水練りの黄砥粉に蠟色漆と松煙を混合した黒錆を使用した。

⑾艶合わせ

漆塗膜に摺漆を数回行い、黒漆部分の艶を復旧した。漆は透き漆と生上味漆を混ぜ、クリーンソルで希釈したものを使用した。ヨーロッパの塗料で復元された部分については、可逆性のある修復塗料を使用した。塗料は、アルコンP90をセェルゾール321で溶き、Tinuvin292を１%を添加したものを使用した。塗料の濃度は10%から40%まで幅広く使用し、漆部分の艶に合わせて選択した。また、黒色部分はシェラックのアルコール溶液にカーボンを加えた塗料で加筆した。

⑿錆の除去

角金具裏側の緑青錆を除去した。５%のギ酸（HCO_2H）水容液を高級水樹脂に吸収させペースト状の素材を作った。緑青錆部分の上に直接ペースト素材を置き、緑青が溶解するのを待ってペースト素材と共に錆を除去した。

⒀金具取付け

側面下の角金具をもとの位置に戻した。正面の錠金具も同様に取り付け、復元したねじを取り付けた。

⒁記録および写真撮影

修理記録をまとめるとともに修理後の写真撮影を行い、現資料の修復を終了した。

６．分析

蒔絵粉および金具、修復材料や接着素材を対象に蛍光Ｘ線分析および赤外線吸収スペクトル分析、元素

分析や鉱物分析を行った。分析の詳細は末尾に添付した。

7．技法分析

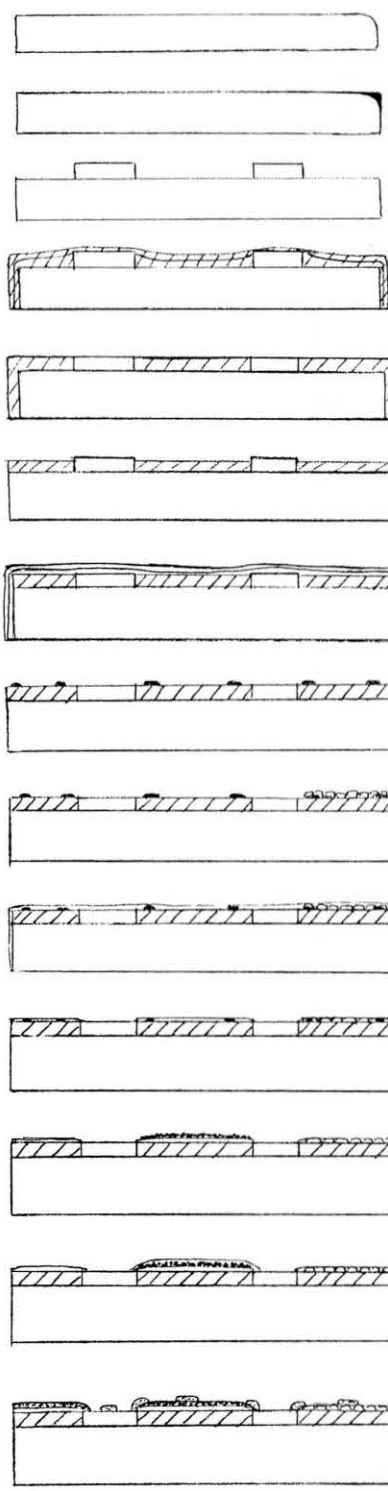
各種分析および視認による技法の調査から判明した結果をもとに洋櫃の加飾工程を推定した。名称と内容は現在の技法をもとに記述した。

	名　称	内　容
1	木地	檜柾目材　数枚矧
2	角下地付け	地の粉　漆下地
3	割付け	大まかな区画線などを墨書きする
4	そくい付け	貝の裏側にそくいを付ける。米糊、松煙
5	貝の接着	中厚貝の鮑を文様に切り、貼り込む。
6	一辺地付け	砥石粉（荒）に生正味漆
7	下地研ぎ	砥石で軽く空研ぎする
8	二辺地付け	砥石粉（細）に生正味漆
9	下地研ぎ	砥石水研ぎ
10	下塗り	黒蠟色漆
11	下塗り研ぎ	朴炭水研ぎ
12	中塗り	黒蠟色漆
13	中塗り研ぎ	朴炭水研ぎ
14	描き置目	弁柄漆筆描き
15	下付け	絵漆（弁柄漆）を薄く塗る
16	梨子地粉蒔き	土坡、草花などの部分に銀粉を蒔く
17	梨地粉漆固め	透漆と樟脳で粉固めする
18	上塗り	透漆で全体を塗り込む
19	上塗り研ぎ	駿河炭で全体を研ぐ　最後はロイロ炭を使用
20	摺漆	生上味漆で３～４回摺漆をする
21	胴摺り	砥粉と菜種油を混ぜ、綿布で細い傷を取る
22	摺漆	生上味漆で摺漆を３～４回する
23	磨き	角粉で磨く
24	下付け	絵漆（弁柄漆）
25	銀粉蒔き	葉などの部分に細い銀粉を蒔く
26	粉固め	透漆で粉固めをする
27	透漆塗り込み	粉蒔きした部分に透き漆を塗り込む
28	下付け	金粉を蒔く部分に絵漆（弁柄漆）を薄く描く
29	金粉蒔き	毛棒をつかって金粉を蒔く
30	漆固め	全体にもう一度固める
31	磨き	全体に軽く磨く

