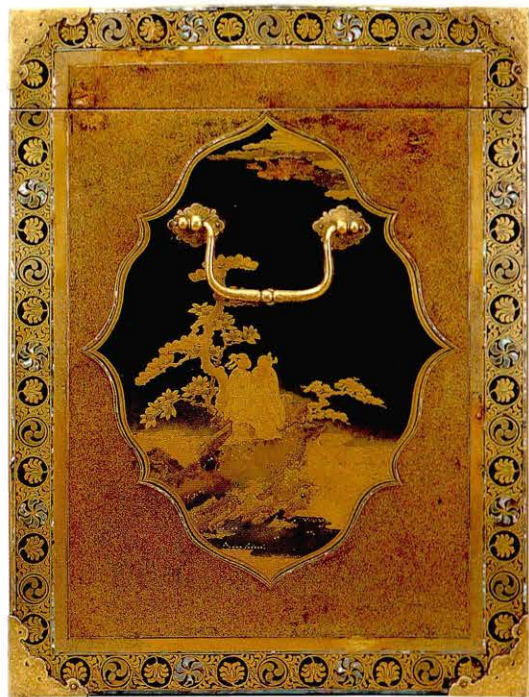


源氏苺絵螺鈿化粧箱
 (バイエルン国立民族博物館)
 "Genji Makie Raden Cosmetic Box"
 (Staatliches Museum für Volkerkunde)



5 源氏苺絵螺鈿化粧箱 修理前
 "Genji Makie Raden Cosmetic Box," before restoration

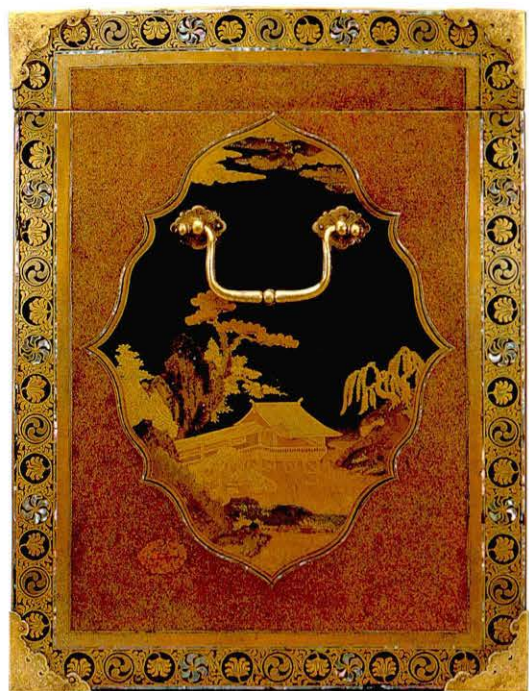
6 源氏苺絵螺鈿化粧箱 修理後
 "Genji Makie Raden Cosmetic Box," interior after restoration



7-1 側面 修理前
Side, before restoration



7-2 側面 修理後
Side, after restoration



7-3 側面 修理前
Side, before restoration



7-4 側面 修理後
Side, after restoration



8-1 正面 修理前
Front, before restoration



8-2 正面 修理后
Front, after restoration

源氏蒔絵螺鈿化粧箱

平成15年度修復事業



品名：源氏蒔絵螺鈿化粧箱

所蔵：バイエルン国立民族博物館所蔵

バイエルン国立民族博物館所蔵

源氏蒔絵螺鈿化粧箱

漆芸修復家
山下好彦

1. 資料名称等

品名：源氏蒔絵螺鈿化粧箱 (図67、68)

所蔵：バイエルン国立民族博物館所蔵 ドイツ

品質構造：木製黒漆塗り、蒔絵、螺鈿、平文

所蔵番号：26. N.128

法量：40.7×43.7×50.6 (金具含む)

時代：1630年代

2. 損傷状態

原資料は全体の印象では保存状態が良好に見られたが、現在までに数回にわたって修復の手が加えられ、その後世修理がかえってオリジナルの塗膜や蒔絵を傷めてしまったものと考えられる。後世修理にはヨーロッパの修復材料と漆の修復材料の両方が各所に見られ、19世紀にトイレットボックスから化粧箱に内部を改装した時点で金具を外すなど大々的な修理が行われたものと思われる。また、漆での修理はヨーロッパの修復材料の上から被っており、原資料が戦後日本から輸出されたものでないことから、ドイツ国内で日本人の手によって行われた可能性が強く、そんなに長い年月は経っていないように思われる。

図67 修復前
Before restoration図68 修復後
After restoration



図69 錠金具部分 修復前
Metal lock before restoration



図70 錠金具部分 修復後
Metal lock after restoration

西洋の修復材料は口縁部周辺に緑色の塗料が薄く付着、これは、内部を改装した時のピロードの接着素材と考えられる。口縁部の蒔絵剥落部分には金色の塗料を塗り込んでいた。錠金具（図69、70）、提げ金具、隅金具などはすべていったん取り外して修理が行われたものと考えられ、釘を緑色のワックスで再接着し、銅釘の欠損部分は真鍮釘を新たに新補していた。蓋の錠金具は曲がって付けられ、新補の釘は蓋裏で打ち曲げられていた。打ち曲げるのにハンマーを用いたものと考えられ、蓋裏の素地がへこんでいた。隅金具は釘で止めるだけでなく金具自体を修理材料で接着、蓋正面右の隅金具は、金具の方向が本来の方向から間違っけて付き、本体からずれていた。提げ金具には黒い塗料が付着していた。銀の露玉の剥落箇所は西洋塗料が塗り込まれ、右側面上部の雲は西洋塗料で新たに描かれていた。底裏面には所蔵番号を書き込んだ上から透明な塗料を塗り込み、その材料が底面全体に付着していた。

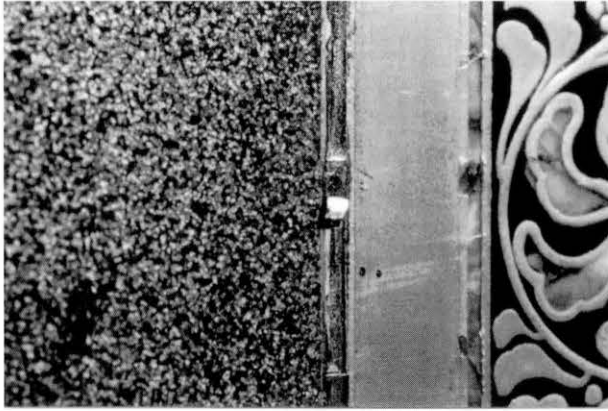


図71 平文剥離部分 修復前
Detached hyomon before restoration

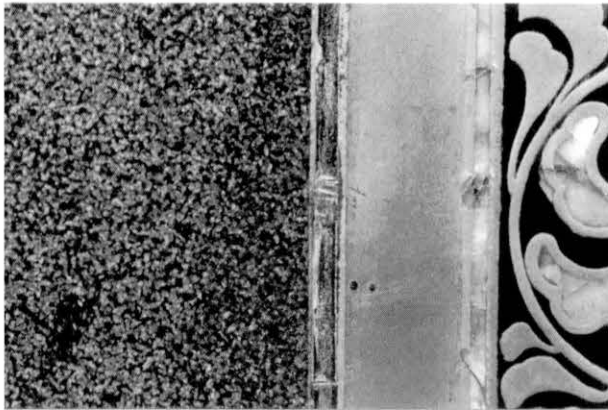


図72 平文剥離部分 修復後
Detached hyomon after restoration

漆を修復材料として使用している部分は全面に及び、摺り漆が各所にむらに付着していた。特に正面の錠金具の周囲には漆が厚く溜り、錠金具の表面も漆がむらに付着していた。各面のカトウシェ内の黒漆部分には水滴が流れた様な跡があった。また、蓋の甲板では打損部分が黒漆で塗りなおされており、実際の傷んだ部分よりも広い面積に塗られ、黒漆部分全体にむらを作っていた。蓋裏の朱漆塗膜剥落部分は弁柄漆が塗られ、底面周囲の全てを黒漆で塗りつぶしていた。貝の剥離部分は黒漆で再接着、欠損部分は貝を新補しており、貝の本来の色合いとは異なってしまっていた。平蒔絵や梨地の傷んだ部分も漆と蒔絵粉を使用して修理を行っていたが、オリジナルの蒔絵と合わないだけでなく、修理箇所の蒔絵をかえって傷めていた。銀平文の剥落箇所は銀の蒔絵を施し、銀が鍍化した色に合わせていた。

