

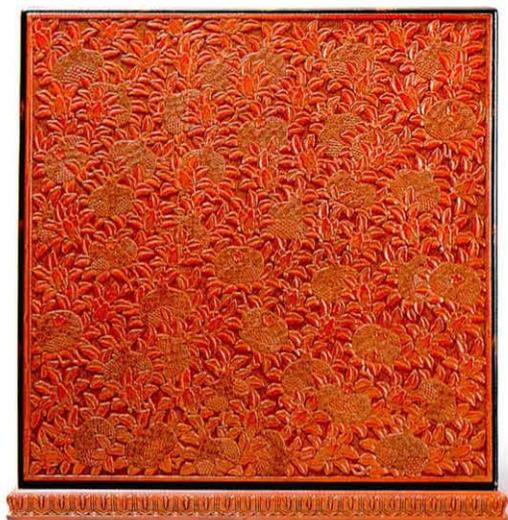


工 芸 篇

Craftworks



1 全景 修復後
Cabinet, after restoration



2 背面 修復後
Back face, after restoration



1 全景 修復後
Cabinet, after restoration



2 背面 修復後
Back face, after restoration



3 扉裏面 小抽斗 修復後
Inner side of the door and small drawers, after restoration



4 正面扉 修復後
Front, door, after restoration



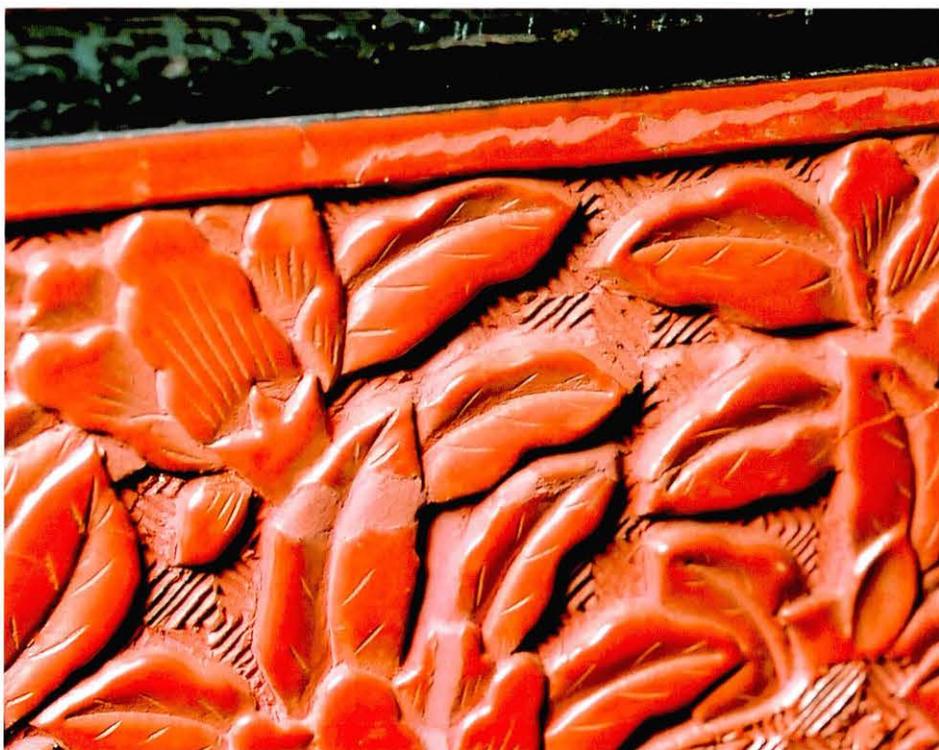
5 天板彫り部 修復前
Carvings on the top board, before restoration



6 天板彫り部 修復後
Carvings on the top board, after restoration



7 背面端喰部亀裂 修復前
Cracks along the *hashibami*, before restoration



8 背面端喰部亀裂 修復後
Cracks along the *hashibami*, after restoration

草花蒔絵螺鈿鎌倉彫簞笥

平成13～15年度修復事業



品名：草花蒔絵螺鈿鎌倉彫簞笥
所蔵：フィラデルフィア美術館
時代：明治時代

フィラデルフィア美術館所蔵

草花蒔絵螺鈿鎌倉彫箆笥

漆芸修復家
勝又 智志

品名 草花蒔絵螺鈿鎌倉彫箆笥
 所蔵 フィラデルフィア美術館
 所蔵番号 1916237
 法量 32.2cm×48.6 cm× 51.6cm

フィラデルフィア美術館所蔵、草花蒔絵螺鈿鎌倉彫箆笥（以後本資料と呼ぶ）は在外日本古美術品修復事業の一環として平成13年6月～平成15年3月までの22か月間、東京文化財研究所第一修復アトリエにおいて修復が行われた。本稿は保存修復の際得られた情報と修復の経緯をまとめたものである

概要

木製、漆塗りの両開き戸を備えた小型の蒔絵箆笥である。全面を木彫朱漆塗とし、背面を除く各面に窓枠をもうけ、四季草花図の蒔絵を施している。本資料は1876年、当時アメリカ最大の都市であったフィラデルフィアにおいて独立100周年を記念して開催されたフィラデルフィア万国博覧会に出品されたものである。所蔵館であるフィラデルフィア美術館は当時の出品作を数多く所蔵しており、本資料もまた、その折購入され所蔵された箆笥である。

当時、明治政府は万国博覧会を美術工芸品の輸出の契機としてとらえ、国を挙げて振興策に取り組み始めた時期であった。本資料には西欧人の東洋趣味にあわせた意匠が意識的に取り入れられており、明治初期、特に輸出を目的とした工芸品の特色が現れた作品として、また、時代が特定できる意味においても貴重な蒔絵箆笥である。(図1、2)

形状及び細部の仕様

本資料の構造は底板、側板、天板、背面板、台輪のそれぞれを内外とも仕上げた後、鍛造した釘で打ち付け、組み上げたものである。接合部である唐戸面には釘穴が目立たないように塗が行われた後、緑と黄色の色漆で簡略化した鳥の文様を描き、磨き上げている。両開きの扉は各面2個の内蝶番で本体に取り付けられ、正面中央には牡丹の図を毛彫した鍵金具が取り付けられている。金具は銅に微量の金を含有した赤銅の煮上げ色である黒色とし、毛彫と飾金具の周囲を金鍍金で仕上げたものである。扉下には1杯の抽斗と2杯の小抽斗を、扉内には大中小の小抽斗六杯を備え、鍵金具と同じ仕上げによる摘み金具が付く。(図15)



15 正面鍵金具 修復後
 Front, metal lock and key, after restoration



16 正面抽斗 修復後
Drawers below the door, after restoration



17 天板 修復後
Top board, after restoration

背面の全面とその他4面の窓枠には、木彫朱漆塗りで柵形の地文に石榴の文様を密に彫りこみ、それぞれの石榴の外皮には柵形文、卍柵文、花柵文、亀甲花文を施し表情豊かなものとしている。(図2)

木彫の塗は彫りの峰部を艶のある朱塗りとし、彫りの谷には朱色の顔料がそのまま施されていることから、朱塗りに朱蒔の技法を併用し仕上げられていることが解る。朱蒔とは、彫りに薄く漆塗りを施し、漆が乾く前に朱の顔料を蒔き付けたものである。本資料の場合は峰部分のみ朱漆塗りを数回行い、磨きまでの仕上げを完了しておき、その後全面に生漆を摺込み、峰部分の漆を拭ききり、その上で朱粉を彫りの谷部分にのみ残るように蒔き、全体を磨き仕上げたものである。単色の朱色に陰影が付き、彫りの形を強く際立たせる鎌倉彫の塗技法である。

各面の窓枠内には、黒呂色仕上げ面に繊細な蒔絵螺鈿が施されている。正面左の扉には薄肉の高蒔絵で



18 左側面 修復後
Left face, after restoration



19 右側面 修復後
Right face, after restoration



20 背面龟裂 修復前
Cracks on the back, before restoration



21 背面龟裂 修復後
Cracks on the back, after restoration

麦の穂を描き、遠景に角細工と思われるヒバリを象嵌している。右扉にはもみじとその翼果が、金粉に朱の顔料を蒔きつめた変り塗の技法と白蝶貝の象嵌で表されている。扉下の抽斗には菊に蔦、小抽斗には左面に撫子、右面に松葉に木の実を白蝶貝や黄蝶貝の象嵌と薄肉の高蒔絵で表している。天板には冬の情景であろうか、一本の水仙に枯葉と木の実が添えられた図が同様の技法で描かれる。左側面には葛の葉を金銀の薄肉高蒔絵で、花を白蝶貝の象嵌で表す。遠景には正面のヒバリに使用されたものと同質の素材でトンボが象嵌されている。右側面には葉桜が左側面と同様の技法で表されている。これらに使用された白蝶貝の背面には、淡い紅色に着色した和紙を伏せ彩色として貼りつけている。このため彫りの深い部分が僅かに紅色に見えることで繊細な彫りが強調されている。四季折々の植物に宙を舞うヒバリ、トンボ、花卉、枯葉、などが脇役のような存在として必ず添うように描かれ、それぞれの季節を情感豊かに表現している。このような空間を生かした絵画的な蒔絵は江戸後期にも見られる表現形式であるが、その伝統の流れをくむ蒔絵といえる。本資料の制作年は明治9年以前であり蒔絵師たちは江戸の時代を生きた蒔絵師そのものである。制作の技術や意匠の考え方に江戸蒔絵の特色が強く現れるのは当然といえる。(図4、16-19)

一方で扉の内側には新しい時代の表現が見られる。扉の裏面と6杯の小抽斗の前板には、冠雪の富士の図が筆致を残すような技法で表現されている。色調も蒔絵の黒に対して水色を基調とした明るい色を使用している。技法としては塗膜の表面に研ぎつけた跡や艶上げの処理が見られることから漆塗りの技法と考えられるが、当時紹介され始めた油絵の表現や技法の影響も見て取れるのではなかろうか。(図3)

現在、国内には東京国立博物館に1冊の出品目録と、受賞目録が1冊、また、国立公文書館に1冊の出品目録が保存されている。出品数が膨大であるのと、記載が簡略なため本資料と特定される記載を見つけることは出来ないが、そのうち東京国立博物館に所蔵されている目録1のなかに、岩崎己之平(交玉)、池田泰真、小川松民など江戸後期より活躍し多くの名品を残した蒔絵師の名前が、膨大な数の漆器や衝立、小箆箱などの蒔絵家具とともに記されており、本資料との関連の可能性が推測される。