おわりに

漆器は、桃山時代から明治時代にかけて諸外国の注文に応じて制作され、数多く輸出されてきた。近年の調査によって17世紀後半からヨーロッパで japanning と呼ぶ蒔絵に似せた技法が発展し、さまざまな種類の工芸品や家具が作られたことが分かってきている。今回修復したギメ美術館所蔵の洋櫃にもそれほど古くはないが修復部分にヨーロッパで行われた蒔絵や螺鈿に似せた金色や銀色の加飾が認められた。このことから、この加飾を歴史的に価値のあるものと捉え、伝統的な修復素材のほかにヨーロッパで現在使われている合成樹脂を併用し保存に努めた。輸出された漆器は保管されてきた歴史とともにさまざまな状態であり、画一的ではない。今後、日本に里帰りした漆器を含め、海外に保管される漆器を修復する機会が増えると予想されるが、今回の修復事例が今後の修復に役に立つことを期待したい。

最後に、今回の修理にあたり御助言、御協力いただいた諸氏に感謝申し上げ修理報告とする。



木地
Substrate

檜の柾目材を数枚矧いで造る。

角下地付け
Jitsuke on the corners

地ノ紛に漆を混ぜた漆下地を、角部分に付ける。

貝の接着
Shell decoration

中厚の鮑貝を文様に切り、米糊と松煙を混ぜて接着する。

下地付け
Applying foundation

荒と細の漆下地を貝の厚みまで付ける。

下地研ぎ
Polishing the foundation

貝と下地部分を砥石で平滑に研ぐ。

地下げ
Jisage

胴ずり刷毛と地の粉で、下地部分を塗り厚分下げる。

塗り（x2）
Urushi coating（x2）

黒呂色漆を全面に2回塗り込む。

描き置目
Underdrawing with *bengara urushi*

塗膜に弁柄漆を直接筆描きし、置目する。

梨子地粉蒔き
Sprinkling *nashiji* powder

土坡、草花などの部分に銀の梨子地紛を蒔く。

上塗り
Final coating

透漆に全体に塗り込む。

上塗り研ぎ・磨き
Final coating polished

駿河炭と呂色炭で全体研ぎ、摺漆をした後、磨く。

銀粉蒔き
Sprinkling silver powder

弁柄漆の下付けで、葉などの部分に細い銀粉を蒔く。

透漆塗り込み
Suki urushi coating

銀粉蒔きした部分に透漆を塗り込む。

金粉蒔き
Sprinkling gold powder

弁柄漆の下付けで、草花や鳥獣などを毛棒を使って金粉を蒔く。

図109　加飾工程図
Drawings of the process of decoration

図110　紫外線照射器具による修復材料の調査
Photographing by ultraviolet light

図111　右側面部分の発光写真
Luminous photo of the right side

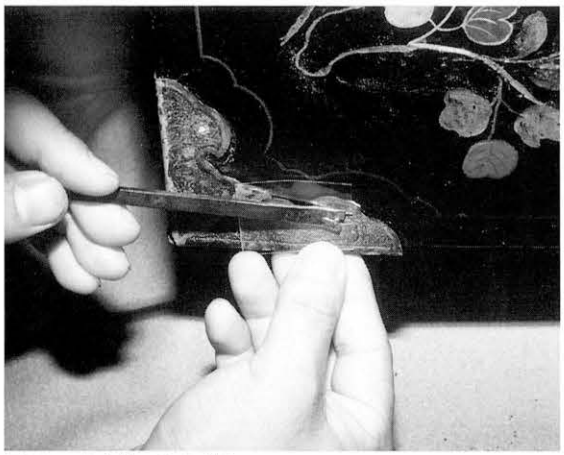


図112　角金具の取り外し
Removing the metal fitting

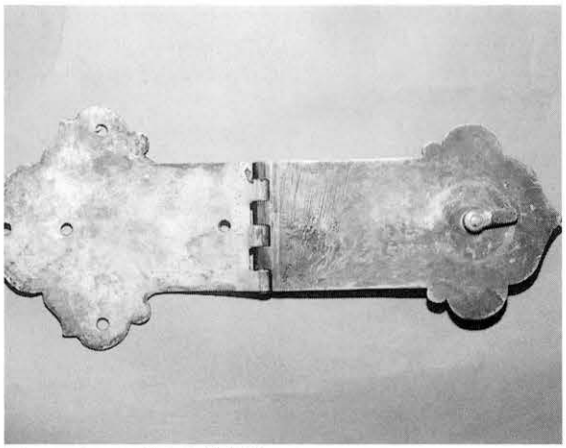


図113　取りはずした錠金具（裏側）
Removed metal fittings (reverse side)