修理箇所以外の保存状態は、埃や汚れが資料全面に薄く被っていた。紫外線や経年変化によって漆の劣化が進行し、漆塗膜には細かい段文が入っていた。梨地の部分の塗膜はやせて変色し、金粉が露出していた(図71、72)。素地の亀裂が蓋板裏側の側板との接合部および蓋板と底板に数条入り、危険な状態であった。錠金具の上部には剥落があり、下地が露出していた。また、蝶番の釘の周辺に亀裂と剥離があり、提げ金具の周囲では一部で黒漆塗膜が剥落していた。貝が素地の収縮によって各所で剥離、貝は一部で割れ、表面から突出していた。貝の剥離は縦のボーダーに集中していた。背面の平文が完全に剥離し、危険な状態であった。全体に打損が各所にある他、蓋裏朱漆部分に水が流れたような跡がり、一部で朱漆が変色していた。

3. 修理仕様

修理は国内で行われている指定文化財の保存修理と同様に考え、日本の伝統的修復材料を用いて現状維持を基本に行い、以前に行なわれた後世修理部分の一部をいったん除去し、再度復元した。復元箇所は蓋甲板の黒漆による後世修理部分と側面や背面の梨地の後世修理部分を中心に行い、その他の螺鈿や平文の後世修理部分や欠損箇所は復元せず、保存修理に留めた。隅金具や提げ傘具の欠失した釘は真鍮で復元し、錠金具や隅金具はいったん取り外した後、本来の位置に取り付け直した。塗膜の欠損箇所や口縁部の金平蒔絵欠損部は形状のみ復元し、周囲に色を合わせた。本作品内部の化粧容器を納める部分は修復対象外とした。

修理材料は螺鈿には膠、その他の部分は漆を使用し、補助材として合成樹脂を用いた。修理にあたりデジタルX線透過写真撮影(図73-77)と蛍光X線分析を行い、構造、加飾や漆工技法の各面から調査を行った。修理後に本資料に合わせて絹の油単と桐箱を制作し、海外での湿度の変化に対応するため、桐箱の内側上部に60%の調湿材2ケースを設置した。

修理仕様を事前に定め、その内容の変更については、修復者と東京文化財研究所の担当官が協議し、決定するものとした。作業は東京文化財研究所の第1アトリエで2002年から2004年の2ヵ年かけて行った。

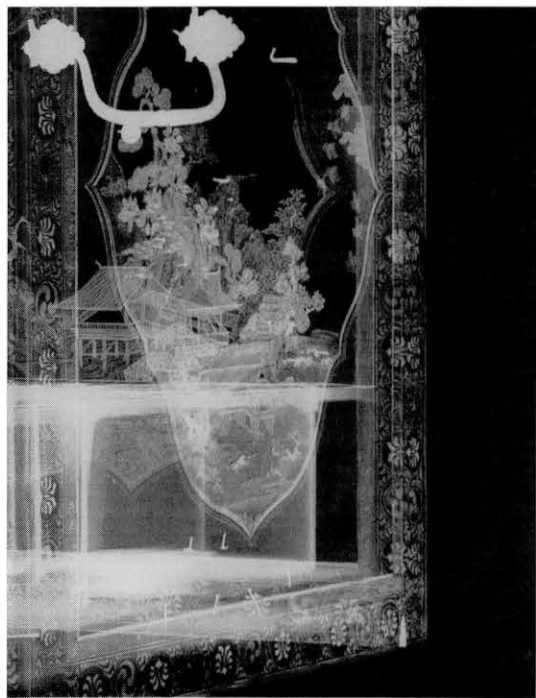


図73 デジタルX線透過撮影
X-ray radiography

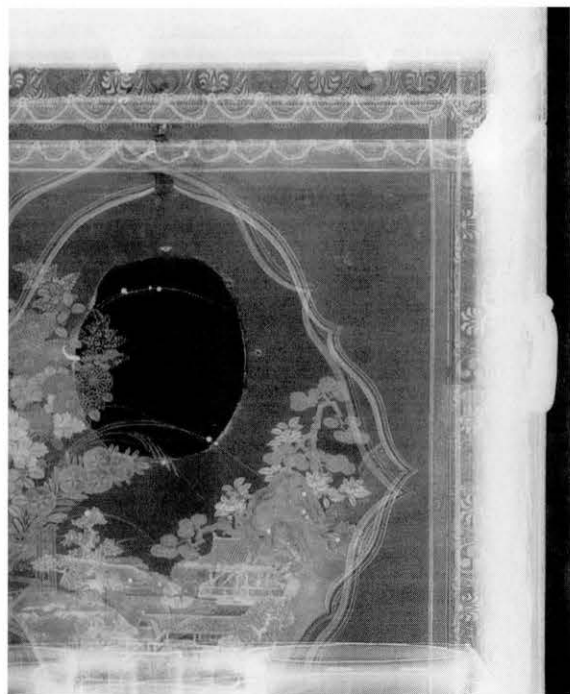


図74 デジタルX線透過撮影
X-ray radiography

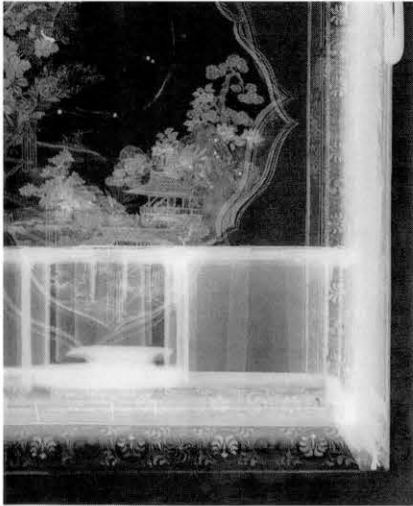


図75 デジタルX線透過撮影
X-ray radiography

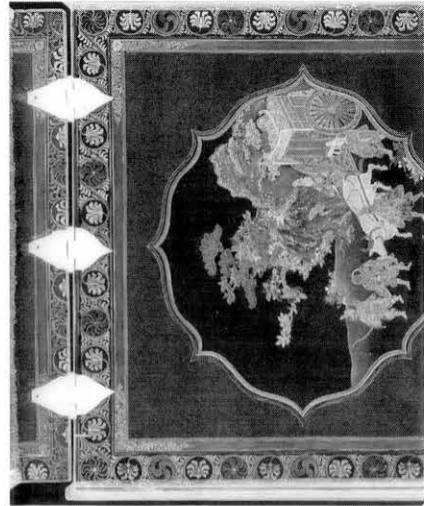


図76 デジタルX線透過撮影
X-ray radiography

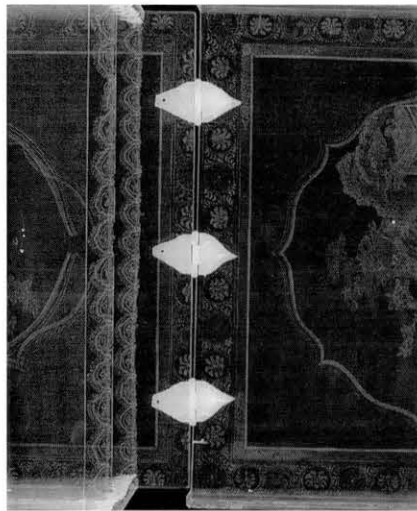


図77 デジタルX線透過撮影
X-ray radiography

4. 修理工程

(1) 修理前調査および写真撮影

修理前の素地、下地、蒔絵、後世修理等の状態を確認し、記録に留めた。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。