修復前の状態

本資料の損傷は素地である木質の乾燥による収縮に起因しており、接合部や木彫部分に重大な亀裂が発生していた。最も大きな亀裂は背面の木彫漆塗りの部分に、背面左端より16cmほどの地点で縦方向に最大幅3mm、長さ41.5cmの亀裂が入る。左右に分断された板は右側の材が外側に1.5mmほど膨れた状態で固定されており、左右のみならず前後に広がった亀裂は実際の寸法以上に大きく見え、痛々しい状態であった。背面板には上下に木地の狂いを抑える為に2.5cm幅の端喰材が入るが、その接合面にも亀裂が入り、上方で15cm、下方で8cmの亀裂が水平方向に伸びていた。木彫部の亀裂周囲には切削が容易な柔らかな材質のためか各所で欠損が見られた。(図7、8、20、21)

この背面板は上下左右の材に囲まれるようにはめ込まれ、縁周りの朱塗りの部分で釘により接合された後、下地と朱塗りが行われているのであるが、丁度この接合部分から天板と側板の三方で完全に切れ、台輪との間も亀裂が生じた状態であった。背面から見て左側の亀裂は大きく、最大幅3mm程に広がり、側板中央付近が大きく外側に膨らんでいた。(図22、23)

木地の亀裂は左右の側板にもおよび、両側面ともに台輪との接合部が大きく切れ、左側はほぼ中央の位置で下方より蒔絵を分断するように中心付近まで1mmほどの幅で切れていた。蒔絵が施されている黒塗りの面をよく見るとわずかに接合の跡が見え、接ぎ合わせの箇所であることが解る。右側面は背面寄りの箇所でも木彫部に縦方向の亀裂が入る。台輪と側板の寸法に1mmほどの差があり、側板のみが大きく収縮したことを示している。(図24、25)

両側面と天板には蒔絵の完了後に嵌め込んだ螺鈿の欠損が見られた。左側中央には葛の花が4個の白蝶貝の厚貝を用いて表されているが、先端部分の最も大きな貝が欠失しており、薄紅色に染められた和紙が現れていた。右側面は左上部と右中央部の桜花が2つ欠損していた。左上部は貝周辺の蒔絵にも欠損が見られる上、同時に剝落したと思われる和紙がケミカルな素材で簡略に接着されていたが、変色が著しく、汚れた状態であった。右中央部の貝は、正面抽斗の奥に張り付いた形で保存されていたが、汚れが激しい上、中央部に亀裂が入った状態で付着しており慎重に取り外す必要があった。また残存する貝も一部に剝離が見られ剝落の危険があった。天板は水仙の花と枯葉の一部に象嵌の欠損が見られた。当初は剝落面が金属が腐食したような印象の灰色であったため、金属の象嵌と考えられたが、観察の結果、汚れの下に和紙の存在が認められたことから、側面同様螺鈿が象嵌されていたことが判明した。側面に比べ蒔絵自体の損傷は少ないが、汚れと腐食が著しく、注意深くクリーニングする必要があった。(図26~28)

蒔絵が施された黒漆の表面には、各面ともに擦り傷や指紋が至る所に見られた。特に天板の塗膜は白濁した被膜が厚く被り艶を失っていた。また抽斗内部の塗膜もうっすらと汚れが被った状態であった。(図29、30)

扉内部の漆絵には指紋や水滴状の染みなどの汚れが点在していた。

木彫部は各面ともに黒色の堆積物が見られた。特に天板の彫りの汚れは著しく、彫りの谷部分の形状が不明なほどであった。また、背面の彫りの峰部分には強い圧力で他の塗膜面と接触した際に付いたと思われる灰色の塗料状の付着物が各所で見られた。(図5、6)

底裏は移動のたびに底面が擦られたためか、木地が露出するほど激しく損傷していた。

正面鍵金具は右扉の金具の左端にあるプレート状の飾り金具が欠落し保存されていた。この金具裏には2個の突起があり鍵金具本体に嵌るように作られていたが、片側の突起が折れ機能しない状態であった。また右扉の内蝶番の組み付けが悪く扉にがたつきが見られ、閉じた状態で僅かに左に傾いてしまう傾向がある上、鍵が失われているため施錠ができず、扉が常に開いてしまう状態であった。また、右扉の鍵金具は2本の釘が欠損し、左扉背面の差込式の止め金具の釘は4本の内下の2本が欠損し、後補の鉄釘が代用さ



22 背面左側亀裂 修復前
Crack on the left end of the back board, before restoration



23 背面左側亀裂 修復後
Crack on the left end of the back board, after restoration

れた状態であった。

修復

修復は、日本の国指定文化財に適応される現状保存修復の原則に基づいて行うこととした。細部の仕様については東京文化財研究所修復技術部 伝統技術研究室長、加藤寛氏、所蔵館フィラデルフィア美術館担当官、マランカ サリー氏と協議した上で実施した。本資料における修復の要点と基本方針は以下の通りである

1. 修復においては、伝統漆芸技法および伝統材料を使用し、本資料の特性を失わぬよう現状維持を基本姿勢とし、最適な修復法を心がけるものとする。
2. 本資料の亀裂は、長期にわたる乾燥による木地の収縮から起きているため完全に接合することは困難であるが、保存環境を整え可能な限り木地の形状を補正することで、最小限の亀裂幅で修復することとする。
3. 塗膜及び彫り部の汚れは、全体のバランスを配慮しながら可能な限り取り除く。
4. 欠損した螺鈿は復元も検討したが、本資料は貝表面のレリーフの状態が想定できない上、周辺塗膜の傷みが激しいため、総合的に検討した結果、現状維持とすることとした。

以上の点を基本方針とし、作業の進行にしたがって生じた問題については、その都度関係者で話し合い、修復法を検討することとした。

修復工程

1. 本資料には美術館側で作成した詳細な亀裂や擦過傷および欠損部のチェックリストが添付されていたので、これに基づき現状を確認すると共に、同様の形式でリストを作り修復前の状態の検査を行った。
2. 修復前の状態を写真撮影した。
3. 亀裂部周辺に発生している塗膜や木地の剥離の内、剥落の危険があるものには、雁皮紙を短冊状に細く切った紙片を生麩糊を用いて貼りつけ、作業中の欠損の予防とした。
4. 背面板の形状を可能な限り補正するため、高湿度に調整した湿し風呂に本資料を長期に渡り保管することとした。湿し風呂の湿度を徐々に上げ、それに伴う亀裂の状態を観察し、材木の動きを把握することにつとめた。最初の三か月間は湿度を70%~75%に維持した状態で保管したが、ほとんど動きは確認できなかった。そこで湿度を80%~85%に引き上げ、さらに、木製の枠に納め背面側より丸棒を用いた芯張りを立て、圧力を加えたところ、2週間の時点で動きが見られた。背面に見られた3mm幅の亀裂は2mmに改善され、段差も僅かであるが回復が見られた。ただし、背面板と両側板の隙間には変化が見られなかった。(図31)

5. 本体への加湿の期間、塗膜及び彫りに堆積した汚れのクリーニングを行った。黒漆の塗膜には薄い皮膜が残留しており、シェラックなどの塗装が行われた疑いがあったため、掃除前に紫外線撮影を行い残留物の確認を行った。その結果、塗膜表面には塗装が行われた形跡はなく、ワックスなど何らかの艶上げ材が薄く残留したものと考えられた。黒漆及び蒔絵螺鈿の部分に対しては、純水を使用し固く絞った綿布を竹箆などに巻き付け、塗膜に水分が残らないように注意しながら徐々に汚れを取り除いた。水分で除去できない汚れに対しては、溶剤試験を行い、塗膜に対して安全な溶剤を選択した。試験の結果エタノールでの拭き取りが最も良好であったことから、綿棒にエタノールを含ませ、徐々に汚れを取り除くことで適度な艶を回復することができた。(図32)

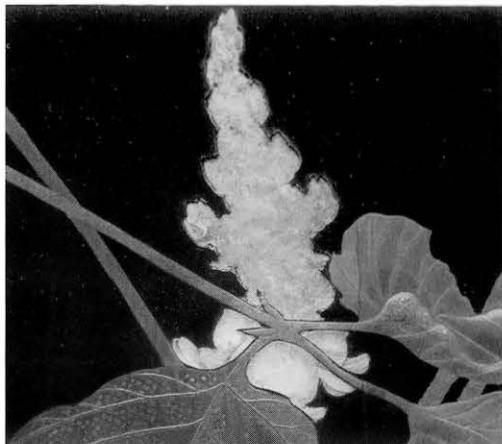


24 左側面中央亀裂部
Crack at the center of the left face



25 左側面正面側
Left face, toward the front

6. 朱塗りの彫り部の汚れに対しては、まず始めに腰の強い特殊な毛棒で彫りの奥に残留した埃を掻き出した。しかし、この作業だけで堆積した汚れは除去できなかったため、薄く柔らかな紙を彫りの部分に当て、その上から僅かに水分を含ませた塗刷毛で彫りの谷部をたたき、固着した汚れを水分でゆるめながら紙の繊維に汚れを吸い取らせることで僅かずつ汚れを取り除くことができた。灰色の塗料が固着した部分は、水拭きや溶剤での除去が不可能であったので、刃先を落とした彫刻刀で塗膜を僅かずつ削ることとした。(図33、34)
7. 天板にある螺鈿の欠損跡は、灰色に変色するなど最も汚れが激しかったが、制作材料である和紙が残っている事が確認されたため、水分の使用を控え、毛棒とエタノールによる掃除のみとした。また右側面上部の桜花の螺鈿欠損箇所は接着の際使用された材料の変色と硬化のため、和紙本来のしなやかさが失われた状態にあった。当初、溶剤を用いて接着材のみを除去する事を目的として作業を行ったが、和紙が粉状に崩れる状態であったため、全て取り外すこととした。
8. 掃除後の塗膜に極薄い生漆を含浸させ塗膜の強化を行った。漆の表面は経年変化により極細かい断文が入る。この断文が光を乱反射させ艶の減少を引き起こすと同時に、塗膜に手油や指紋を残しやすく