図114　錠金具の形状修正
Reshaping the metal fitting

図115　破損したネジの復元
Restoring the damaged screw

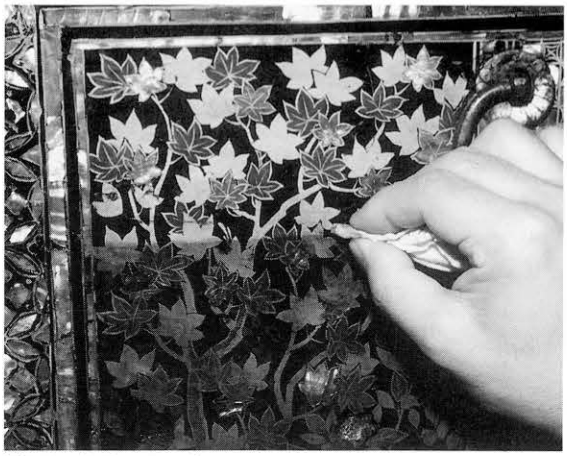


図116　クリーニング
Coffer being cleaned

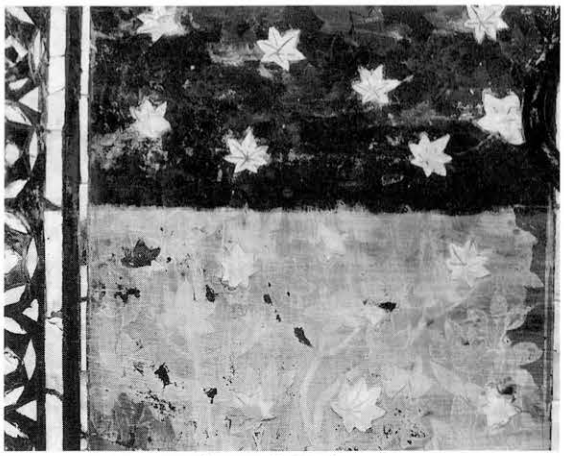


図117　クリーニング部分の発光写真
Luminous photo of a cleaned part

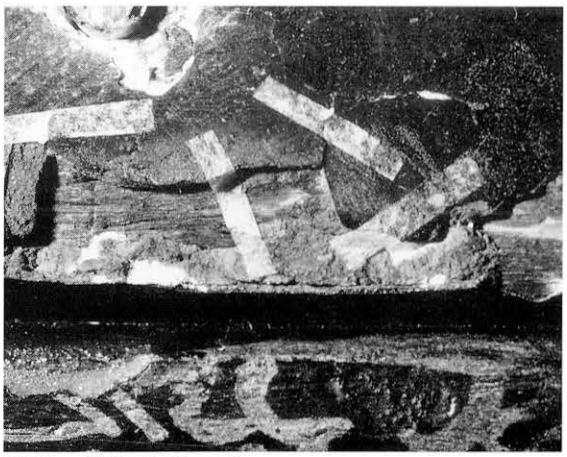


図118　和紙による仮止め
Temporarily fixing the coating film with Japanese paper

図119　シェラックの除去
Removing shellac

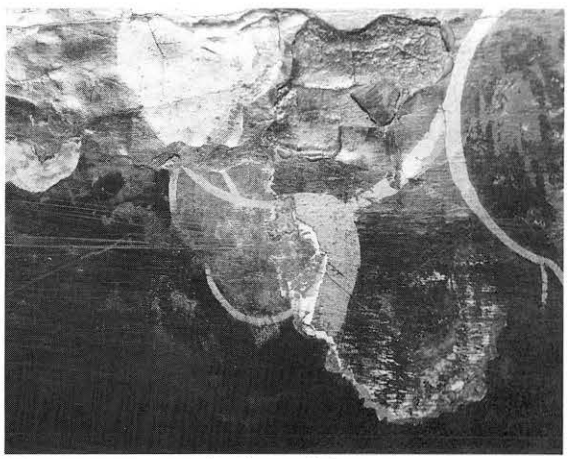


図120　ヨーロッパの復元部分の除去
Removing past treatment done in Europe

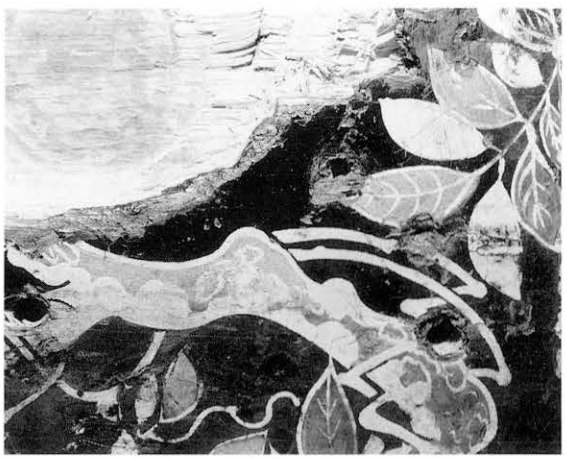


図121　下地が被っていた蒔絵（錠金具下部分）
Makie on the foundation (below the metal fitting)