デジタルX線透過写真撮影を東京文化財研究所の三浦定俊氏が行い、素地の構造や後世修理の現状を確認した。蛍光X線分析は東京文化財研究所の早川泰弘氏が行い、蒔絵技法や材料の調査を行った。現資料の下地、塗り、螺釘、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把握した。また、後世修理の状況を判断するため、紫外線ランプによる発光写真を撮影した(図78、79)。その結果のもとに細かな修理工程を決定した。蒔絵の復元資料にするため、蒔絵の5倍から10倍の拡大写真を撮影した。

X線透過写真から原資料の素地は檜の指物作りで、角を止めで合わせ、口縁部を中心に布着せが認められた。下地は荒い褐色の地の粉と砥粉の漆下地で2回から3回施し、研いだ後に黒色顔料を含んだ漆を薄く塗り込み、その上から厚さ $0.2\sim 0.25\mu$ の鮑の薄貝を膠で貼りこむ。貝の段差を砥粉錆で整え、全体の貝と下地を平滑に研いだ後に薄い平文をホーダーに貼り込む。漆塗りは黒色漆を1回薄く塗り込み、その上から深い褐色の透き漆を数回塗り重ねて磨いて仕上げる。底には下地の上の黒色漆は見られない。中塗り面に描き置き目で文様を漆で描き、金粉を蒔く。蒔絵は研ぎ出し蒔絵、肉合い研ぎ出し蒔絵、平蒔絵、高蒔絵を併用する。蒔絵には描き割り、引っ掻き、付け描き、切り金、露玉などの技法が観察され、純度の異なる金の蒔絵粉が効果的に用いられている。木地の各所にオリジナルの釘が刺さったままになっているのがX線透過写真から分かった。

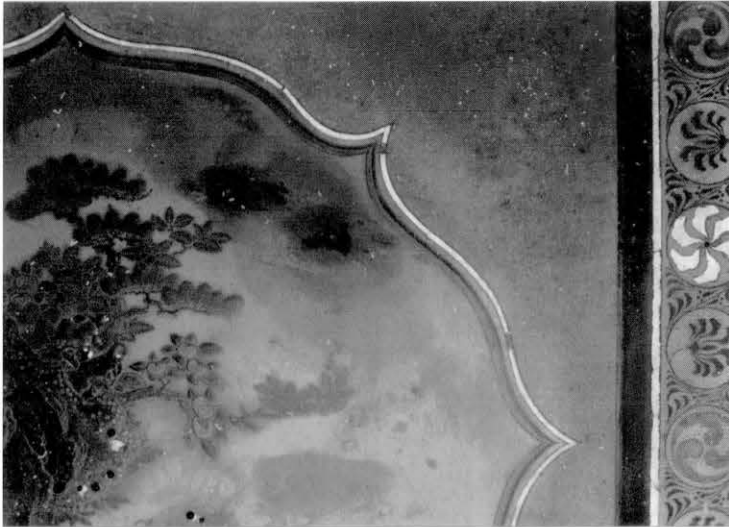


図78 後世修理部分発光写真 修復前
UV photograph of the part of a past restoration, before restoration



図79 後世修理部分発光写真 修復前
UV photograph of the part of a past restoration, before restoration

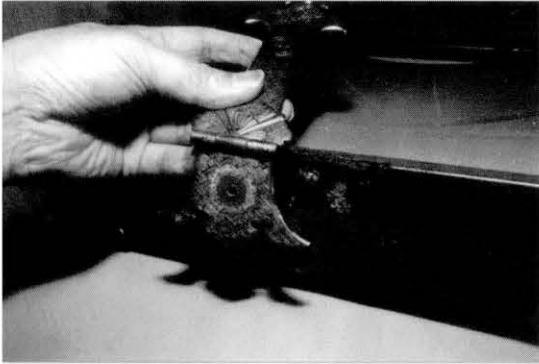


図80 錠金具の取り外し
Removing the metal lock



図81 蒔絵表面のクリーニング
Cleaning the makie surface



図82 蒔絵の漆固め
Consolidating the makie

(2) 金具の取り外し (図80)

蓋に付く錠金具をいったん取り外し、本体とは別に保管した。当初、金具の取り外しは最低限にすると修理仕様であったが、正側面の錠金具や隅金具の周囲に修理材料が厚く付着していたことから、側面左右の提金具以外の金具を全て取り外した。釘の取り外しには釘の形状や大きさに合わせて2種類の道具を新たに製作し、プラスチックシートを併用して金具に傷をつけないように慎重に取り外した。取り外した金具は前後左右が分からなくならないように発泡スチロール製の立方体に取り付け保管した。

(3) クリーニングと養生 (図81)

資料全面を覆っている埃や汚れのクリーニングは、毛棒を使って埃を払い、水を洗いざらしの綿布に含ませ丁寧に取り除いた。隅金具が取り付けであった周囲には西洋の塗料が付着しており、無水エタノールやアセトンを用いて除去した。また、口縁部内側に付着していた接着素材の除去も同様にアセトンやTHFなどの有機溶剤を使用した。当初、シェラック等の西洋塗料が全面を斑に覆っていると思われたが、この材料は後世修理の漆でほとんどの跡はクリーニングが出来なかった。塗膜、螺釘や平文の剥落の危険のある箇所には小片に切った雁皮紙を生麩糊で貼り、作業中での剥落を予防した。

(4) 漆固め (図82)

劣化した塗膜の細かな段文を補強するため、漆固めを行った。漆固めは透き漆と日本産の生漆を混合した漆をクリーンソルGで4倍に希釈し、断支に含ませた後に表面の漆を完全に拭き取った。また、蒔絵粉の周囲の塗膜を強化するため、塗膜に使用した漆にさらに梨地漆を混合し、蒔絵部分に漆固めを同様の方法で行った。蓋内側の朱漆部分も蒔絵と同様の漆を使用して漆固めを行った。打損等によって下地が露出した部分にはリグロインで薄く希釈した麦漆を含浸し、崩れかけた下地を補強した。

(5) 亀裂部の補強と接着 (図83)

蓋と底板には素地に亀裂が進行しており、危険な状態にあった。特に、蓋裏には甲板に亀裂が2条あるが、蓋表にはまだ亀裂がでていないことから、螺鈿などの剥落止めよりも先に優先して素地を接着した。亀裂箇所にはリグロインで希釈した麦漆を含浸した。余分な漆は溶剤で完全に拭き取り、十分乾燥させた。底板の亀裂箇所は内側にビロードが貼られていることから、漆が内側に回らないように十分注意した。亀裂の補強は2度行った。十分に乾燥後、空隙のあった底板の亀裂部分にやわかい刻苧を充填し素地を完全に接着した。