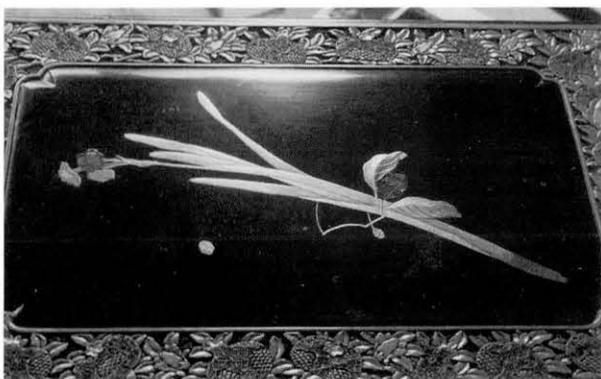
26 左側面螺鈿欠損部
Missing *raden* on the left face



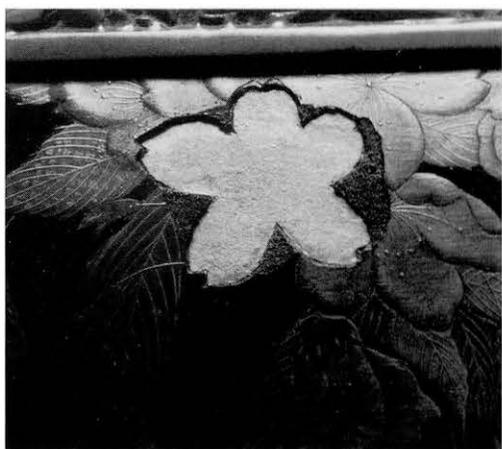
29 天板 修復前
Top board, before restoration



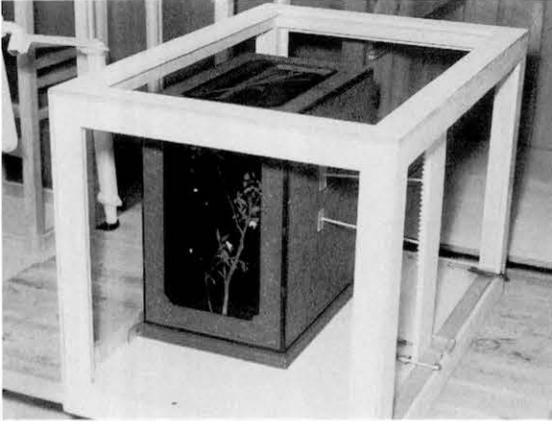
27 右側面上部螺鈿欠損部 修復前
Missing *raden* on the upper part of the right face, before restoration



30 天板 修復後
Top board, after restoration



28 右側面上部螺鈿欠損部 修復後
Missing *raden* on the upper part of the right face, after restoration



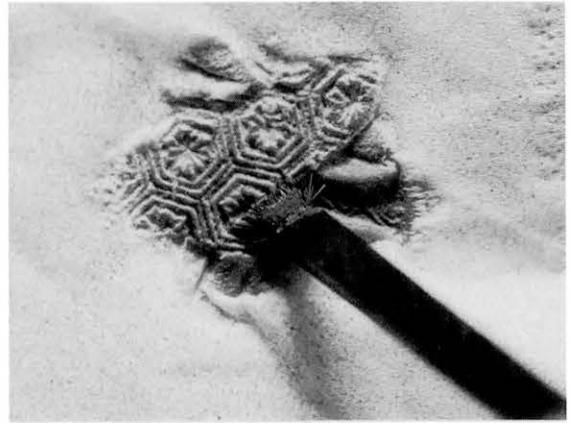
31 木枠による芯張り
Shimbari sticks and wooden frame



32 右側面蒔絵部 エタノールによるクリーニング
Makie on the right face, cleaning with ethanol



33 だるま刷毛による埃の除去
Removing dust with a brush



34 彫り谷部の汚れの除去
Removing grime from the lower part of the carving



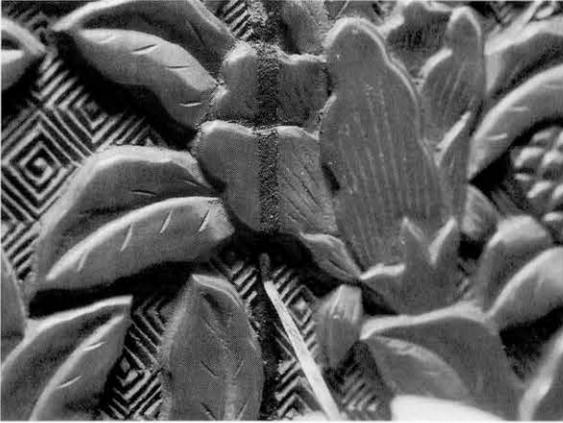
35 漆固め
Urushi-gatame



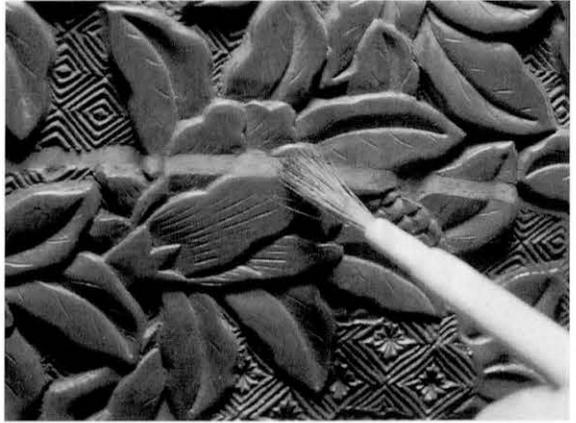
36 内部への刻苧
Impregnating *kokuso* inside



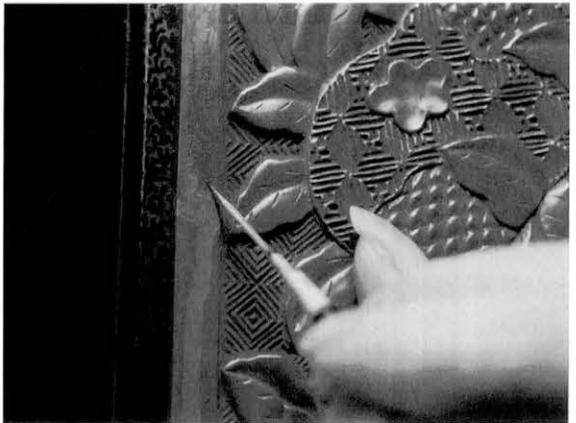
38 名倉砥石による表面処理
Grinding with Nagura whetstone



37 表面近くへの刻苧
Applying *kokuso* near the surface



39 毛棒による朱粉蒔き
Shunaki using a brush



40 朱粉の固め
Consolidating vermilion pigment

する原因になっている。このため、漆の含浸は修復の際には一般的に塗膜全面に行われる作業であるが、本資料の場合は彫りの部分の固めに特別な配慮が必要であった。それは、朱蒨の処理が蒨き放しのため、固めの際、朱の色に変色の危険があり、彫りの谷部分に浸透しないよう峰の部分に限定して固め作業を行わなければならないことであり、細心の注意を要する作業となった。(図35)

9. ほぼ一年にわたる加湿と芯張りによる木地の修正も最終段階となり、芯張りを取り外し、漆芸品にとって最適な環境である60%~65%の湿度まで徐々に戻すこととした。ところが、湿度を60%に戻すと、残念ながら木地は修正前の形状に戻ろうとし、段差も発生する状況であった。このため、修復後の保存環境を考えた場合、芯張りなどの圧力による修正は修復部分の亀裂につながりかねないことから、60%の環境で圧力をかけない状態で安定した地点で木地の接合を行い、刻苧の充填による安定が最も本資料に適した修復であると判断した。
10. 充填すべき亀裂の周辺を補強するため溶剤で薄めた麦漆を含浸した。
11. 麦漆に麻の繊維とエゾマツの木粉を混ぜ合わせた刻苧を作り、亀裂の発生した木地の中心部分から針を加工した鉄篋で充填した。中心部分が十分に乾燥した後、内側と外側の双方から充填するのであるが、刻苧は一度の充填で乾く厚みに限度があるため、1mm程度の厚みを限度に十数回に分けて充填することとなった。中心部分は接着力が求められるため麦漆の量を多めにし、長めの麻の繊維を多用した。また、塗膜表面に近くなるに従ってより細かな木粉を使用するなど、深さによって刻苧の成分を変えて充填を行った。(図36)
12. 充填による大まかな形状が完了した後、彫金用の鑪を用いて彫りの形状に合わせて形を整えた。地文など細かな部分の復元は避けたが、実や葉などは鑑賞の妨げとならないよう形状のつながりが判明する程度の復元を行った。(図37)
13. 亀裂部の表面を整えるため、麦漆を檜篋で篋付けした。
14. 表面を名倉砥石で空研ぎした後、蒨絵筆で透漆を塗った。
15. 再度表面を名倉砥石で空研ぎを行い表面の仕上げに備えた。(図38)
16. 背面の亀裂部周辺は、彫りの峰部分の朱塗と谷部分の朱蒨の二つの処理で仕上げられているが、充填部分は本来存在しない部分であることから、亀裂の修復部分全体を朱蒨の仕上げとすることとした。これは、朱蒨の方が塗に比べ彫りの形状が柔らかく見える上、色の主張が弱められることから、鑑賞の妨げとならないと判断した結果である。
17. 朱蒨には朱漆の顔料である硫化水銀を使用した。硫化水銀を原材料とする朱は赤みの強い方から本朱、赤口、黄口、淡口、の4種類である。今回はこれに弁柄と黒弁柄の6種の顔料を調合して、近似色の朱粉を製作した。

