



工芸篇

Craft works

風景蒔絵ナイフアーン

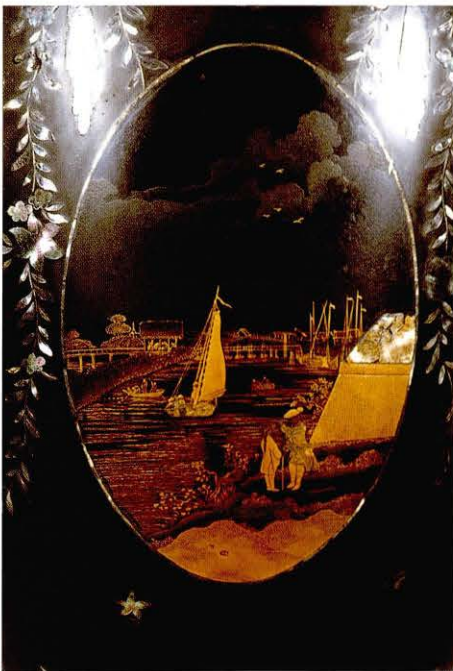
平成12・13年度修復事業



品名：風景蒔絵ナイフアーン
所蔵：アシュモリアン美術館
時代：19世紀初



13 ナイフアーン全景 修理後



14 正面蒔絵部

オックスフォード大学付属アシュモリアン美術館蔵

風景蒔絵ナイフアーン

漆芸修復家
勝又 智志

品名：風景蒔絵ナイフアーン

所蔵：アシュモリアン美術館

時代：1801年

修復施工：目白漆芸文化財研究所

修復者：勝又智志

工期：平成12年6月～平成14年3月

オックスフォード大学付属アシュモリアン美術館所蔵の風景蒔絵ナイフアーン（以後本資料と呼ぶ）は在外日本古美術品保存修復事業の一環として、平成12年6月から14年3月までの22ヶ月間、東京国立文化財研究所第一修復室において修復したものである。初年度は主にクリーニング、塗膜の強化と調査に当て、次年度に本地の接合と表面処理そして図面の制作をおこなった。

概要

木製、黒漆塗りの洋食器収納箱、円形の本体に可動式の蓋を持ち、矩形の基台がつく。全体を薄貝螺鈿で飾り、正面には風景画を蒔絵で表す。本資料と同型のナイフアーンが米国セーラム市のピーボディ・エセックスミュージアムに2基保管されている。18世紀末から19世紀初頭にかけてオランダは対立関係にあったイギリス船からの攻撃を避け、長崎貿易を続けるため数回にわたり備船としてアメリカ船を派遣している。当博物館のインベントリーによると、1801年アメリカ・セーラム船籍のサミュエル・ガードナー・ダービー船長が率いるマーガレット号は、オランダ国旗を掲げ長崎に入港し多くの漆器、陶器、家具とともにナイフアーンを輸出した事が判明している。本資料もまた、その折輸出されたものと考えられており、制作年代がほぼ確定できる輸出漆器として貴重な存在である。この作品の名称であるナイフアーンのアーンとは、古代ギリシャのブドウ酒などの保存に使用された壺であるアーンフォラーの形状を模しているところから名付けられたものである。18世紀ヨーロッパではボンベイの遺跡の発掘なども相まってネオクラシックのデザイン様式が流行しており、このナイフアーンも当時の流行を意識した形状の一つと考えられる。(P13) (P72)

形状および細部の仕様

蓋部は尖塔と反り面のある二段の甲面と側板で構成され、蓋の上部を鮑の薄貝で7本の飾り房に細かな花綱をループ状に繋ぎ、下段の反り面には同様に8本の飾り房に8枚のドレープのついた布を切貝と微塵貝で表している。側板には、短冊型の上下を丸く雄型と雌型に搔き落とした形状の切貝81本を等間隔に並び、対角に4個の楕円を配し、その中を微塵貝に平蒔絵で花器や花を表している。胴部正面には、縦16セ

ンチ横11センチのアワビの薄貝で囲われた楕円形の中に、銅版画を写したと考えられる風景画が非常に繊細な蒔絵技法で表されている。全体を研出蒔絵とし、中央の帆船と右側の人物そして要塞の砲身の囲い部分は薄貝に金の付描で表され、帆と人物、要塞の石垣は薄肉の高蒔絵で描かれている。側面から背面にかけては、蓋部と同様の飾り房と大小8連のループ状の花綱を配し、下部の空間には各種の花を散らしている。現在この形状のナイフアーンは国内外で8基確認されているが、胴部にこれ程の緻密な蒔絵が施されている例は見あたらない。(P14)