図122　錠金具下の剝離部分の圧着
Refixing the exfoliated part under the metal fitting

図123　漆の希釈
Diluting urushi

図124　土坡部分の漆固め
Consolidating urushi

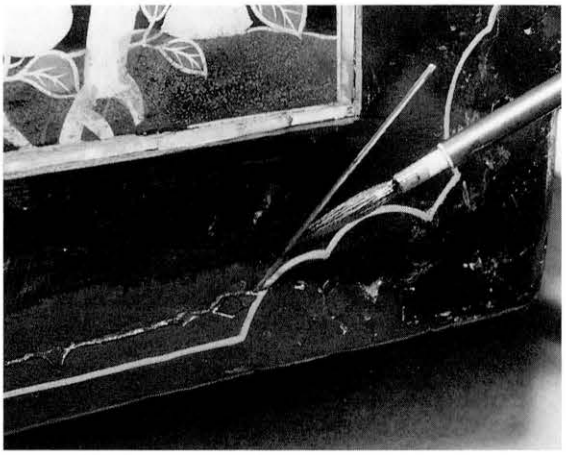


図125　剝離部分の麦漆含浸
Impregnating *mugi urushi*

図126　膠の調整
Adjusting animal glue

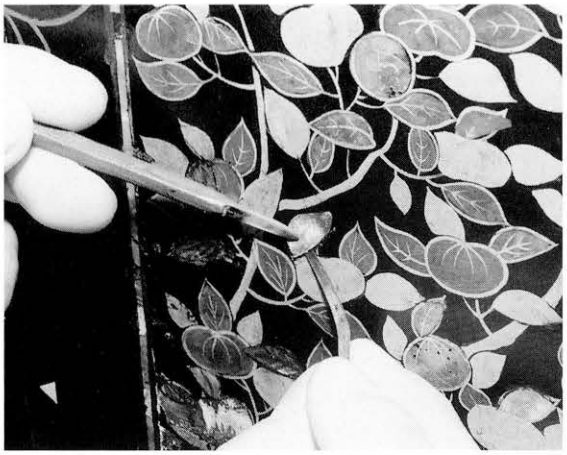


図127　螺鈿の剝落止め、膠の含浸
Refixing the *raden* by impregnating animal glue

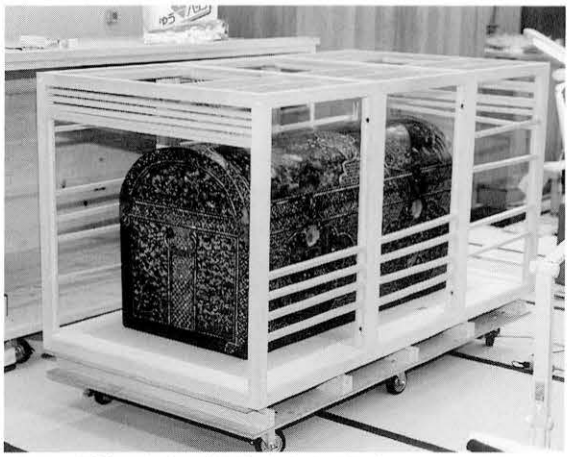


図128　圧着のために使用したしんばり台
Shimbari stand used for press-stabilizing

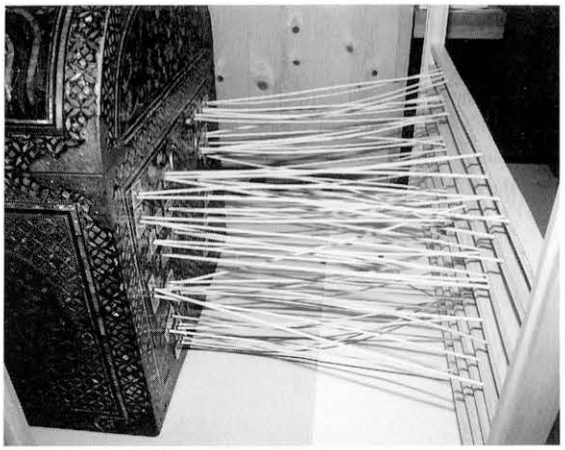


図129　螺鈿と塗膜の圧着、右側面
Press-stabilizing the *raden* and coating film

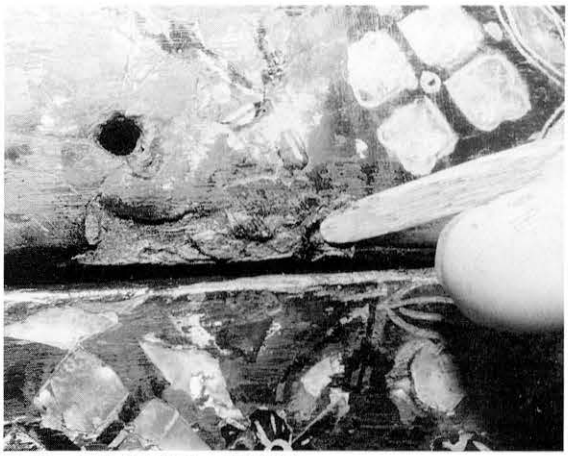


図130　下地剝落箇所の刻苧充填
Impregnating *mugi urushi* on parts of the foundation that have become lifted