18. 名倉砥石で表面の歪みを整えた修復箇所、蒔絵筆を用いて透漆を薄く地塗り、毛棒を用いて朱粉を蒔き詰めた。形状が複雑なため地塗りに時間を要し、漆の乾きを考慮すると一度に蒔ける範囲はおおよそ10cmであった。また周辺の彫りに朱粉が散らないよう配慮する必要があり、相応の時間を要する作業であった。(図39)
19. 乾いた朱粉の表面に溶剤で薄めた透漆を染みこませ、再度朱粉を蒔き詰めた。
20. 朱蒔を終えた修復箇所の周辺に残留した朱粉を毛棒で払いのけ、溶剤で薄めた透漆を極薄く塗り込み、余分な漆を雁皮紙で吸い取り、朱粉の固めとした。この作業を数回繰り返すことで漆固有の色味である褐色が朱粉に浸透し、周辺との色相に違和感のない状態をつくりだすことができた。(図40)
21. 螺鈿欠損部の周辺塗膜は、塗膜が下地ごと剥離しているため、伏せ彩色に使用した和紙を汚さぬように注意しながら麦漆を亀裂に流し込み、木枠に納め、芯張りをたて接着した。剥離部と芯張り棒の間には安全かつ確実に接着できるように、樹脂板やビニールなど4層の材質を重ねた緩衝材を挟んで押さえ込んだ。(図41)
22. 右側面上部の螺鈿欠損部は、和紙を取り除いた後、彫刻刀で下地面を整えた。剥離保存した和紙を顕微鏡で観察すると比較的繊維が細く、短い傾向にあり、和紙の中でも厚手の雁皮紙に類似した和紙であると考えられた。螺鈿欠損部は現状維持の方針で修復する予定であったが、本欠損部の状態は、鑑賞上違和感が強く感じられることから、和紙のみを復元し貼り込むこととした。厚手の雁皮紙に膠で溶いた弁柄で着色した後、剥離部である桜花の形状に切り抜き、膠を用いて接着した。(図28)
23. 剥離し保存されていた桜花形の貝剥離部は、剥離面に和紙が残っているものの、隅の部分がせり上がり平面が崩れているため、現状では貝を貼ることが出来ないと判断されたため、隅の和紙の一部を削り落とすこととし、不足部分には刻苧を充填し、接着面を整えた。表面が剥離し和紙の地色が露出した部分は弁柄で着色し、鏝で周辺の塗膜の形状を整えた後、膠を貝の背面に付け、指で軽く押さえ込み接着した。(図42)
24. 保管されていたプレート状の飾金具を鍵金具に取り付けるにあたり、右扉の鍵金具を取り外した。また、金具の背面にある2本の突起部分の内、破損している上方にある突起部分をエポキシ樹脂で盛り上げ、本体に嵌るように復元した。この扉は本来であれば、鍵穴に差し込まれた鍵が扉のつまみを兼ねているのであるが、鍵が失われているため、この飾金具がその代用として扱われ破損したものと考えられた。今後も同様の使用が考えられることから、鍵金具への接着は強固なものとする必要があり、エポキシ樹脂で接着固定した。欠損した釘は4本あり、本体と同様赤銅の煮上げ色である黒色であったが、修復においては真鍮製の釘に漆下地を焼き付けることで黒色に色付けし、その代用とした。(図43)
25. 右扉の内蝶番の緩みは、本体側のネジ穴の破損が原因と考えられたので、いったん本体より右扉を取り外すこととした。蝶番の下を確認したところ、下方の蝶番下より黒色に着色された厚手の紙が現れた。これについては、金具を取り付ける際、過剰に彫り込み過ぎた部分を補う為に補填されたものと考えられた。木ネジの穴は木質が全て抜け落ち、大きな穴となっており、蝶番を固定することが出来

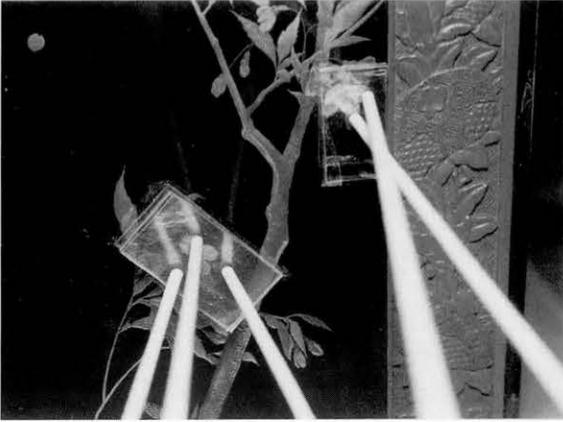
表1 草花蒔絵螺鈿鎌倉彫簞笥の蛍光X線分析結果
Results of X-ray Fluorescence Spectroscopy Analysis of "Soka Makie Raden Kamakurabori Cabinet"

No.	測定箇所 Places analyzed	蛍光X線強度 (cps) X-ray fluorescence intensity(cps)								金-銀-銅 濃度比* Gold-silver-copper Ratio of concentration*				
		金 Gold (Au-Lβ)	銀 Silver (Ag-Kα)	銅 Copper (Cu-Kα)	カルシウム Calcium (Ca-Kα)	鉄 Iron (Fe-Kα)	ヒ素 Arsenic (As-Kα)	水銀 Mercury (Hg-Lβ)	鉛 Lead (Pb-Lβ)	金 Gold (wt%)	銀 Silver (wt%)	銅 Copper (wt%)		
01	正面右扉 紅葉の葉 切金 <i>Kirikane</i> , maple leaf, front, right door	181.1	0.1	0.1		10.2						99.7	0.3	0.0
02	正面右扉 紅葉の葉 金色部 Gold, maple leaf, front, right door	220.4	0.1	1.3		12.0						99.5	0.4	0.1
03	正面右扉 紅葉の葉 金銀色部 Gold and silver, maple leaf, front, right door	153.4	3.8	2.1		21.0				2.6		85.4	14.4	0.3
04	正面右扉 紅葉の葉 赤色部 Red, maple leaf, front, right door	97.1	0.1	0.0		17.4		97.6	0.1			99.3	0.7	0.0
05	正面右扉 紅葉の葉 枝の交点 Intersection of branches, maple leaf, front, right door	17.3	0.1	0.1		76.0				4.8		97.1	2.8	0.1
06	正面左扉 麦の穂 Barley head, front, left door	45.0	0.1	0.1		68.6						98.6	1.4	0.0
07	背面中央上部 木彫朱塗部 Vermilion coating, carving, back face, upper center					88.6		140.2						
08	背面中央上部 木彫朱蒔部 <i>Shumaki</i> carving, back face, upper center					28.3		146.6						
09	正面左扉内側 富士山山肌 青色部 Blue, Mt. Fuji, inner side of the left door, front									159.3				
10	正面左扉内側 富士山稜線 白色部 White, Mt. Fuji, inner side of the left door, front									180.7				
11	正面左扉内側 空 白色部 White, sky, inner side of the left door, front					6.4				93.8				
12	正面左 唐戸面 鳥 黄色部 Yellow, bird, decorative edge, front left				3.6	8.3	172.3							
13	正面左 唐戸面 緑色地文 Green background design, decorative edge, front left				13.0	8.9	39.7	10.3						
14	正面扉金具 黒色地 Black, metal fitting, door, front	4.0		1665.1						0.1				
15	正面扉金具 金色部 Gold, metal fitting, door, front	25.7		1477.0										
16	上面 水仙の花 銀色部 Silver, narcissus flower, top face	0.1	18.1			13.2				5.2		0.1	99.2	0.7
17	上面 水仙の葉 金色部 Gold, narcissus flower, top face	126.4	2.5			21.7				1.3		87.6	11.9	0.5
18	上面 葉の先端 平目粉 <i>Hirame fun</i> , tip of narcissus leaf, top face	93.8	0.5			60.1				0.1		96.5	3.5	0.0
19	正面右扉内側 内枠端部 白色物質 White substance, edge of the frame inside, back of the right door, front					109.1		46.3	87.1					

* 金・銀・銅が均一に混合された板状資料と仮定したときの値であり、本資料における蒔絵粉の金純度を正確に示すものではない。
These results show the approximate values of gold content for extremely thin *makie* material because the values were calculated by using only thick sample containing gold, silver and copper homogeneously.

ない状態であった。

このため現状での取り付けは不可能であることから、補填した紙の厚み分を刻苧で充填するとともに、ネジ穴も刻苧を用いて適当な大きさの穴となるよう同時に充填した。刻苧の乾燥後、元の状態に組み付けることで扉の傾きや、常に開いてしまう状態を改善することが出来た。



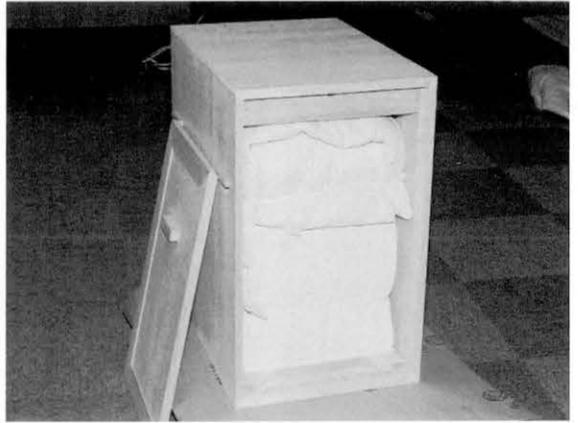
41 螺鈿欠損部への芯張り
Shimbari on the missing *raden* part



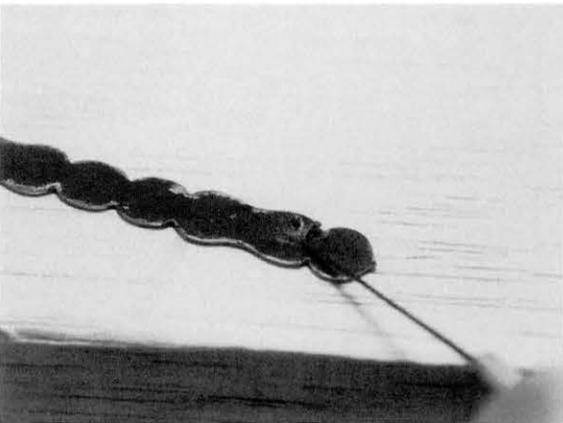
44 亀裂部への際錆
Applying *kiwasabi* on the cracks



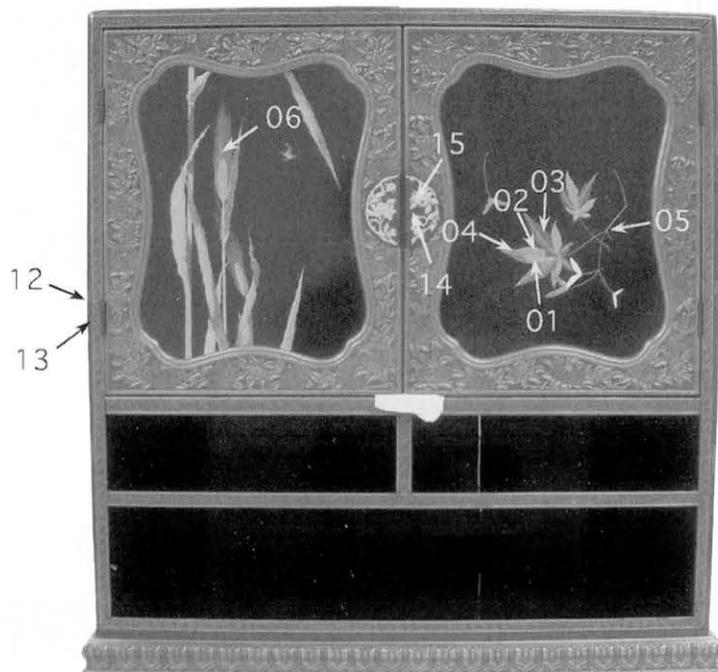
42 螺鈿欠損部の形状修正
Correcting the shape of the missing *raden* part