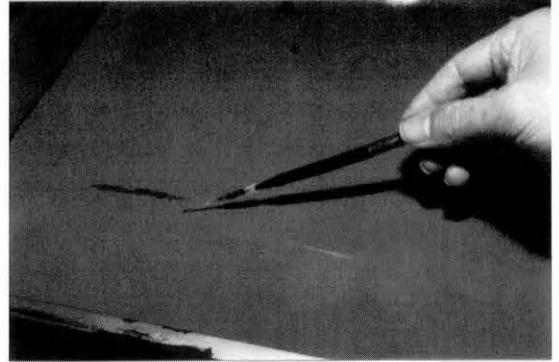


図83 内亀裂の接着
Adhering the cracks on the lid

(6) 蓋内塗膜の剥落止め

内側の朱漆塗膜は錠金具の裏側や蝶番の周囲で剥離していた。リグロインで希釈した麦漆を剥離部分に含浸し、表面の余分な漆を取り去りクランプやヒゴを用いて剥落止めをした。

(7) 螺鈿の剥落止め (図84、85)

はじめに、螺鈿剥離部分の圧着作業をするため、化粧箱に合わせた木枠を作製した。各面の木枠には移動可能な棧を設け、修理箇所に対店できるような構造にデザインした。剥離した貝は表面から突出し、部分的に割れている部分があり、修理で平滑にすることは出来ないことから、剥離した貝が今後剥落しないようにするに留めた。剥離した貝に湯煎した16~20%粒膠水溶液に少量のエタノールを加え含浸し、余分な膠は拭き取り、竹ヒゴや木製棒を用いて圧着した。膠が含浸しにくい部分は事前にエタノールを含ませ含浸しやすくした。圧着には貝の上にサランラップとプラスチックシートを置き、貝を傷めないようにした。

(8) 平文の圧着

銀平文の剥離箇所は背面の一箇所だけで、平文が反り返っていた。はじめに反り返りを直すため籠甲篋で形を修正した。次に、剥離した平文部分に調整した麦漆を篋で置き、木枠とヒゴを用いてゆっくり伸ばすように圧着した。アクリル板と薄いプラスチックシートを使って平文を出来る限り平滑にした。



図84 螺鈿剥離部分の膠含浸
Impregnating animal glue into parts of detached *raden*

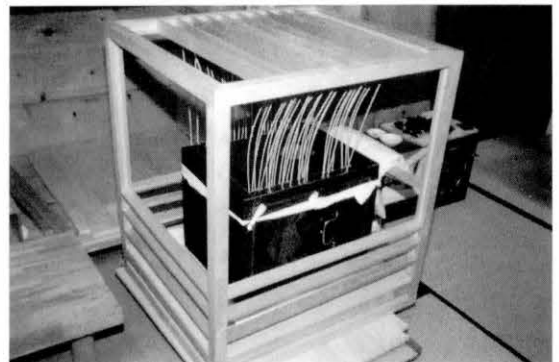


図85 螺鈿の剥落止め
Reattaching detached *raden* pieces



図86 錠金具のクリーニング
Cleaning the metal lock

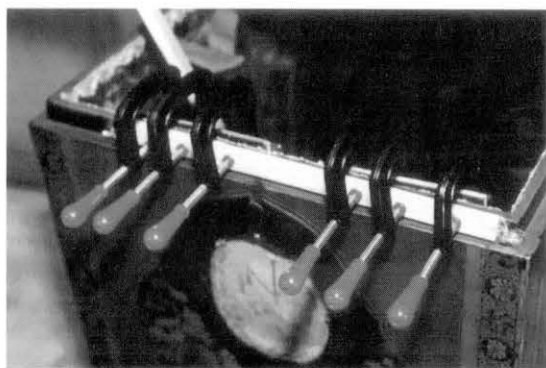


図87 漆塗膜の剥落止め
Reattaching detached urushi coating film

(9) 金具のクリーニング (図86)

金具はすべて銅製の金鍍金で、フランス・ベルサイユ宮殿のトリアノン宮にある類品から隅金具の一部に黒がさされていたと考えられる。しかし、すでにその表情は失われていた。修復のはじめに取り外した隅金具の裏側には西洋の塗料が付着、一部で緑青錆がふいていた。また、金具をとめていた釘先には緑色のワックスが付着していた。この塗料とワックスは後世修理で金具を取り外し、再度取り付けるときに隅金具が外れないようにした処置と考えられる。塗料と緑青錆、ワックスを綿棒にアセトンやTHFを含ませ取り除いた。隅金具表面の汚れも同様の溶剤で軽く拭き取った。錠金具には汚れの他に表面に漆が各所に付着しており、その漆をさらに除去しようとした痕跡があった。特に蓋の錠金具は強く磨きなおされており、表面の金鍍金が薄くなって入る部分があった。金具の漆は出来る限り竹箆で取り去り、隅金具のクリーニングと同様の溶剤で軽く拭き取った。

(10) 黒漆塗膜の剥落止め (図87)

黒漆塗膜の剥離はボーダーの貝の周囲と口縁部分、蝶番周辺に集中していた。剥落止めにはリグロインで希釈した麦漆を使用した。貝の周囲の漆塗膜の剥離部分は貝の色合いを考え、貝の下に漆が回らないように十分注意した。口縁部分や蝶番周辺も同様に調整した麦漆を含浸し、口縁部分は剥離箇所にはシナ合板とゴムを置き、クランプで圧着、蝶番周辺は木枠とヒゴを用いて剥落止めした。

(11) 後世修理の除去 (図88、89)

復元箇所は後世修理いったん取り外し、下地を整えた。側面の各面にある後世修理の梨子地部分は、下にオリジナルの蒔絵がある可能性があることから慎重に除去した。除去には先端を切れなくした彫刻刀等を用い金属粉を除去し、漆はクリスタル#2000を使って除去した。梨地の後世修理は打損部分を繕ったもので、下地が露出した部分を中心に行ったものと考えられ、正面左の復元箇所以外では下の蒔絵はなくなり、周囲の蒔絵もすでに失われていた (図88)。蓋甲板打損の後世修理部分は何度も漆が塗り重ねられ、全体に摺り漆が被っており、はじめに斑に被った摺り漆を除去するところから始めた。蒔絵部分の保護のためパラロイドB72の無水エタノール9対純水1の20%溶液を筆で蒔絵の上に直接描き乾燥させた。摺り漆の除去には細かくつぶした砥石粉と水を含ませた鹿皮を使って丁寧に取り去った。何度も塗り重ねた漆部分はクリスタル#2000、#3000を使って慎重に研いで除去した。凹んだ打損中の漆も全て取り除いた。

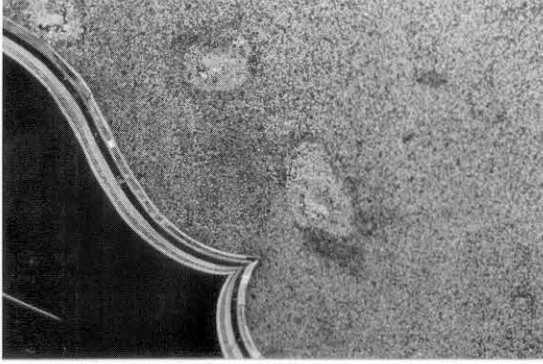


図88 後世修理部分 修復前
Traces of a past restoration, before restoration

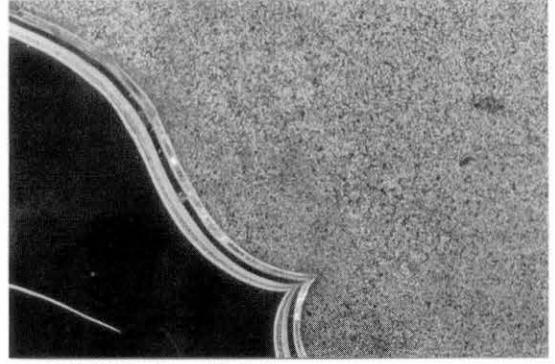


図89 後世修理部分 修復後
Part where traces of a past restoration was found, after restoration

(12) 蒔絵の復元 (図90)