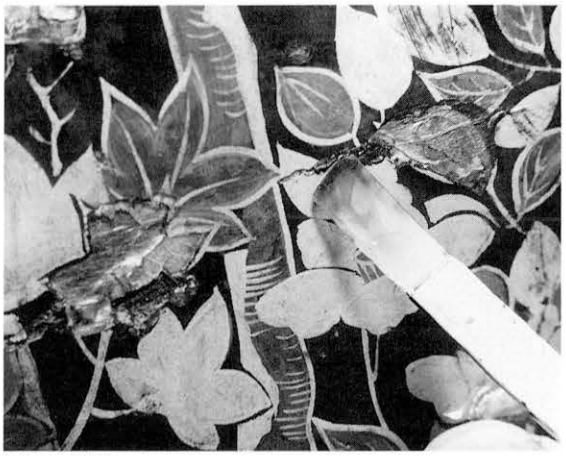


図131　際錆
Kiwasabi

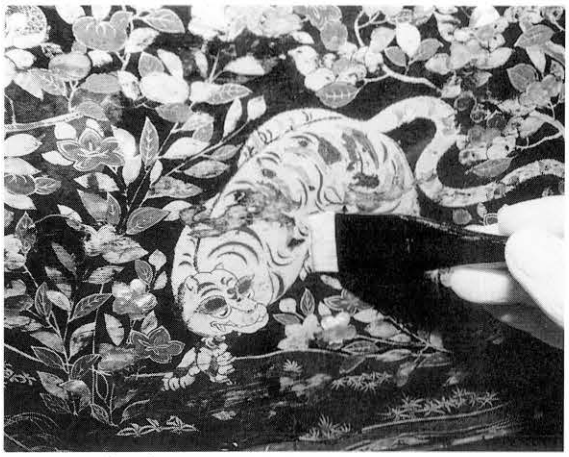


図132　塗膜の復旧
Repairing the coating film

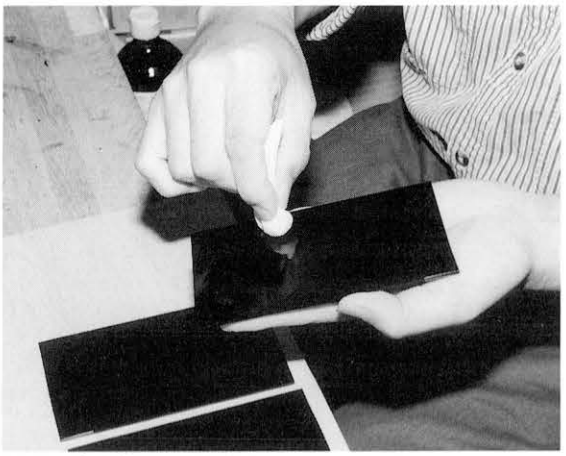


図133　合成樹脂の塗布実験
Experimenting coating synthetic resins

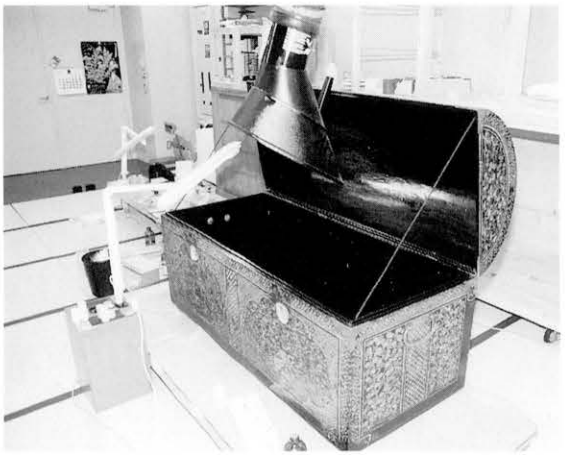


図134　ドラフトによる溶済の吸引（作業中）
Adsorption of solvent

図135　洋櫃内部の剝落止め
Prevention of peeling (inside of the coffer)

図136　黒色塗料の製作
Making black paint

図137　ギ酸による緑青錆の除去
Removing verdigris-colored rust witn formic ocid

図138　樹下鳥獣蒔絵螺鈿洋櫃　部分（修理後）
Coffer (detail, after restoration)

図139　樹下鳥獣蒔絵螺鈿洋櫃　部分（修理前）
Coffer (detail, after restoration)

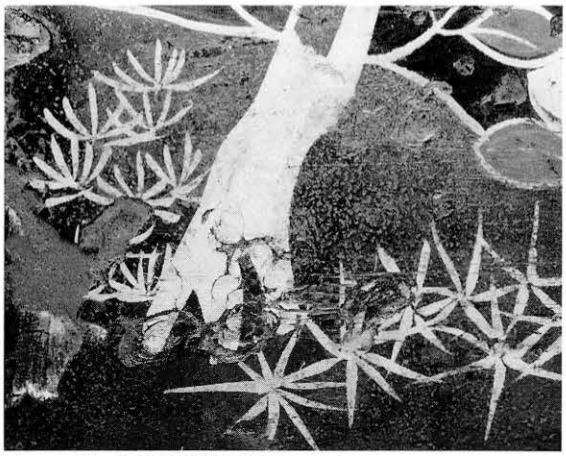


図140　樹下鳥獣蒔絵螺鈿洋櫃　部分（修理後）
Coffer (detail, after restoration)

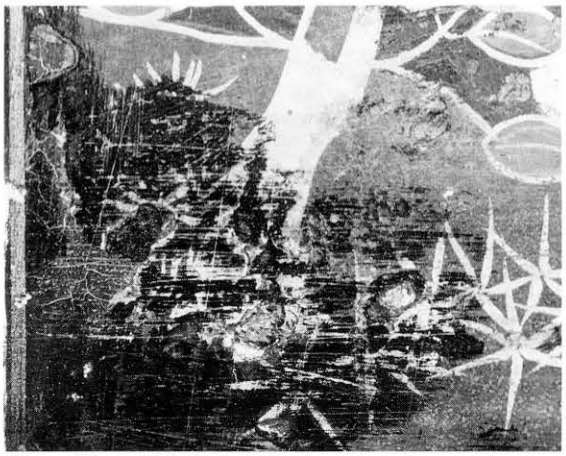


図141　樹下鳥獣蒔絵螺鈿洋櫃　部分（修理前）
Coffer (detail, after restoration)

図142　樹下鳥獣蒔絵螺鈿洋櫃（部分拡大　修理後）
Coffer (close up of detail, after restoration)

図143　樹下鳥獣蒔絵螺鈿洋櫃（部分拡大　修理前）
Coffer (close up of detail, before restoration)

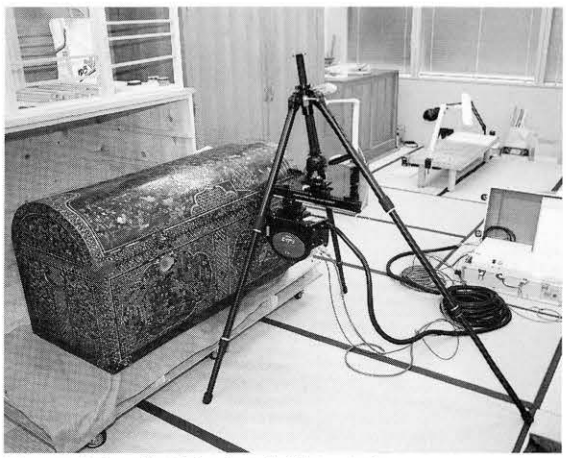


図144　蛍光X線分析による蒔絵紛の調査
Examiring *makie* powder by X-ray fluorescence

Report on the Restoration of "*Jukachoju Makie Raden* Coffer" in the Collection of the Guimet Museum

YAMASHITA Yoshihiko

Introduction

The restoration of "*Jukachoju Makie Raden* Coffer" in the collection of the Guimet Museum of Art was included in the Project for Conservation of Works of Japanese Art in Foreign Collections from the fiscal year 1999 to 2000, over a period of two years, with financial support from the Arts Research Foundation. Restoration work was done in Restoration Studio 1 of the National Research Institute for Cultural Properties, Tokyo. This is a report of that restoration work.