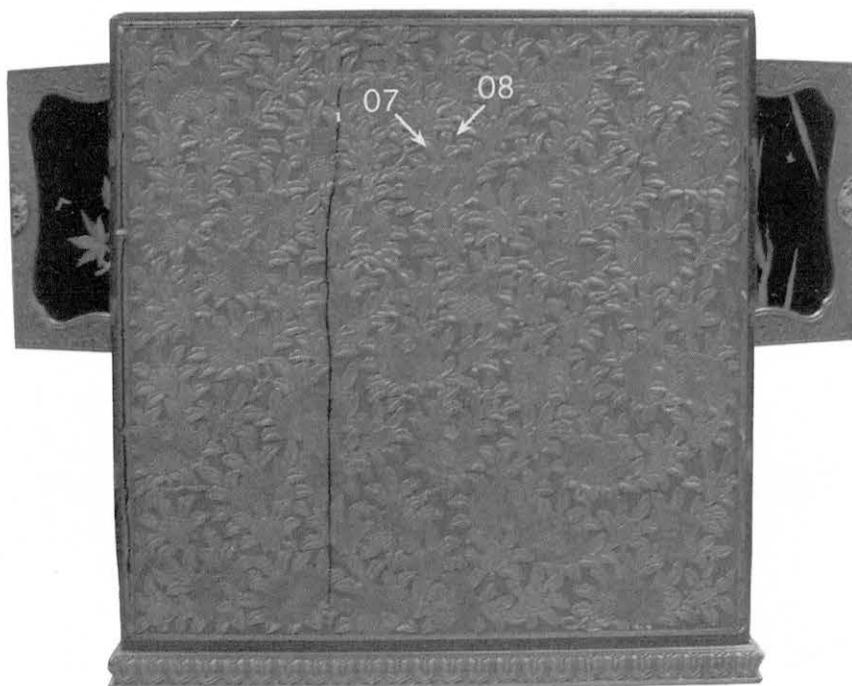
45 保存箱
Storage box



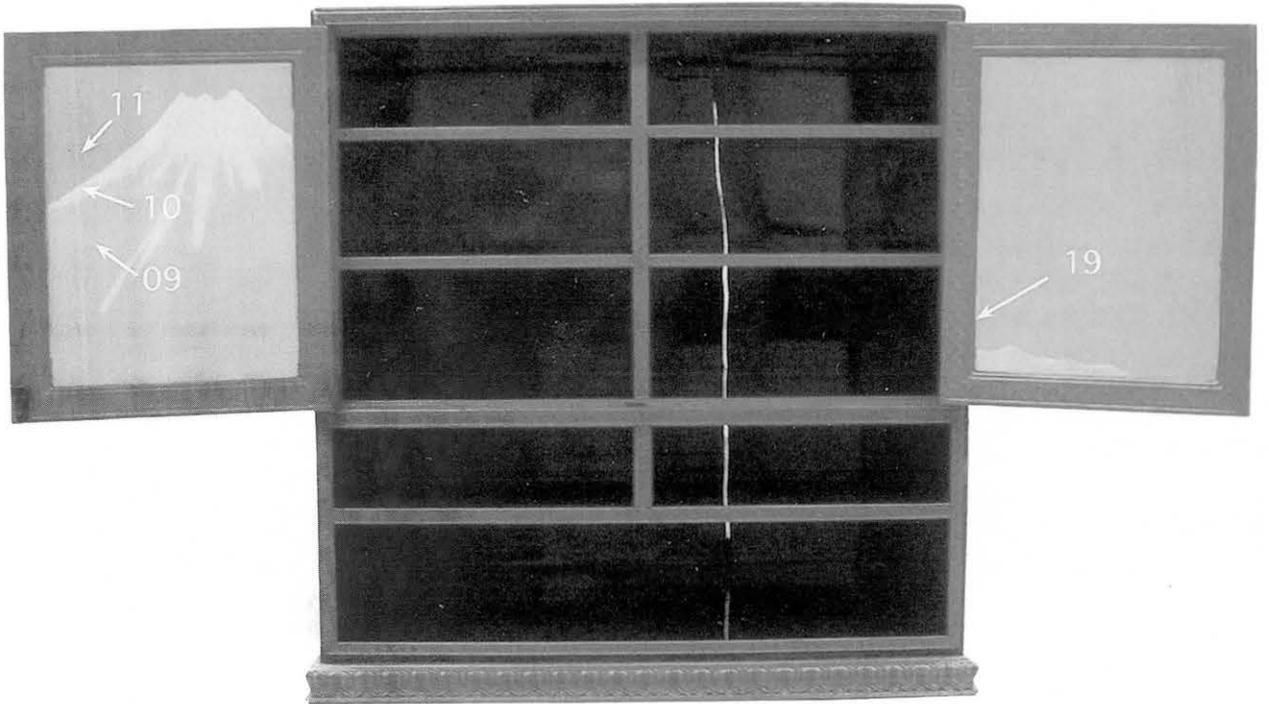
43 金具欠損部の復元
Reproducing the missing metal covering plate



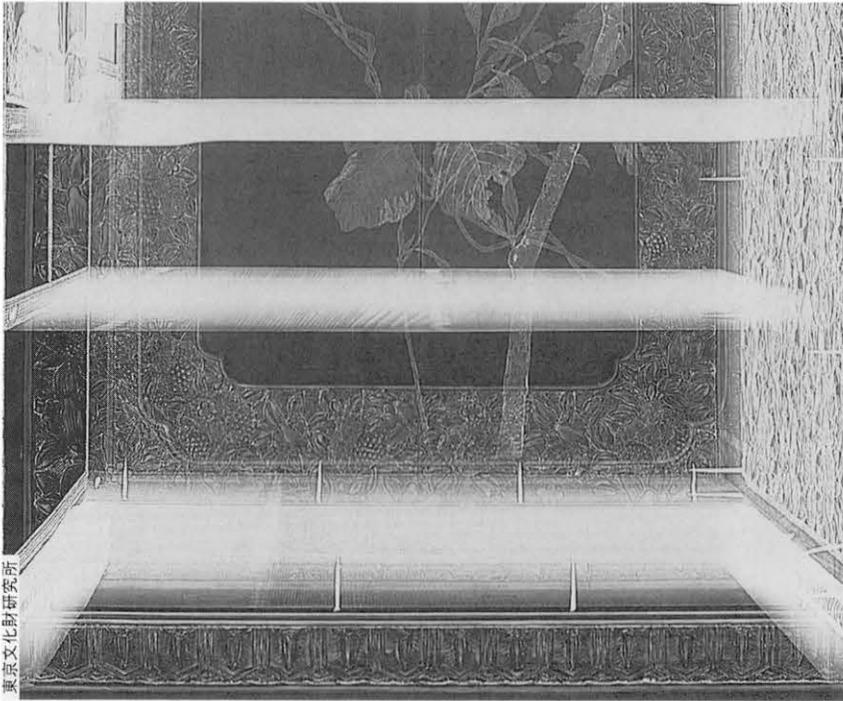
46 蛍光X線測定位置 1
X-ray fluorescence, measuring point 1



47 蛍光X線測定位置 2
X-ray fluorescence, measuring point 2



48 蛍光X線測定位置 3
X-ray fluorescence, measuring point 3



49 X線透過撮影 右側面より撮影
X-ray radiography, taken from the right

26. 最後に、朱蒔の際使用した顔料に麦漆を練り込んだ下地を作り、朱塗りの部分の細かな亀裂や木地の接合部分の隙間に小さな檜箆を用いて充填した。また、黒漆面や蒔絵部には、水練りした微細な砥粉に黒漆を混合した下地を塗膜の際や破損した蒔絵の際に同様に充填し、柔らかな紙で拭ききることで極微量の下地材を残留させ、塗膜剥離の再発防止とした。(図44)
27. 修復終了後、桐材で保存箱を製作した。気密性を高めるため開口部を側面とし、滑りの良い檜材を組み込んだ底板を使用し、重量のある本体を容易に納められるよう考慮した。また、多少の湿度変化に対応できるように内部に60%に調整した調湿材を2個組み込んだ。(図45)

材料及び構造の確認

修復の合間をみて、東京文化財研究所の協力の下、蛍光X線による蒔絵粉、金具、漆絵の金属分析とX線透過撮影による木地構造の確認をおこなった。

金属分析は、正面扉と天板の蒔絵粉、正面鍵金具、唐戸面と扉内部の漆絵の顔料、背面の朱の顔料、全19か所を選択し、測定を依頼した。

分析の結果は次の通りである(表1、46~48)

蒔絵部分であるNo.01~06のうち、03の灰色部分を除く粉及び切金は、ほぼ純金と判断された。03の灰色部分は、およそ20金の青金を使用していることから、現状での色調は銀の成分が酸化したものであり、本来はより黄色みが強調された色調であったと考えられる。左右の側板の蒔絵に見られる同様の色調部分も、同じ組成と判断される。

天板の蒔絵データの16~18の内、金色部分は正面蒔絵とほぼ類似した金粉が使用されているが、16の水仙の花や葉の付け根に見られる灰色は銀粉であることが解った。銀の酸化は早いいため、海路でアメリカに着いたときにはすでに銀色は失せていたと思われる。

背面の朱のデータである07、08を比較すると水銀以外に朱塗りの部分の方が朱蒔のみの部分より鉄分が遙かに大きく含まれていることが解る。これは朱塗り以前に施された下地材に含まれる鉄分と考えられる。

12、13は唐戸面に施された漆絵であるが、鳥を描いた黄色の顔料からは多量の砒素が含まれていることから、硫化砒素、いわゆる石黄(雌黄)を使用したものと考えられる。地文を描いた緑色からも砒素が現れており、石黄に何らかの顔料を混ぜあわせたものか、青系統の染料で石黄を染めたものと考えられる。なお、Caは明度を上げるために使用した胡粉と推測される。