後世修理除去部分や下地が露出していた箇所は周囲に合わせて復元した。蒔絵粉は梨地部分の蛍光X線分析結果を元に95%金と5%銀の配合で合金した少々青みのある金粉を金沢に特注し、原資料の梨地粉に形状を合わせた7号から3号粉を作った。梨地の復元は、原資料に直接金粉を蒔く復元方法ではなく、蒔絵フィノレムを別に作り貼りこむ方法をとった。この方法の利点は資料上での作業が最低限に減らす事が出来る点で、資料に負担や傷をつける可能性が低減される。また、数百年経った漆は透けが進み、劣化によって艶が自然に消えている事から色や表情を合わせることが難しい。別に作った蒔絵フィルムを日光に当て劣化と漆の透けを進行させ、復元箇所の周囲と表情が馴染んだタイミングで貼りこむことが出来る。復元にあたっては、事前に蒔絵手板を作製した。蒔絵フィルムはスライドガラスに蒔絵を行い、表面を仕上げた後に水に付け込みスライドガラスから剥がした。復元箇所に原資料と同様に赤みの強い弁柄漆を点状に付け下準備をした。フィルムは復元箇所に合わせて切り取り透き漆で貼りこんだ。

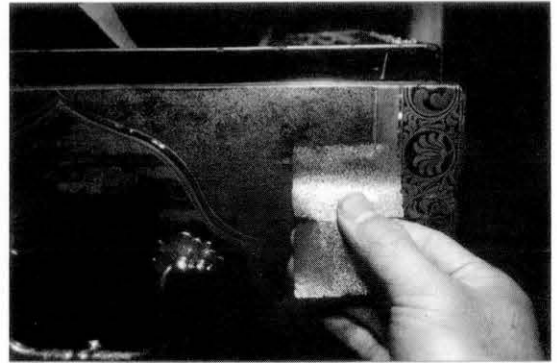


図90 梨地の復元
Reproducing *nashiji*



図91 後世修理部分の復元
Reproducing parts of a past restoration

(13) 黒漆塗膜の復元 (図91)

蓋甲板の打損部分はオリジナルに近い色の下地をするため山科の地の粉と砥粉下地を中心に使って2回漆下地を行った。次に黒色顔料を少量練り

込んだ漆を薄く塗り込み、黒味の強い透き漆を3回塗り込んだ。上塗りはクリスタル#2000、#3000を使い表面を研ぎ、摺漆2回、胴摺り、摺漆2回、磨き1回して仕上げた。復元部周囲の黒漆部分も指に少量の磨き粉を付け軽く撫でて斑をとった。

(14) 欠損部の成形

底板の亀裂充填箇所を錆下地を施した。口縁部分の塗膜と平時絵欠損箇所を成形するため刻苧と下地をした。黒漆部分は黒錆をし、金の平時絵部分は金色錆を施し、それぞれ呂瀬漆と透漆で固めた。

(15) 際錆

再剥落防止のため塗膜の際に極く少量の細かい錆下地を付け、触指による再剥落を予防した。際錆は周囲の色を考慮して内部は本朱錆、外部は黒錆を使用した。

(16) 釘の復元と金具の取り付け

欠失した釘を真録下製作した。釘は頭の丸い既成の釘をオリジナルの長さに切り、打って作った形状に合わせた。復元した釘の数は隅金具4本、提げ金具の2本で蓋錠金具の後世修理時に新補した釘は5本とも全て作り直した。隅金具の釘穴にはオリジナルの釘がしっかり残り、抜くことが出来ない事からリユーターを使って釘を必要最小限削った。釘穴は刻苧で適度に充填し、しっかり隅金具が固定するように調節した。隅金具の歪みは手で形状を微調整してから取り付けた。隅金具は一枚の銅版を折り曲げて製作しており、継ぎ目が側面に向くように付けられていたと考える。正面右上の隅金具が異なった方向に向き少々ずれて付いていたことから、本来の位置に直して取り付けた。

(17) 写真撮影および記録

修理前に撮影した写真に合わせて修理後の撮影を行った。修理記録をまとめ、現資料の修復を終了した。

On the Restoration of "Genji Makie Raden Cosmetic Box" in the Collection of Staatliches Museum für Volkerkunde

YAMASHITA Yoshihiko
Urushi Conservator

Name of the object: "Genji Makie Raden Cosmetic Box"

Owner: Staatliches Museum für Volkerkunde

Inventory number: 26. N. 28

Dimensions (cm) : 40.7 x 43.7 x 50.6 (including metal fittings)

Condition of Damage

Although the overall impression of the condition of preservation of the object was good, it was believed that repeated restorations of the object in the past must have caused damage to the original urushi coating and *makie*. In reality, traces of European restoration materials and traditional restoration materials for urushi objects from previous restorations were both found at several places, suggesting that a major restoration had been conducted in the 19th century during which the inside of the box was changed from that of a toilet box to that of a cosmetic box and metal fittings were removed. Moreover, since urushi was coated over European restoration materials and since the object had not been exported from Japan after the War, there is a great possibility that it was restored not so long ago in Germany by a Japanese.

Among Western restoration materials, green coating material was found applied thinly around the rim of the object. This is believed to have been used to adhere velvet when the inside of the object was changed. In addition, gold coating material was applied to the parts on the rim from where *makie* had become detached or fallen. The metal lock, handles and corner fittings seemed to have been removed during restoration. Green wax was used to reattach the nails, and new brass nails were made to replace missing copper nails. The lock on the lid was attached at an angle. The new nails were bent intentionally on the reverse side of the lid and a hammer seems to have been used to do this since there was a dent on the substrate. The metal corner fittings were not just nailed but also adhered with restoration material. The metal corner fitting on the right front was attached in a wrong direction and not completely in line with the corner of the body of the object. Black coating material was found on the handles. Western coating material was applied to the parts from where silver beads had fallen. The cloud on the upper portion of the right side of the box was drawn anew with Western coating material. The inventory number was written on the underside of the bottom board and coated with transparent material, but traces of this material were found over the entire surface of the bottom board.

Parts where urushi had been used as restoration material was found everywhere, but *suri urushi* was found to have been applied unevenly at many places. Especially, there was a very thick coating

of urushi around the metal lock in the front and there were even some traces of urushi on the surface of the lock. There were traces of what seemed to have been water droplets and water streaks on the black urushi portion inside the cartouches on each side of the box. Parts damaged by impact on the surface of the lid were recoated with urushi, but since the recoating was applied over an area larger than the actual damaged parts, there was unevenness over the entire black urushi portion. *Bengara urushi* was applied to those parts of vermilion urushi that had been lost on the reverse side of the lid and the periphery of the bottom board was completely covered with black urushi. Shell pieces that had become detached were re-adhered with black urushi. New shell pieces were made for those that had been lost, causing a difference in the color of the shell pieces. Damaged parts of the *hiramakie* and *nashiji* were also repaired with urushi and *makie* powder. However, in addition to being not in harmony with the original *makie*, they had damaged the *makie* on the restored parts. Silver *makie* powder was applied to parts from where silver *hyomon* had fallen, and the color was adjusted to that of tarnished silver.

In addition to the restored parts, the entire surface of the object was covered thinly with dust and soiling. Urushi had deteriorated due to the effects of ultraviolet rays and the passage of time so that there were fine cracks on the urushi coating film. The coating material on the *nashiji* had deteriorated and changed color, exposing gold powder. Cracking of the substrate was found at several places on the joints of the reverse side of the lid and the boards on its side as well as on the lid board and the bottom board so that these parts were in great danger. The upper part of the metal lock had become detached, and the foundation was exposed. There were also cracks and detached parts around the nails of the hinges. Parts of the black urushi coating film around the handles had become detached. Shell pieces had become detached and fallen from many places due to the shrinking of the substrate; some of the shells had cracked and were protruding from the surface. Detached shell pieces were found mostly on the vertical borders. *Hyomon* on the back had become completely detached and were in great danger of falling. In addition to traces of damage by impact found everywhere, there were also traces of water streaks on the vermilion urushi coating of the reverse side of the lid and partial discoloring of the vermilion urushi.