Restoration of urushi was done by Yamashita Yoshihiko and Matsumoto Tatsuya; restoration of metalwork was done by Okumura Kiminori.

In order to preserve the object, various analyses were conducted with the cooperation of researchers at the Institute. X-ray fluorescence was analyzed by Dr. Hirao Yoshimitsu and Dr. Hayakawa Yasuhiro; FT-IR spectroscopy was analyzed by Ms. Hayakawa Noriko; X-ray diffraction and X-ray fluorescence were analyzed by Mr. Kuchitsu Nobuaki. Ms Hayakawa also helped us with cross section analysis. Ms. Shayne Rivers of the Victoria and Albert Museum offered data concerning synthetic restoration materials and advice.

Description

The coffer was made in the late 16th century Japan, during the Momoyama Period, as urushiware for export to Portugal, with which Japan held trade. Many coffers were made by order according to the taste of the Portuguese. Decorations on these coffers are characterized by a very splendid design using a combination of the popular *kodaiji makie* and *raden* techniques. At the time of export there were coffers of similar shape but of various sizes, ranging from small ones to large ones. These were nested into one another and loaded on ships. Even now, there are many similar-shaped coffers stored in European palaces, art museums and museums. However, many of the urushi objects in Europe have lost the gloss characteristic of urushi because their surface has been re-coated over and over with coating material used for repair of western furniture. This coffer is over 400 years old and has been restored several times in Europe. Many of the metal fittings including the locks were added in Europe. Moreover, a large area of the lid was decorated in gold. The surface of the coffer had been coated 4 to 5 times so that the color has become brownish.

Materials and Structure

The object is a large wooden black-lacquered coffer with a dome-shaped lid. There are

metal handles on both sides, locks, hinges and corner fittings. Each side except the backside is divided into sections with *raden* decoration. In the front, plants like mandarin orange trees, autumn leaves, pine, wisteria, camellia and bellflower, and birds and animals like tigers, peacocks, and Chinese lions are depicted in *raden* and gold *hira-makie* inside Chinese window-frame patterns. The other areas are filled with checkered and *shippo tsunagi* patterns with family crests inside. On the topside of the lid in the center front, there is a cloud-shaped geometric pattern, and from the backside to the top is an arabesque bellflower design. The substrate is made of thick Japanese cypress boards; the boards of the sides are set in connecting pieces and the bottom boards are joined by wooden nails to the boards of the sides. The boards of the sides of the lid and the top board are pieced together. For the *makie* decoration, silver *e-nashiji*-like expression and gold *hira-makie* are combined; in some parts *kakiwari* is seen. For the *raden* decoration, medium thick shell pieces of abalone are used, showing one of the features of early exported urushiware. Originally, the metal fittings were made of copper and gilded with gold, but about a third of the locks, hinges and corner fittings are later additions.

Measurements (mm)

Length 565 Width 1312 Height 652

Condition of Damage

(1) The entire surface of the coffer was soiled. Areas around the corner fittings was especially dirty. There were also many places where cotton scraps had become attached.

(2) Coating material applied on the entire surface in Europe for restoration had turned brown, causing differences in color of the black urushi surface and the *makie* surface. Also the coating material on the right side had deteriorated, causing fine cracks to appear so that the overall impression of the surface was whitish. Part of the coating had also peeled off.

(3) Deterioration due to ultraviolet rays was observed on the surface of the original coating film, and fine cracks were found. The urushi film had lifted in many places and had peeled off in areas around them.

(4) The substrate had become distorted due to the shrinking of the substrate and changes caused by the passage of time so that cracks of different sizes had developed in the joints and joining parts of the substrate. Inside the coffer there were cracks in the joining parts of the substrate, and lifting and falling of the coating film and foundation had spread from those areas.

(5) The separating of *raden* from the foundation had progressed due to the shrinking of the substrate so that the shell pieces had lifted from the surface. Coating film around the lifted *raden* also suffered similar damage. Many of the shell pieces had already fallen off.

(6) Additions had been made on the corners of the coffer and three-fourths of the lid. White foundation was used on the retouched parts. Then black coating material was applied

over it. Some parts were decorated in gold color. The bottom and the inside were totally re-painted with a black coating material.

(7) New shell pieces had been inlaid on the missing *raden* parts of the checkered design on the front.

(8) Traces of later repair were seen on parts of the *raden* decoration. White foundation was used to fill in the areas where the shell pieces had fallen and the shapes of shell pieces were drawn with silver material.

(9) There were cracks and lifting on areas that had been repaired and the white foundation had become exposed. In addition, there was significant lifting of the coating film on the bottom of the coffer so that falling was apparent over a large area.

(10) Dents were found in various places. The foundation and the substrate were exposed and parts of the coating film had caved in.

(11) Scratch marks were found in various places and there were damages to the *makie*.

(12) Discoloration due to the corroding of metal powder of the *makie* could be seen.