09~11の扉内部の漆絵からは強い鉛の反応が検出されている。この画面の色調は白をベースに薄緑や青色が僅かに混合されているものと考えられるのであるが、この色調を漆で表現する場合、大きな問題が存在する。通常漆は鉛系顔料と混合した際、発色せず黒色化する傾向にある。また、漆特有の褐色が顔料の間に残り容易に色がでないのである。130年の歳月が漆に透明度を与えたのか、もしくは漆以外の塗料が混合ないし、単独で使われた可能性もあるのか、判断に迷うところである。後日、白色顔料の1つである鉛白を分析したところ、本作の漆絵の顔料に近い組成であることが判明した。今後、明治期の同種の技法を元に制作された作品群を調査分析することで技法の解明に繋げたいところである。

19の白色顔料は、漆絵と外枠との隙間に充填されているものである。鉛の反応が強いため、鉛白の使用が考えられる。水銀の反応が現れているが、対象の面積が狭いため、隣接する朱の水銀の影響と推測される。

X線透過撮影は、正面、左右側面、上面、背面右角、正面左角の6か所より撮影を行った(図49)。そ

の結果判明したことは次の通りである。

木地はそれぞれ2枚から4枚の柾目の良材を接ぎ合わせて1枚の板としている。杳目や柔らかな木質を見る限り、家具、彫刻の適材である桂材を使用したものと考えられる。

布着せは施されていない。

天板と側板は1枚の板に彫りと塗及び蒔絵が施されているが、正面扉及び各抽斗の蒔絵面は別材に仕上げられ、彫りを施したフレームに嵌め込まれる形式で組み立てられている。

本体は各角面に長い釘が見られることから内部の棚板を柄穴で組み、蒔絵まで仕上げられた天板、両側板、底板の四面を鍛造製の釘を打ち付けることで組み立て、その後、背面板を同様に釘で打ち付け、最後に台輪を麦漆などで接着したものと判断することが出来る。

使用された釘は、長さ3cm、根本部分の太さは3mm程度と考えられる。本数は天板側より4本、両側板14本、底板8本、背面板24本、総数50本の釘が使用されている。この箆筒は蒔絵や彫りの技術の見事さに眼を奪われがちであるが、表に見えない部分で、長さ3cmの釘を仕上げ面を傷めることなく打ち込み、組み上げるこの技もまた、現在では失われた驚異的な技術として評価されるのではなかろうか。

おわりに

明治期の万国博覧会を通じて多くの漆器や家具がアメリカ、ヨーロッパの国々に輸出された。本資料に類似する蒔絵家具もまた、相当量輸出されたものと考えられる。保存のよい美術館から帰ったこの箆筒の状態を見れば、多くの漆器類がどのような状態に置かれているか想像することは難しくない。修復を終え、改めてこの箆筒を見るとき、明治初期、幕藩体制の崩壊とともに職を失った蒔絵師や塗師が再生を懸け、渾身の想いで作ったことであろうこの作品には、蒔絵師たちの声と江戸蒔絵の本流が流れていることを強く感じた。今回の修復を通じて得られた情報が、今後これら蒔絵家具類の修復の一助となれば幸いである。

謝辞

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ここに記して、皆様にお礼申し上げます。

On the Restoration of "*Soka Makie Raden Kamakurabori Cabinet*"
in the Collection of the Philadelphia Museum of Art

KATSUMATA Satoshi
Urushi Conservator

Name of the object: "*Soka Makie Raden Kamakurabori Cabinet*"

Owner: Philadelphia Museum of Art

Inventory number: 1916237

Measurements: 32.2cm x 48.6cm x 51.6cm

Introduction

"*Soka Makie Raden Kamakurabori Cabinet*" (hereafter referred to as the Cabinet) in the collection of the Philadelphia Museum of Art was restored as part of The Cooperative Program for the Conservation of Japanese Art Objects Overseas at Restoration Studio No. 1 of the National Research Institute for Cultural Properties, Tokyo from June 2001 to March 2003, a duration of 22 months. This is a report on the actual work of restoration and on information obtained through it.

History of the Cabinet

The Cabinet being discussed is a small wooden carved cabinet coated with urushi and decorated with *makie* and *raden*. It has a door that opens to the right and left. The entire surface is carved and coated with vermilion urushi. There are window frames on all the faces except the one at the back, and designs of plants and flowers of the four seasons are applied in *makie* in these windows. The Cabinet was exhibited at the World Exposition held in Philadelphia in 1876, said to be the then largest city in the United States, to celebrate the centennial of the independence of America. The Philadelphia Museum of Art, its owner, has a large collection of objects exhibited at the Exposition, and the Cabinet was also purchased by the Museum on that occasion.

At that time, the Meiji Government considered the Exposition as a good opportunity to export works of fine art and crafts, and began a nationwide movement to promote such projects. The Cabinet exhibits designs that were intended to respond to the Western people's taste for the oriental. It is a very valuable *makie* cabinet of the early Meiji period that shows characteristics of craftwork made specifically for export. It is also valuable as an object whose time of manufacture can be determined. (Photos 1, 2)

Description

Structurally, the Cabinet consists of a bottom board, side boards, top board, back board and a base. After finishing both sides of these boards, they were assembled and nailed with forged nails. Foundation and urushi coating were applied on the edges of the joints so as to conceal the nail heads. Then the edges were decorated with simplified motifs of birds in green and yellow urushi and polished.

Each of the door boards is attached to the body of the Cabinet by two hinges on the inside, and there is a metal lock and key at the center front with a design of a finely line carved (*kebori*) peony. The metal is black, the color of heated copper containing a small amount of gold. The *kebori* and areas surrounding the lock and key are finished with gold gilding. There are one large drawer and two small drawers below the door. Inside the door are six small drawers of various sizes. The metal knobs are of the same finish as the lock and key. (Photo 15)

The entire surface of the back board and the window frames on the other four sides (the front, two sides and the top) are intricately carved with a motif of pomegranates against a background of inlaid concentric squares. The outer skin of the pomegranates is also expressively decorated with patterns of various types. (Photo 2)

Two different types of surface finish can be found on the carvings: the higher part of the carvings is coated with glossy vermilion urushi while the lower part is sprinkled with vermilion pigment using a technique called *shumaki*. In this technique, urushi is first applied thinly over the carvings; then vermilion pigment is sprinkled, as in *makie*, before the urushi hardens. In the case of the Cabinet, vermilion urushi was applied several times to the higher part and then polished. Then raw urushi was rubbed into the entire surface after which it was wiped off from the higher part. Then vermilion pigment was sprinkled so that they would remain only on the lower part. Finally the entire surface was polished. This is a coating technique used in *Kamakurabori* to highlight the lines of carvings by creating shades on the vermilion.

The inside of each window frame is decorated elaborately with *makie* and *raden* on a black *roiro* finish. The design on the left door is that of barley head done in thin *takamakie* with a lark in the background in what appears to be an inlay using the horn of an animal. The design on the right door is that of Japanese maple leaves and propeller-shaped seed pods in *kawarinuri* technique and mother-of-pearl inlay. The design of chrysanthemum and Japanese ivy on the drawer below the door, *nadeshiko* flower on the small drawer to the left and nuts and pine needles on the small drawer to the right are expressed with inlays of mother-of-pearl, using both white and yellowish parts of the shell, as well as with thin *takamakie*. The design on the top face seems to be that of a winter scene, a similar technique having been used to depict a single narcissus flower, fallen leaves and nuts. On the left face of the Cabinet is a design of arrowroot leaves in gold and silver thin *takamakie* and flowers of inlaid mother-of-pearl; in the background is an inlay of a dragonfly made by using material of the same quality as that used for the lark on the front. *Makie* technique similar to the one on the left face is used to express the branch of a *hazakura* cherry tree on the right face. Lightly-colored Japanese paper was attached to the back of the mother-of-pearl shell pieces used for these designs in order to create the very light pink color of the carving and to emphasize its delicateness. In these ways, the seasons are poetically expressed with plants and flowers, birds and insects. Picturesque *makie* like these that make the most of the spaces provided is a form of expression also found in the late Edo period, and the *makie* technique used on this Cabinet may be said to have inherited that tradition. Considering that the Cabinet was made before Meiji 9 (1876) and that the *makie* artists themselves had lived during the Edo period, it is quite understandable that the characteristics of Edo *makie* are observed strongly in the techniques and designs. (Photos 4, 16–19)

On the other hand, expression representative of a new age can be found on the inner side of the door. On the inner side of the door and on the front board of the six small drawers is a design of snow-capped Mt. Fuji depicted in such a way that the strokes of the brush can be seen. The color tone is also different, with light blue being used rather than the black of *makie*. Since traces of the surface coating having been ground and glossy finish can be observed on the blue portion, urushi coating technique is considered to have been used. It is also possible to see, however, some influence of oil painting that had begun to be introduced around this time. (Photo 3)

There are two inventories of objects exhibited at the World Exposition, one in the Tokyo National Museum and the other in the National Archives of Japan, and a list of objects that were awarded prizes in the Tokyo National Museum today. Since the number of objects exhibited was so large and since the entries are quite simplified, it is not possible to find an entry that can be determined to be that of the Cabinet. However, the inventory of exhibited objects in the collection of the Tokyo National Museum contains names of *makie* artists like Iwasaki Minohei (Kogyoku), Ikeda Taishin and Ogawa Shomin who actively manufactured many outstanding works, along with a list of an enormous number of urushi objects and *makie* furniture like partitions and small cabinets, suggesting some relation with the Cabinet being discussed in this report.