Restoration Specifications

It was decided that restoration be done with the maintenance of the present condition in mind and using traditional Japanese restoration materials, as is the case in the restoration of designated cultural properties in Japan. Traces of past restorations were removed in part temporarily and reproduced later. Such reproduced parts concentrated mainly on those parts of the lid top that had been restored with black urushi and the restored *nashiji* on the back of the object. Other parts restored in the past, including *raden* and *hyomon*, were not reproduced but simply restored for preservation. Missing nails of the metal corner fittings and handles were reproduced with brass. Metal lock and corner fittings were removed and replaced in their original positions. Only the shape of the missing coating film and gold *hiramakie* on the rim was reproduced and their color matched with the surroundings. The inside of the object where cosmetic containers would have been kept was left untouched.

Animal glue was used as restoration material for the *raden* while urushi was used for other parts.

Synthetic resin was used as supplementary material. X-ray radiographs were taken and X-ray fluorescence analysis was conducted to study the structure, decoration and urushi techniques. After restoration, silk fabric and a paulownia box were made for storage. Two cases of a humidity-controlling agent (adjusted to 60%RH) were placed inside the upper part of the storage box in order to meet changes in humidity overseas.

These restoration specifications were established before the actual work was started, and any change to these specifications was to be discussed between the conservator and the person in charge of restoration at the National Research Institute for Cultural Properties, Tokyo and decided. The actual work of restoration was conducted over a period of two years, between 2002 and 2004, at the Restoration Studio 1 of the National Research Institute for Cultural Properties, Tokyo.

Processes of Restoration

1. Preliminary investigation and photographing

Condition of the substrate, foundation, *makie* and past restorations was confirmed before restoration and recorded. In addition, photographs were taken before restoration for comparison after restoration.

X-ray radiography was conducted by Miura Sadatoshi of the National Research Institute for Cultural Properties, Tokyo in order to confirm the structure of the substrate and the present condition of past restorations. X-ray fluorescence was conducted by Hayakawa Yasuhiro of the same Institute in order to investigate the *makie* technique and materials. The foundation, coating, *raden* and *makie* of the object were investigated from the aspect of their techniques, and the present condition of damage was studied. Furthermore, in order to determine the condition of past restorations, UV photographs were taken. Details of the processes of restoration were decided based on results of these investigations. Photographs of *makie* magnified 5 to 10 times were taken for use as reference in reproducing the *makie*.

It was found from X-ray radiography that the substrate of the object is made of cypress boards that have been assembled at corners. *Nunokise* was applied around the edges. Two to three layers of urushi foundation using coarse brown *jinoko* and *tonoko* were applied to make the foundation. After polishing, the object was coated with a thin layer of urushi containing black pigment. Then thin shell pieces of abalone approximately 0.2 to 0.5mm were adhered with animal glue. The difference in level caused by the shell pieces was adjusted with *sabishitaji*. After polishing the shell pieces and foundation, thin *hyomon* was attached to the borders. A thin layer of black urushi was applied once, followed by several layers of deep brown translucent urushi. Finally, a finishing polish was conducted. There is no black colored urushi over the foundation of the bottom. *Makie* was applied by first making drawing designs with urushi (*okime* technique) on the middle urushi coating layer and then sprinkling gold powder. Several types of *makie* techniques are used, including *togidashi makie*, *shishiai togidashi makie*, *hiramakie* and *takamakie*. Decorative techniques are observed on the *makie*, including *kakiwari*, *hikkaki*, *tsukegaki*, *kirikane* and silver beads. Gold *makie* powder of varying purities is used effectively. X-ray radiography revealed that there were original nails at several places of the wooden substrate.

2. Removal of the metal fittings

The metal lock on the lid was removed temporarily and stored separately from the object. At first, it had been decided that the removal of the metal fittings would be kept at a minimum. However, since there was a thick trace of restoration materials on the metal lock in the front and around the metal corner fittings, all the metal fittings were removed with the exception of the handles on the left and right sides. To remove the nails, two types of tools were especially made to fit the shape and size of the nails. The nails were removed carefully, using a plastic sheet, so as not to damage the metal fittings. The removed metal fittings were temporarily attached to a cube made of polystyrene foam so that their positions would not be mistaken, and stored.

3. Cleaning and facing

Dust and soiling that covered the entire surface of the object were cleaned by first removing them with a brush and then wiping carefully with moist cotton. Absolute ethanol and acetone were used to remove Western coating material from areas around the metal corner fittings. Organic solvents like acetone and THF were also used to remove the adhesive material around the inner side of the edges. At first it was believed that Western coating material like shellac was covering the entire surface unevenly, but it was found to have been *urushi* used in a past restoration. It was not possible to clean this uneven coating. Small pieces of *gampi* paper were fixed with wheat starch paste to areas of the coating film, *raden* and *hyomon* that were in danger of becoming detached so as to protect them during restoration work.

4. Consolidation

In order to reinforce the fine cracks on the deteriorated coating film, *urushigatame* was applied. For *urushigatame*, a mixture of *suki urushi* and Japanese raw *urushi* was diluted four times with Clean Sol G and impregnated into the cracks. Excess *urushi* on the surface was wiped off completely. Furthermore, in order to reinforce the coating film around the *makie* powder, *nashiji urushi* was added to the *urushi* used for coating. *Mugiurushi* diluted thinly with ligroin was impregnated into parts where the foundation had become exposed due to impact damage in order to reinforce the damaged foundation.

5. Reinforcement and adhesion of cracks.

There were cracks on the substrate of the lid and the bottom board, causing great danger to the object. There were two cracks on the reverse side of the lid near the top, but since these cracks had not advanced to the surface of the lid, their treatment was given priority. Thus, the substrate was reinforced and the cracks fixed even before reattaching the detached *raden* pieces. *Mugiurushi* diluted with ligroin was impregnated into the cracks. Excess *urushi* was completely wiped off with a solvent and the area was dried sufficiently. Since a piece of fabric covers the inner side of the bottom board, the cracks were treated carefully lest the *urushi* affect the inner side. The cracks were reinforced twice. After drying, soft *kokuso* was impregnated into small openings around the cracks on the bottom board in order to adhere the substrate completely.

6. Reattachment of the detached coating film inside the lid

The vermilion *urushi* coating film on the inside had become detached around the back of the metal lock and the hinges. *Mugiurushi* diluted with ligroin was impregnated into these areas and excess *urushi* was wiped off from the surface. Then clamps and bamboo sticks were used to firmly reattach

the coating film.

7. Reattachment of the detached *raden*

In order to reattach the detached *raden* pieces by applying pressure, a wooden frame was made to fit the cosmetic box. The structure of the frame was designed in such a way that each side of the frame would have movable crosspieces that could be moved to necessary places. The detached shell pieces were protruding from the surface and were partially cracked so that it was not possible to lay them flat again with repair. So measures were taken to prevent these pieces from falling in the future. A mixture of double boiled 20% animal glue solution to which a small amount of ethanol was added was impregnated into the detached shell pieces. Excess animal glue was wiped off and the shell pieces were press stabilized by using bamboo sticks and other types of wooden sticks. Parts where it was difficult to impregnate animal glue were first treated with ethanol to make impregnation easier. The shell pieces were covered with plastic sheets to protect them during press stabilization.