(13) Coating material used in repair was also found on the corner fittings. Golden powder was found on various places of the metal fittings and their surroundings.

(14) The bottom corner fittings had become distorted and the nails were loose. The head of a screw on the right lock was broken and the metal fitting had become distorted and partly come off from the body.

(15) Shell pieces had been removed from their original positions and inlaid in different positions.

(16) Changes had been done to designs over a large area.

Restoration Specifications

This coffer had been preserved for a long time and a great portion of it had been repeatedly repaired in Europe. Since golden drawings in imitation of *makie* were made as part of repair, this coffer is valuable not only as an applied art object exported to Europe but also as a historical material.

Restoration was done on the basis of conservation, maintaining the present condition of the object. Past repairs done in Europe were also restored. Traditional materials were used for the restoration of the urushi part, while chemical synthetic materials that are presently used for restoration in European museums were used for those parts that had been repaired in Europe. Only the shape of the missing parts of the substrate was reproduced, and the color and gloss were matched with those of the surrounding coating film. Surface coating film that had been applied in later additions was removed as much as possible by using solvents. Drawings as well as golden and silver decorations that were added in Europe were not removed, except for those which covered the original *makie* and *raden*. *Urushi gatame* was done to reinforce the parts of the deteriorated coating film where urushi had lost its gloss. Then *suri urushi* was done to bring back its gloss to such a degree that it would match the

surroundings. The damaged metal fittings were partly removed and were returned to their original positions after re-shaping. The damaged screw of the lock was also removed and replaced with a new one which was made in the same shape.

Restoration specifications were made before the actual work of restoration was started. It was decided that any alternation or change would be made upon consultation among the three parties concerned — Ms. Hélène Bayou, curator in charge from the Guimet Museum, Mr. Kato Hiroshi, head of the Technical Standard Section of the Department of Restoration Techniques of the Institute and Mr. Yamashita Yoshihiko, the conservator in charge.

Restoration Processes

(1) Investigating and photographing

In order to record the present condition, investigation of the substrate, foundation, coating, and *makie* was made from the point of view of their methods. The condition of damages was also recorded. Photographs were taken of the object before and after restoration for comparison.

(2) Removing metal fittings and re-shaping

Both locks were removed and the broken screw of the right lock was carefully removed by cutting into the screw head. The shape of the distorted lock was fixed in the following manner. A mold was taken of the shape of the curve of the body by using Craft Resin. This mold was fixed to a receptacle made of pine resin and the lock was hammered from the inside for re-shaping. The distorted corner fittings were also removed and hammered from the inside for re-shaping.

(3) Cleaning and curing

Soil and cotton scraps that covered the whole coffer were removed with a brush and tweezers. They were further cleaned with moistened cotton swabs and damp cotton cloths. The shellac that covered the surface was removed mainly by ethanol; in certain cases a solution of water and ethanol or of alcohol and acetone were used. The coating was carefully removed by using a rectangular piece of rubber wrapped with cotton cloth and dipped into a solution little by little. Bamboo or tortoise shell spatula was used at places where the coating was thick. Small pieces of *gampi* paper were pasted with starch glue (*shofu nori*) to places where there was a risk of the film falling in order to prevent exfoliation while at work.

(4) Removing past repairs

Acetone and alcohol or acetone alone was used to remove past repairs, which covered the *raden* and *makie*. After the past repairs had softened, they were removed as much as possible with a bamboo spatula. A dull carving knife was used for areas where the coating had hardened.

(5) *Urushi gatame*

To reinforce the deteriorated urushi coating film, *urushi gatame* was done. In order not

to change the brightness of the *makie* as much as possible, different urushi was used for the *makie* part and the coating film. *Nashiji urushi*, *suki urushi* and *kijomi urushi* were mixed for use on the *makie* part, while *suki urushi* and *kijomi urushi* were mixed for use on the coating film. In both cases these mixtures were diluted approximately ten times with a petroleum solvent (Cleansol G) and applied with a *makie* brush. Urushi was then completely wiped off with ligroin before it dried. *Urushi gatame* was repeatedly done from one to five times, depending on the condition of deterioration.

(6) Re-fixing the lifted *raden*

First, considering the shape and size of the object, a wooden frame was made. Three wooden rectangular frames were bolted together and a bottom was made of thick plywood. On each side a square bar was fitted into grooves on the frame so that they could be moved in order to press the *raden* pieces. Pearl Glue (particles of animal glue) was used to fix the lifted *raden*. This glue was made into liquid form and placed in an ultrasonic apparatus for 3.5 to 7 hours in order to make it easier to penetrate. For areas where the coating material had entered into the edges of the shell pieces, alcohol was impregnated and the coating material was removed after it had become soft. Then 20~25% animal glue was impregnated under the shell pieces and an acrylic sheet and plastic sheet were placed over the shell pieces which were then pressed down with a bamboo or wooden *shimbari* sticks. When the glue had dried, excess glue was wiped off with a damp cloth.

(7) Re-fixing the lifted coating film

To press down the lifted urushi coating film, *mugi urushi* adjusted for adhesion was diluted with ligroin and impregnated with a brush. Excess urushi was carefully wiped off from the film surface. After the ligroin had evaporated, the coating film was pressed down in the same manner as with *raden*. Clamps were used for the lifted portion under the lock. Lifting on the inside and the bottom of the coffer that had been completely re-coated in Europe was restored by using a 10% solution of acetone and Paraloid B72 to prevent further falling off.

(8) Re-fixing the cracks

Mugi urushi was impregnated to the joints of the substrate and other cracked areas in order to fix the substrate and to reinforce the foundation and the coating film. Excess urushi was completely wiped off with ligroin and thoroughly dried.