Condition before restoration

Damage to the Cabinet was caused by the shrinking of the wooden substrate due to exposure to a dry condition. There were critical cracks on the joints and wooden carvings, the largest one being found on the urushi-coated carving on the back face. This crack extended vertically for 41.5cm from a point approximately 16cm from the left edge of the back face; the maximum width of the crack was 3mm. The portion of the board to the right of the crack had swelled approximately 1.5mm, causing the crack to appear painfully larger than it really was since it appeared to have widened not just to the right and left but also forward and back. A piece of board each 2.5cm wide is placed at the top and bottom of the back board, with the grain running perpendicular to that of the back board, in order to prevent the substrate from warping. So there were also cracks that ran horizontally on the portion where this reinforcement board called *hashibami* and the back board meet, 15cm at the top and 8cm at the bottom. There were also many missing parts around the cracks on the carvings, possibly caused by the soft nature of the wood. (Photos 7, 8, 20, 21)

The back board is inserted into a frame-like structure composed of the four remaining boards and joined with nails. The nails and the joining edges are covered with foundation and coated with vermilion urushi to hide the nail heads. For this reason, large cracks were found on three sides of the back board (top, left and right). There was also a long crack between the back board and the base. The crack to the left, as seen from the back face, was especially large, its maximum width being approximately 3mm. This crack caused the side board to swell outward near the center. (Photos 22, 23)

There were cracks on the substrate of the right and left side boards as well. There were large cracks on the part where both side boards join the base. The one on the left board extended vertically almost to the center at a width of about 1mm severing the *makie* a little below the center. A close look

at the black coated surface on which the *makie* had been applied revealed a trace of a joining, suggesting that this is a joint. On the right board, the crack ran vertically on the carving close to the back face. There was a difference of about 1mm in the length of the base and that of the side boards, indicating that the side boards had shrunk greatly. (Photos 24, 25)

Raden shell pieces inlaid on the left, right and top faces after the completion of *makie* were missing. There is an arrowroot flower depicted with four pieces of thick mother-of-pearl inlay in the middle of the left face, but the largest piece at the tip was missing and a piece of Japanese paper dyed pink could be seen. On the right face, two cherry blossoms were missing, one on the upper left portion and the other at the center. Parts of the *makie* around the shells on the left upper portion were also missing. There was also Japanese paper, which had probably once fallen but was reattached with some kind of synthetic adhesive, but it had discolored severely and was dirty. The shell piece from the right center was found stuck and preserved in the back of a drawer, but it was extremely dirty and had cracked at the middle so that it had to be removed carefully. The remaining shell pieces had also become partially lifted and were in danger of falling. Inlays of the narcissus flower and fallen leaves on the top face were partly missing. Because the part from where the inlays had fallen was grayish, it was thought at the beginning that metal inlays had been applied. However, observation revealed Japanese paper under the grime, proving that shell pieces had been inlaid just as on the sides. The gray color was actually the color of grime that had accumulated. On the whole, *makie* had not been lost but, as with the *urushi* coating, it was quite dirty and there was much corrosion so that careful cleaning was necessary. (Photos 26-28)

Abrasions and fingerprints could be found on the black *urushi*-coated surface of all the faces where *makie* had been applied. The *urushi* coating of the top board, in particular, was covered thickly with a milky film and had lost its gloss. The *urushi* coating on the inside of the drawers was also covered thinly with grime. (Photos 29, 30)

There were fingerprints and droplet-like stains on the *urushie* inside the door.

Black deposits were found on the carvings on all the faces of the Cabinet. The carvings on the top board were especially so dirty as to make it difficult to confirm the shape of the lower part of the carvings. On the higher part of the carvings on the back face, there were traces of gray coating-material-like substance which is thought to have been left when the Cabinet came in contact with another coated object with great impact. (Photos 5, 6)

The underside of the bottom board was severely damaged so that the substrate could be seen at places. This was probably due to friction that occurred every time the Cabinet was moved.

As for the lock and key on the front of the Cabinet, the metal covering plate on the left edge of the right half of the lock and key had fallen, but it had been preserved. There were supposed to be two projections on the back of the plate that would have been used to hold it in place, but one of them had been broken. In addition, the hinge on the right door was not attached properly so that the door was unstable and would tilt slightly to the left when closed. Moreover, because the key was missing the door could not be locked; it would open all the time. Two nails were missing from the lock and key on the right door. Iron nails had been used at a later repair to replace the missing two lower nails of the four nails used to attach the stopper at the bottom on the back side of the left door.

Restoration policy

Restoration was to be conducted in accordance with the principle of maintenance of the present condition that is applied in Japan to the restoration of nationally designated cultural properties. Detailed specifications were discussed with Kato Hiroshi, Head of the Technical Standard Section, Department of Restoration Techniques, National Research Institute for Cultural Properties, Tokyo and Sally Malenka of the Philadelphia Museum of Art. Major points for restoration and the basic concept are as follows.

1. Traditional techniques and materials for the restoration of urushi objects would be used. Priority would be given to the maintenance of the present condition so as not to destroy the characteristic of the Cabinet. Efforts would be made to conduct the most appropriate restoration.
2. Although it would be very difficult to rejoin the cracked parts completely since they had been caused by the shrinking of the wooden substrate due to exposure to a dry condition for a long time, they would be repaired to a minimum width by adjusting the conservation environment and correcting the shape of the substrate as much as possible.
3. Grime on the coating film and carvings would be removed as much as possible, paying attention to the overall balance.
4. Reproduction of the missing *raden* pieces was discussed comprehensively but was not conducted because it was not possible to imagine the condition of the carved reliefs on the surface of the shell pieces and because the damage on the urushi coating around them was very severe.

This was the basic concept, and any problem that would arise in the process of restoration was to be discussed by persons concerned.

Restoration process

1. Since there was a checklist made by the Philadelphia Museum of Art concerning the details of cracks, abrasion and missing shell pieces and parts, the condition of the Cabinet was checked according to this checklist. In addition, a separate list of a similar form was made to doubly confirm the condition before restoration.
2. Photographs were taken of the condition before restoration.
3. Those pieces of urushi coating and substrate found around the cracks that were in danger of falling were faced with narrow rectangular pieces of *gampi* paper using wheat starch paste so as to prevent them from becoming lost during restoration.
4. In order to readjust the shape of the back board as much as possible, it was decided to store the Cabinet for a certain length of time in a humidifying chamber set at high humidity. The humidity of the chamber was gradually raised, observing the condition of the cracks and checking the movement of wood. For the first three months, humidity was kept at 70 to 75%, but almost no movement could be confirmed. Then humidity was raised to 80 to 85%, and the Cabinet was placed in a wooden frame and pressure was applied to the back board by using *shimbari* sticks. By doing this, the wood began to move in two weeks. The 3mm crack found on the back face narrowed to 2mm and the difference in level was also reduced, although only a little. However, no change was

- seen on the cracks between the back board and the side boards. (Photo 31)
5. While humidity was being applied to the Cabinet, grime that had accumulated on the urushi coating and the carvings was cleaned. There was a thin film remaining on the black urushi coating, suggesting that some kind of coating, like shellac, had been applied. So UV fluorescence photography was taken before cleaning to identify the substance. As a result it was found that there was no trace of coating having been applied on the urushi surface. Instead, it was thought to have been a remnant of wax or some kind of material that had been applied thinly to give gloss. Grime on the black urushi, *makie* and *raden* was carefully removed by using a bamboo spatula wrapped with a cotton cloth that had been moistened with pure water and firmly wrung dry. Care was taken to make sure that moisture would not remain on the urushi coating. For grime that could not be removed with water, solvents were tested in order to select one that would be safe. Test results showed that ethanol was the best, so cotton swab immersed in ethanol was used. By gradually removing the grime in these ways, it was possible to bring back an appropriate amount of gloss to the surface. (Photo 32)
 6. Grime around the carvings of vermilion urushi was cleaned by first removing the dust that had accumulated in the lower part of the carvings with a hard brush. However, this was not enough to remove the grime that had accumulated, so a thin, soft piece of paper was placed on the carvings and a slightly moistened brush was used to tap on the lower part of the carvings in order to loosen the stubborn grime. By thus using paper as a blotter it was possible to remove the grime little by little. Because it was not possible to remove the grime with water or solvent from parts where gray coating material had been found, a blunt carving knife was used to scrape the urushi coating little by little. (Photos 33, 34)
 7. Parts on the top board where the *raden* had fallen had become gray and were most dirty. Since remnants of Japanese paper that had been used in the process of fixing the *raden* were confirmed, water was not used. Instead, cleaning was done with a brush and ethanol. Parts on the upper portion of the right face where *raden* pieces for the cherry blossoms were missing had lost softness unique to Japanese paper due to the discoloring and hardening of the material used for adhesion. At first, work was done to remove only the adhesive with a solvent. However, it was decided to remove everything because the Japanese paper had deteriorated into a powdery state.
 8. After cleaning, the urushi coating was reinforced by applying very thin raw urushi. With the passage of time microcracks will appear on the surface of urushi, and light deflected by these microcracks will cause the gloss to be reduced. It is also these microcracks that will cause fingerprints and oiliness of the hand to remain on the urushi coating. Thus, although in restoration raw urushi is applied over the entire surface, in the case of this Cabinet special care had to be taken for the carvings. Because raw urushi had not been applied over the *shumaki*, there was danger of the vermilion color becoming darker during this reinforcement process. Care had to be taken so as to reinforce only the higher part of the carvings and not to allow raw urushi to seep into the lower part. (Photo 35)
 9. After about a year of adjusting the shape of the substrate by humidification and *shimbari* method, *shimbari* sticks were removed and humidity was gradually returned to approximately 60 to 65%

Rh, the most appropriate environment for urushi objects. When humidity was further returned to about 60%, the substrate tended to return to the previous condition and the difference in level appeared. However, when the environment in which the Cabinet would be placed after restoration was considered, there was a risk that adjustment by means of applying pressure any longer with *shimbari* sticks may cause cracking on the restored portion. For this reason, it was decided that the most appropriate way to restore the Cabinet would be to join the substrate in an environment of 60% Rh and in such a way that it would not be subject to pressure. This would then be followed by filling the cracks with *kokuso* for stabilization.