8. Press stabilization of *hyomon*

Detachment of the silver *hyomon* was found only at one place, at the back of the object. *Hyomon* foil was warped and curved out. First a tortoiseshell spatula was used to readjust the shape of the *hyomon*. Then slightly dried *mugiurushi* was placed on the parts of the body from where the *hyomon* had become detached and the foil was slowly stretched and press stabilized by using a wooden frame and bamboo sticks. Acrylic sheet and plastic sheets were used to flatten the *hyomon* as much as possible.

9. Cleaning of the metal fittings

The metal fittings were all made of copper and gilded with gold. Because of similar metal fittings found on objects at Trianon at the Versailles, it is believed that the metal corner fittings were partially colored with a black material. However, all the colorings had been lost. There were traces of Western coating material on the back of the metal corner fittings that had been removed at the beginning of restoration and some verdigris patina was observed as well. There was also some green colored wax on the tip of the nails that were used to fix the metal fittings. It is believed that this coating material and wax were applied in a past restoration, when these metal fitting were temporarily removed, in order to prevent the corner fittings from becoming loose. The coating material, patina and wax were removed by using cotton swabs moistened with acetone and THF. Similar solvents were used to lightly wipe off soiling from the surface of the corner fittings. In addition to soiling, urushi was observed at several places on the surface of the metal lock. There were also traces of attempts that had been made to remove that urushi. The metal lock on the lid, in particular, had been polished with force so that some of the gold gilding had been damaged. Urushi on the metal fittings was removed with a bamboo spatula as much as possible and wiped off with a solvent similar to that used for the cleaning of the metal corner fittings.

10. Reattachment of the black urushi coating film

Detachment of the black urushi coating film was observed mostly around the shell pieces on the border as well as around the rim and the hinges. *Mugiurushi* diluted with ligroin was used for reattachment, but extra care was taken in treating the urushi coating film around the shell pieces lest the color of the shell pieces be affected. Similarly diluted *mugiurushi* was used around the rim and the

hinges. Plywood board and a sheet of rubber were placed near the detached coating film on the rim and clamps were used for press stabilizing. Detached coating film around the hinges was reattached using a wooden frame and bamboo sticks.

11. Removal of past restorations

Past restorations of parts to be reproduced were temporarily removed and the foundation adjusted. *Nashiji* applied in past restorations found on the sides of the object was removed with extra care since there was a possibility that the original *makie* may be hidden under the *nashiji*. A sculptor's knife with its tip blunted was used to remove the metal powder. Crystal #2000, a kind of whetstone, was used to remove the urushi. *Nashiji* had been applied in past restorations to repair parts damaged by impact; this was believed to have been done mainly on those parts where the foundation had been exposed. However, it was found that the *makie* underneath the *nashiji* had been lost on parts to be reproduced other than the front left, and the *makie* around these parts had also been lost. Urushi had been repeatedly applied to areas on the lid top that had been restored in the past, and *suri urushi* had been used to cover the entire area. Thus, it was decided to remove the uneven coating of *suri urushi* first. In order to protect the *makie*, a solution of Paraloid B 72 dissolved in absolute ethanol and pure water (ratio of 9 : 1) was applied over the *makie* and allowed to dry. *Suri urushi* was removed carefully by using finely crushed whetstone powder and a piece of soft leather (deer) moistened with water. Coatings of urushi that had been applied a number of times were removed by polishing with Crystal #2000 and #3000. Urushi inside dents were also completely removed.

12. Reproduction of the *makie*

Parts from past restorations where the foundation had become exposed were reproduced to match the surrounding areas. Based on the results of X-ray fluorescence analysis, special order was placed to a *makie* powder manufacturer in Kanazawa (Ishikawa prefecture) for gold powder made from an alloy of 95% gold and 5% silver. Powder ranging from size 7 to size 3 was made to match the *nashiji* powder used on the object. Rather than directly sprinkling gold powder on the object, it was decided to make a film of *makie* powder and to apply this film in order to reproduce the *nashiji*. The advantage of this method is that by minimizing the amount of work it reduces the possibility of causing damage to the object. In addition, the translucence of urushi that has been used for several hundreds of years becomes greater and the urushi loses its gloss due to deterioration so that it is difficult to match the color and gloss. By exposing *makie* film to sunlight, it is possible to cause deterioration and advance the change in translucence artificially so that the film may be applied at the exact time that the texture of the *makie* film matches that of the surrounding areas. Prior to reproducing the *makie*, a sample *makie* board was made. The *makie* film was made by sprinkling *makie* powder on a glass surface. After finishing the surface, this was immersed in water and the film was removed from the glass. Parts to be reproduced were prepared first by applying small drops of very red *bengara urushi*, just as found on the original. Then the film was cut into pieces to fit the parts to be reproduced and adhered with *suki urushi*.

13. Reproduction of the black urushi coating film

The parts on the lid top that had been damaged by impact were restored by applying urushi foundation made from Yamashina *jinoko* and *tonoko*. This foundation, whose color was made to

match that of the original foundation, was applied twice. Then urushi into which a small amount of black pigment had been kneaded was applied thinly. This was followed by applying dark *suki urushi* three times. The surface of the final coating was polished by using Crystal #2000 and #3000. This was then followed by two applications of *suri urushi*, *dozuri*, two more *suri urushi* and one process of polishing. The unevenness of the black urushi parts around the reproduced areas was also removed with fingers by lightly polishing with powder.

14. Shaping of the missing parts

Sabishitaji was applied to the parts of the cracks on the bottom board that had been filled. *Kokuso* and foundation were applied to shape the coating film and the missing *hiramakie* on the rim. Black *sabi* was applied to the black urushi parts and gold *sabi* was applied to the gold *hiramakie* parts. They were both consolidated with *rose urushi* and *suki urushi*.

15. *Kiwasabi*

In order to prevent further detachment of the coating film that may be caused by slight contact of fingers, a very small amount of fine *sabishitaji* was applied to the edges of the coating film. Surrounding colors were taken into consideration in applying *kiwasabi*. *Sabishitaji* mixed with *honshu* (vermilion) was used for the inside while black *sabi* was used for the outside.

16. Reproduction of the nails and attachment of the metal fittings

Brass nails were made to replace missing nails. Commercially available nails with round heads were cut into the length of the original ones and hammered to match the shape. Four nails were reproduced for the metal corner fittings and two for the handles. All the five nails for the lock on the lid that had been newly made at past restorations were replaced. Since parts of the original nails remained firmly in the nail holes of the metal corner fittings, making it impossible to remove them, small sized dentist's drill was used to carve the nails. Appropriate amount of *kokuso* was impregnated into the nail holes to make sure that the metal corner fittings would be fixed firmly. Distortions of the metal corner fittings were fixed with hands before reattaching. Each metal corner fitting was made by bending one sheet of copper plate and attached in such a way that the joint would face the side. The metal corner fitting on the right upper corner, which was out line, was returned to the correct position.

17. Photographing and documentation

Photographs were taken of the object after restoration so that they may be compared with photographs taken before restoration. Documents of the restoration were made.