(9) Re-shaping the missing parts of the foundation

Missing parts of the foundation and dented portions of the substrate were filled with *kokuso* in order to prevent them from falling. Foundation was applied over the *kokuso* as needed, and the color of the coating was matched to that of the surrounding coating film.

(10) *Kiwasabi*

A very small amount of urushi foundation was applied to the edges of the lifted or fallen coating film in order to prevent them from falling by contact. Black *sabi* made by

mixing *roiro urushi* and pine soot to yellow *tonoko* that had been kneaded with water was used as foundation material.

(11) Matching the gloss

Suri urushi was applied several times to the urushi coating film and the gloss of the black urushi was brought back. *Suki urushi* and *kijomi urushi* mixed and then diluted with Cleansol Gwas used. A reversible restoration coating material was used to restore the portions where coating material had been used in past restorations done in Europe. Arkon P90 (a synthetic low molecular weight resin) dissolved in Shell Sol 321 (a hydrocarbon solvent) and further mixed witn Tinuvin 292 (a hindered amine light stabilizer), 1wt% of Arkon P90 was used for the coating. Concentration ranged from 10% to 40% and was selected accordingly to match the gloss of the urushi. A coating material made by adding carbon to a solution composed of shellac and alcohol was used for the black portions.

(12) Removing *rust*

Verdigris-colored rust on the back of the corner metal fittings was removed. To do this, a 5% formic acid solution (HCO^2H added to water) was made. Then a highly absorbent resin was used to absorb this solution. The solution, which then had become a paste, was placed directly on top of the verdigris-colored rust. After this rust had dissolved, it was removed together with the paste material.

(13) Attaching the metal fittings

Bottom corner metal fittings were returned to their original positions. The front locks were similarly attached with original screws; the damaged screw was restored.

(14) Documentation and photography

Records of the restoration were documented and photographs of the object after restoration were taken, thereby concluding the restoration of the coffer.

Analysis

X-ray fluorescence spectroscopy, infrared absorption spectroscopy, elemental analysis and mineral analysis were made of the *makie* powder, metal fittings, restoration materials and adhesion materials. Details of these analyses are attached at the end of this report.

Analysis of Techniques

The process of decorating the coffer was inferred as follows based upon results of investigation by various analyses and visual observation of the techniques employed.

Names and contents follow those of techniques used today.

Name	Contents
1. Substrate	Straight-grained cypress wood, several pieces joined
2. *Sumishitaji tsuke*	*Jinoko*, urushi foundation
3. *Waritsuke*	Drawing partition lines roughly with Chinese ink
4. *Sokui-tsuke*	Applying *sokui* on the back of shell pieces. Rice glue, pine soot
5. Fixing of shell pieces	Cutting out patterns from medium-thick abalone shell pieces and inlaid
6. *Ippen jitsuke*	Coarse whetstone powder and *kijomi urushi*
7. *Shitajitogi*	Dry polishing with whetstone
8. *Nihen jitsuke*	Fine whetstone powder and *kijomi urushi*
9. *Shitaji togi*	Wet polishing with whetstone
10. Under coating	Black *roiro urushi*
11. Polishing the under coating	Wet polishing with magnolia wood charcoal
12. Middle coating	Black *roiro urushi*
13. Polishing the middle coating	Wet polishing with charcoal
14. Underdrawing	Drawing with *bengara urushi*
15. *Shita tsuke*	Thinly applying *e-urushi* (*bengara urushi*)
16. Sprinkling *nashiji* powder	On the mound and flowers
17. Consolidating *nashiji* powder	Using *suki urushi* and camphor
18. Final coating	Applying *suki urushi* over the entire surface
19. Polishing the final coating	Polishing with *Suruga* charcoal; finishing with *roiro* charcoal
20. *Suri urushi*	3~4 times with *kijomi urushi*.
21. *Dozuri*	Using a mixture of *tonoko* and colza oil to take away fine cracks
22. *Suri urushi*	3~4 times with *kijomi urushi*
23. Polishing	Polishing with powder made of deer antler
24. *Shita tsuke*	*E-urushi* (*bengara urushi*)
25. Sprinkling silver powder	Sprinkling silver powder on leaves, etc.

26. *Fungatame*	Using *suki urushi* to consolidate silver powder
27. Coating *suki urushi*	Using *suki urushi* to coat parts where silver powder had been sprinkled
28. *Shitatsuke*	Using *e-urushi* thinly on parts where gold powder has been sprinkled
29. Sprinkling gold powder	Sprinkling gold powder by using a brush
30. Urushi consolidation	Consolidating the entire design once more
31. Polishing	Lightly polishing the entire design

Conclusion

From the Momoyama Period (late 16th century) to the Meiji Period (early 20th century), urushiware was custom-made and many were exported overseas. Recent studies reveal that from the late 17th century, a technique similar to *makie* called "japanning" developed in Europe and that many types of art crafts and furniture were made using this technique. Even on this coffer from the Guimet Museum there were not-so-old decorations in gold on parts that were restored in Europe. Therefore, acknowledging that such decorations have historical value, synthetic resins used in restorations in Europe today were employed in addition to traditional restoration materials. The condition of exported urushiware is as varied as the history of their preservation and is not standardized. It is assumed that opportunities to restore urushiware stored in collections overseas, including those that will be returned to Japan, will increase. I hope that the restoration discussed in this report will be beneficial in future restoration work. Finally, to conclude my report, I would like to thank all those who gave me advice and cooperated with me in this restoration.