10. *Mugi urushi* diluted with a solvent was impregnated in order to reinforce areas around the cracks that would then be filled with *kokuso*.
11. *Kokuso* was made by adding hemp fibers and sawdust of spruce wood to *mugi urushi*. This was filled into the largest crack on the back board with an iron spatula made by processing a needle. After the urushi in the mid-portion of the crack had hardened sufficiently, *kokuso* was filled again from both sides of the board. However, since there is a limit to the thickness of *kokuso* that would dry at one application, *kokuso* was applied repeatedly ten or so times at a thickness of about 1mm each time. Because adhesion is required around the middle, more *mugi urushi* and a great amount of longer hemp fibers were used. In addition, finer sawdust was used for *kokuso* filled in areas closer to the urushi coating surface. In this way, the components of *kokuso* were adjusted according to the depth to be filled. (Photo 36)
12. After the shape was roughly restored by using *kokuso*, the shape of the carved parts was adjusted with a file normally used for metal carvings. Reproduction of finer portions like the ground design was avoided, but the nuts and leaves were reproduced to a certain degree, making sure that the overall appearance would not be impaired. (Photo 37)
13. In order to adjust the surface of the cracked portions, *mugi urushi* was applied with a spatula made of cypress.
14. The surface was dry ground with a Nagura whetstone and coated with translucent urushi using a *makie* brush.
15. The surface was once again dry ground with Nagura whetstone for a finish touch. (Photo 38)
16. Originally, the areas around the cracks on the back face were finished with a coating of vermilion urushi on the higher part of the carvings and *shumaki* on the lower part. But since parts filled with *kokuso* were parts that did not originally exist, it was decided to apply *shumaki* there. The reason for this measure was that when compared to using coating, this would not impair the overall appearance since the form and color of the carvings would be less conspicuous.
17. Mercury sulfide, which is a pigment for vermilion urushi, was used for *shumaki*. There are four kinds of vermilion that have mercury sulfide as its material: *honshu*, *akakuchi*, *kiguchi* and *awakuchi*, in order of dark to light vermilion. In this restoration, *bengara* and black *bengara* were used as well. These six kinds of pigments were mixed to make vermilion pigment similar to the original one.
18. The part where the warped surface had been leveled with Nagura whetstone was first thinly coated with translucent urushi by using a *makie* brush. Then vermilion pigment was sprinkled with

a brush. Because the shape was complex, much time was required to do the ground coating. Considering the time it would take for the urushi to harden, an area of only about 10cm could be sprinkled with vermilion pigment at a time. Moreover, since care had to be taken to make sure that vermilion pigment would not spill on the surrounding carvings, this was a relatively time-consuming work. (Photo 39)

19. Translucent urushi diluted with a solvent was applied over the surface of dried vermilion pigment. Then vermilion pigment was sprinkled again.
20. Excess vermilion pigment was first dusted off with a brush from areas around the restored *shumaki* portion. Then translucent urushi diluted with a solvent was applied thinly to consolidate the vermilion pigment. Excess urushi was blotted with *gampi* paper. By repeating this step several times, the translucent brownish color characteristic of urushi penetrated into the vermilion pigment, making it possible to create a tone of color that blends in with the surroundings. (Photo 40)
21. The urushi coating around the missing *raden* pieces had become lifted together with the foundation. So *mugi urushi* was impregnated into the cracks, taking care not to stain the Japanese paper that had been used to apply color to the back of the shell pieces. The urushi coating was then press-stabilized by using *shimbari* sticks. Four kinds of plastic sheets were placed between the lifted portion and the *shimbari* sticks as buffering material so that the urushi coating might adhere safely and firmly. (Photo 41)
22. After removing Japanese paper from parts on the upper right face where *raden* pieces were missing, the surface of the foundation was leveled with a carving knife. Observation under a microscope of the Japanese paper that had become detached showed that the fibers were comparatively fine and short. So it is thought that Japanese paper similar to thicker *gampi* paper was used. At the start of the restoration work it was decided that maintenance of the present condition would be followed for the missing *raden* part. However, this was changed since it was feared that the appearance might be greatly impaired. Thus Japanese paper alone was reproduced. Thick *gampi* paper was colored with *bengara* that had been dissolved with animal glue, cut into the shape of cherry blossoms (the parts that had become lifted) and adhered with animal glue. (Photo 28)
23. Japanese paper was remaining on parts of the cherry blossom from where shell pieces had fallen. However, the edges of the paper had become lifted and were no longer flat so that it was not possible to refix the shell pieces. So the lifted edges of Japanese paper were cut off and the gap was filled with *kokuso* to level the surface. Other parts where the surface of the paper had lost its color due to the loss of its upper layer were colored with *bengara*. After adjusting the shape of the surrounding urushi coating with a file, the shell pieces, on whose back side animal glue was applied, were adhered by pressing lightly with a finger. (Photo 42)
24. In order to return the metal covering plate to its original position, the metal fitting of the lock and key was first removed. Of the two projections on the back of the metal covering plate that were used to hold the plate in place, the upper one that had broken was reproduced by using epoxy resin. Normally, the key placed in the keyhole would also serve as the knob of a door. But because the key was missing, it is thought that the covering plate had been used as a substitute and that this

is the reason for the damage. Since it was thought that the door would be shut and opened in a similar way after restoration, it became necessary to adhere the lock and key firmly. So epoxy resin was also used here. There were four missing nails of the same black heated-copper color as that of the body. But in restoring them, brass nails were used. These nails were coated with urushi foundation before being heated to produce black-colored nails. (Photo 43)

25. It was thought that the looseness of the hinges on the inner side of the right door was caused by the damaged screw holes on the body. So the right door was temporarily removed from the body. When the hinges were checked, a thick black piece of paper was found under the lower hinge. This is thought to have been used to cover a part that had been carved too much. Because the tracks made by the threads of the screw were missing and there was a big hole, it was impossible to hold the hinge in place.

Because it would have been impossible to put the hinge back in place, *kokuso* was used to replace the piece of paper that had been used to adjust the height of the hinge and the size of the hole. The hinge was replaced after *kokuso* had hardened and it became possible to improve the tilting of the door and to keep the door closed.

26. Finally, foundation material was made by kneading *mugi urushi* and the pigment that had been used for *shumaki*. This was used to fill fine cracks on the vermilion-coated surface and gaps between the joints of the substrate. A small spatula made of cypress was used. For the black urushi surface and the *makie* parts, foundation material made of fine *tonoko* powder kneaded with water and mixed with black urushi was used. This foundation material was applied to the edges of the urushi coating and of damaged *makie*. Then it was wiped off with a piece of soft paper. By doing so, it was possible to apply a very small amount of foundation material and thus to prevent the urushi coating from becoming lifted again. (Photo 44)
27. After restoration was completed, a storage box was made of paulownia. To allow for greater air tightness, the opening was made on the side. On both long ends of the bottom board of the box, rail-like pieces of oak were attached. Similarly, rail-like pieces were attached to the long sides of a board on which the Cabinet would be placed. In this way the board could be made to slide in and out of the box, thus making it possible to place the heavy Cabinet into the box easily. In addition, two humidity-controlling agents adjusted at 60% Rh were placed inside in order to respond to slight changes in humidity. (Photo 45)

Identification of the materials and structure

Analysis by X-ray fluorescence of the metal components of *makie* powder, metal fittings and pigments used for *urushie* and analysis by X-ray radiography of the structure of the substrate were conducted during restoration with the cooperation of the National Research Institute for Cultural Properties, Tokyo.

Analysis of the metal components were conducted for the *makie* powder on the front door and the top board, the metal of the lock and key in the front, pigments used on the *urushie* on the decorative edge and on the inner side of the door and the front of the drawers, and the vermilion pigment on the back face, a total of 19 places.

The results of analysis are as follows (Table 1, Photos 46-48).

Of the *makie* parts No. 01 - 06, gold powder and *kirikane* used on all the parts other than the gray portion of No. 03 were identified to be pure gold. Since 20 carat gold was used for the gray portion of No. 03, the tone as it is seen now is the result of oxidation of silver. It is thought that originally this part was more yellowish. Parts of the *makie* on the left and right side boards that are similar in color are also believed to have similar components.

For the *makie* on the top board, samples No. 16 - 18, gold powder similar to that found on the *makie* of the door was used. However, the gray seen on the narcissus flower and the root of the leaves (No. 16) was found to be silver powder. Because silver oxidizes quickly, it is thought that by the time the Cabinet arrived in the United States by ship this portion had already lost its silver color.

When the vermilion on the back face, samples No. 07 and 08 were compared, it was found that besides mercury there is much more iron in the vermilion-coated portion than in the *shumaki* portion. This is thought to be the iron contained in the foundation material that was applied before coating vermilion.

Samples No. 12 and 13 are *urushie* on the decorative edge. Since there was much arsenic in the yellow pigment used to depict the bird, it seems that arsenic sulfide, or what is called "orpiment," was used. Arsenic was also detected from the green used to depict the ground design. It seems that some kind of pigment was added to arsenic sulfide. Calcium was also detected; it is a component of *gofun* (calcium carbonate) probably used to increase brightness.

Lead was detected from the *urushie* on the inside of the door, samples No. 09 - 11. The overall tone of this area is white with a small amount of light green and blue. There is a problem when one tries to express such a tone with urushi. Normally, when lead-based pigment is mixed into urushi, it detracts from the true color of urushi, making urushi more blackish. Moreover, the brownish color characteristic of urushi will remain in the pigment, making it difficult to bring out the color well. Could the 130 years have brought translucency to urushi or could some coating material other than urushi have been used by itself or mixed into urushi? When lead white, a white pigment, was analyzed at a later date, it was found to be similar in composition with the pigment used for the *urushie*. It is hoped that analysis of other objects manufactured during the Meiji period using similar techniques may reveal more about the techniques employed.

The white pigment of sample No. 19 is from the material used to fill the gap between the *urushie* and the outer frame. It is thought to be lead white because lead was clearly detected. Mercury was also detected, but since the area is quite small this is thought to be the influence of mercury from adjacent vermilion.

X-ray radiography was taken from six points: front, left and right sides, top, right corner of the back face and left corner of the front. (Photo 49)

The substrate consists of two to four pieces of straight-grained wood joined together as one board. From the grain and the quality of the wood, it is thought to be wood of a *katsura* tree, which is considered good material for furniture and sculptures.

Nunokise was not applied.

For the top board and each side board, carvings, coating and *makie* are applied on a single board. However, the *makie* on the front door and on the drawers are applied on separate boards that are fitted into carved frames.

Since there are long nails on each corner of the Cabinet, it is believed that the top board, both side boards and the bottom board were nailed with forged nails while the shelf boards were assembled with mortise joint. Then the back board was nailed. Finally the base was adhered in place with *mugi urushi*.

The nails are 3cm long and approximately 3mm square at the root. A total of 50 nails were used: 4 from the top board, 14 from each side board, 8 from the bottom board, 24 from the back board. The *makie* and carvings are both very skillfully executed, but the skill of assembling an object by using nails 3cm long without damaging the finished surface is an extraordinary skill that has been lost today.

Conclusion

A great number of urushi ware and furniture was exported to the United States and Europe on the occasion of World Expositions of the Meiji period. Many pieces of *makie* furniture similar to the Cabinet are thought to have been exported as well. Considering the condition of the Cabinet, which was stored at a museum whose storage environment is good, it is not difficult to imagine the condition in which many urushi objects are placed. While working on the restoration of this Cabinet, the author thought that he could hear the voice of *makie* artists and urushi workers who devoted themselves to the revival of their tradition. He sincerely hopes that the information obtained through this restoration may contribute to the future restoration of *makie* furniture.

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