源氏寺絵螺鈿化粧箱

蛍光X線分析による漆製ToiletBoxの材質調査

東京文化財研
早川泰弘

【分析日時・場所】 2003年5月22日(木) 13:30~16:00

東京文化財研究所 修復技術部第1アトリエ

【分析装置・条件】 セイコーインスツルメンツ(株)ポータブル蛍光X線分析装置SEA200

X線管球:Rh(ロジウム)

管電圧・管電流 : 50kV・100 μ AX線照射径 : ϕ 2mm

測定時間 : 100秒

測定雰囲気 : 大気

装置ヘッド~資料間距離 : 約5mm

【分析結果】 別紙参照(図92、93)

・得られた蛍光・線強度を一覧表(表1)に示すとともに、全測定結果を添付した。

・今回の測定結果に関しては、下記の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) 蛍光X線分析では試料に含まれている元素を特定することはできるが、その構造(化学式)を知ることはできない。
- (2) 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。
- (3) 無機物であっても、軽元素(例えばAl, Si, S, Clなど)の検出は行えない。
- (4) 得られた蛍光・線強度は表面からある深さまでの組成情報である。
(金属鋼の場合:数10 μ m程度)
- (5) 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か、それらが層状に存在しているのかの判断はできない。
- (6) 分析機器と資料との距離が異なると蛍光・線強度は変化するため、異なる測定部位から得られた強度を相互に比較する際は十分な注意が必要である。
- (7) 蛍光X線の検出効率率はエネルギーによって大きく異なるため、元素間での蛍光X線の強度比は実際の濃度比とは一致しない。



図92 蛍光X線分析の測定ポイント
Measuring points of
X-ray fluorescence analysis



図93 蛍光X線分析の測定ポイント
Measuring points of
X-ray fluorescence analysis

表1 漆製ToiletBoxの蛍光X線分析結果

測定 箇所 No.	測定位置		Data File	蛍光X線強度 (cps)					コメント (推定される金属組成)
				鉄 Fe-K α	銅 Cu-K α	銀 Ag-K α	金 Au-L β	水銀 Hg-L β	
1	蓋上面	左縁 巴文	Toilet01	16.3	36.0	9.9	9.9		(Au65%-Ag31%-Cu4%)
2	"	上部 平文	Toilet02	10.2	17.1	14.3	169.5		Auは周囲の影響あり
3	"	上部 平時絵	Toilet03	14.8			164.3		(Au>99%)
4	"	左上部 菊花文	Toilet04		21.0	10.3	169.7		(Au74%-Ag26%)
5	"	左上部 梨地粉	Toilet05	60.6	18.8	5.3	62.6		(Au94%-Ag3%-Cu3%)
6	"	岩上部 切金	Toilet06	12.8	34.0	9.9	110.7		周囲の影響あり
7	"	岩中央 露玉	Toilet07	6.4	11.9	20.3	60.0		Auは周囲の影響あり
8	"	木の実	Toilet08		35.9	11.9	116.8		(Au60%-Ag37%-Cu5%)
9	"	置目 赤色	Toilet09	24.0	15.0		81.2	(43.7)	赤色材料の主成分はHg
10	"	下付 赤色	Toilet10	16.1	17.2		96.3	(54.3)	赤色材料の主成分はHg
11	"	着物の下付 赤色	Toilet11	12.3	28.1		144.7	(73.7)	赤色材料の主成分はHg
12	"	土坡	Toilet12	70.3	12.4	4.7	28.1		(Au88%-Ag7%-Cu5%)
13	"	土坡 人物の頭上	Toilet13	18.5	15.5		135.7		(Au>99%)
14	"	人物の顔 赤い唇	Toilet14		16.1		175.9	(89.4)	赤色材料の主成分はHg
15	"	岩肌 時絵 銀色	Toilet15		15.5	27.6	76.8		(Au31%-Ag69%)
16	身背面	撫子の花びら	Toilet16	15.8	16.1		163.3		(Au>99%)
17	"	撫子の花びら	Toilet17	13.1	18.1		192.8		(Au>99%)
18	"	土坡	Toilet18	37.1	22.6	5.3	55.2		(Ag93%-Ag2%-Cu5%)
19	"	菊の花びら	Toilet19		15.3	19.7	94.0		(Au45%-Ag55%)
20	蓋上面	牛の背 高上げ	Toilet20		16.7		212.0		(Au>99%)
21	"	右縁 牡丹文	Toilet21	43.3			71.3		(Au>99%)

Hg-L β はAu-L β の一部と重なるため、Hg-L β 強度値はAu-L β ピークの一部を含んだ値である。

X-ray Fluorescence Analysis of the Materials of "Genji Makie Raden Cosmetic Box"

HAYAKAWA Yasuhiro
National Research Institute for Cultural Properties, Tokyo

1. Apparatus and Conditions of Analysis

Portable X-ray Fluorescence Spectrometer SEA200, Seiko Instruments Co. Ltd.

Target: Rh (rhodium)

Tube voltage · Tube current: 50kV · 100 μ A

X-ray irradiation diameter: ϕ 2mm

Measuring time: 100sec.

Distance between the apparatus head and the object: approximately 5mm

2. Analytical Results

Twenty-one positions were selected and measured. X-ray fluorescent intensity obtained is listed in a table. Fluorescent X-ray was obtained from a certain depth of the sample (in the case of metallic copper: approximately several 10 μ m). In the present analysis, light elements (i.e. Al, Si, S, Cl) and organic substances (major components C, N, O, H) cannot be detected. Furthermore, since the detecting efficiency of fluorescent X-ray differs by energy, X-ray intensity does not correspond with the actual concentration.

Results of X-ray Fluorescence Analysis of the "Genji Makie Raden Cosmetic Box"							
No.	Measuring points	X-ray fluorescent intensity (cps)					Composition assumed
		Iron Fe-K α	Copper Cu-K α	Silver Ag-K α	Gold Au-L β	Mercury [*] Hg-L β	
1	Upper face of the lid, left edge, <i>tomoe</i> design	16.3	36.0	9.9	9.9		(Au65%-Ag31%-Cu4%)
2	Upper face of the lid, upper portion, <i>hyomon</i>	10.2	17.1	14.3	169.5		
3	Upper face of the lid, upper portion, <i>hiramakie</i>	14.8			164.3		(Au>99%)
4	Upper face of the lid, upper left portion, chrysanthemum		21.0	10.3	169.7		(Au74%-Ag26%)
5	Upper face of the lid, upper left portion, <i>nashiji</i> powder	60.6	18.8	5.3	62.6		(Au94%-Ag3%-Cu3%)
6	Upper face of the lid, upper portion of the rock, <i>kirikane</i>	12.8	34.0	9.9	110.7		
7	Upper face of the lid, center of the rock, silver bead	6.4	11.9	20.3	60.0		
8	Upper face of the lid, fruit of a tree		35.9	11.9	116.8		(Au60%-Ag37%-Cu3%)
9	Upper face of the lid, <i>okime</i> , red	24.0	15.0		81.2	(43.7)	
10	Upper face of the lid, undercoating of <i>makie</i> , red	16.1	17.2		96.3	(54.3)	
11	Upper face of the lid, undercoating of <i>makie</i> on the <i>kimono</i> , red	12.3	28.1		144.7	(73.7)	
12	Upper face of the lid, riverbank	70.3	12.4	4.7	28.1		(Au88%-Ag7%-Cu5%)
13	Upper face of the lid, riverbank, over the head of a person	18.5	15.5		135.7		(Au>99%)
14	Upper face of the lid, face of a person, red lips		16.1		175.9	(89.4)	
15	Upper face of the lid, rock, <i>makie</i> , silver		15.5	27.6	76.8		(Au31%-Ag69%)
16	Back of the body, petal of a <i>nadeshiko</i> flower	15.8	16.1		163.3		(Au>99%)
17	Back of the body, petal of a <i>nadeshiko</i> flower	13.1	18.1		192.8		(Au>99%)
18	Back of the body, riverbank	37.1	22.6	5.3	55.2		(Au93%-Ag2%-Cu5%)
19	Back of the body, petal of a chrysanthemum		15.3	19.7	94.0		(Au45%-Ag55%)
20	Upper face of the lid, back of the cow, <i>taka-age</i>		16.7		212.0		(Au>99%)
21	Upper face of the lid, right edge, peony design	43.3			71.3		(Au>99%)

*Since Hg-L β overlaps with a part of Au-L β , the value of intensity of Hg-L β contains the value of a part of Au-L β .