胴を支える軸部は座と軸の2つの部材からなり、金平蒔絵による4本の緑の間に蓋と同様の花綱装飾が薄貝で施される。

基台は上部の円形の構成に対して矩形とし、脚部は和様の形態でまとめられる。各面に切貝による界線を設け、反り面には、切枝文を各面2個ずつあしらっている。

花形に切り抜かれた貝の表面は、それぞれ細かな毛彫りが施され、表情豊かな表現となっている。花の総数は161個に及び、種類も梅、桜、桔梗、牡丹など10種前後に分類できる。薄貝はすべて鮑貝が使用され、反り面に対しても薄貝を割ることなく貼り込んでいることから、現代使用されている薄貝の厚みである0.08から0.1ミリ程度に加工した薄貝を膠を膠着材とし、加熱した鋺で貝の表面側から押し当て接着したものと考えられる。(P73)

蓋は、本体中央の軸部に内蔵された角柱が蓋と連結しており、軸の外枠に支えられながら垂直にせり上がる機構になっている。最上部まで持ち上げると、角柱の下部に貼り付けた2枚の反りのある板材が広がり、留め具となる仕掛けとなっている。格納する際はこの薄板を押さえることにより自重で正確な位置に収まる巧みな構造である。蓋裏は柱とともに梨子地粉が蒔かれ、磨き仕立となっている。(P5)

蓋をあげた内部は五段の雛壇に64個の大小の穴が刳られ、蓋の側板の内部とともに、和紙の裏打ちをした緑色のピロードを貼りめぐらしている。大小12本セットのナイフ、フォークなどの銀食器が先端を上に向けた状態で納められる構造となっている。(P75)

雛壇に刳られた孔から覗き込むと正面の蒔絵部の裏側に3行の墨書が確認できる。右から「丑とし」「四印前」「清友作之」と書かれたものと考えられる。また蓋正面裏には「四前」の二文字の墨書があり、通し番号と、正面の位置合わせの覚え書きと考えられる。この墨書について本資料の所蔵館であるアシモリアン美術館のオリバーインピー教授は、1998年発行のオリエンタルアートの論文の中で本資料とともに4基のナイフアーンを取り上げ、その中の一基であるプライベートコレクションの内部の墨書中にある「木地師清友」と同一人物であるとし、清友とは木地の制作者であり、ほぼ同時期に制作されたことを裏付ける資料として紹介している。(P76) (P77)

修復前の状態

蓋正面は側板と甲板の接合部が切れ大きな段差が生じている。また、蓋背面は側板と甲板に縦方向に大きな亀裂が入る。このため充填材と思われる黄白色の下地材がほぼ全周にわたって塗膜の上を覆った状態である。

下地材はオリジナルの塗膜と同じレベルとするため耐水ペーパーによる研磨が行われており、周辺の塗膜

を激しく痛めている。(P78) (P79)

蓋裏を見ると亀裂が蓋表から貫通した状態で入り、内張されたビロードも裂けている。ビロードの端を見ると木地を固定するための黒色の充填材がはみ出している。蓋は柱と先端に取り付けられた尖塔に挟まる形で固定されているが、取り付けが不十分なため前方向に傾き、さらに柱を中心に回転して正面を維持することが出来ない状態である。(P80)

蓋下部に作られた玉縁は下地の型引きで作られているが、蓋の開閉に伴い各所で亀裂を起こしている。大きな欠損部は玉縁の形状を模して補修がされているが、ラミンと思われる木材をケミカルな接着剤で貼り付け、サンドペーパーで研磨した状態と考えられる。周辺の塗膜も同時に研磨され下地が露出している。断面が露出した下地を観察すると0.7ミリほどの下地厚に三層の粒度の違う下地がそれぞれ二回前後塗布されていることが分かる。漆下地に比較してこの下地は僅かな水分にも弱く、膠を膠着材としているものと考えられる。(P81)

加飾に使用された貝は各所で剥離し欠損も多数見られる。

蓋の側面は艶を維持するためであろうか、過剰な磨きにより貝の際が摩耗している。また表面には白濁した被膜が厚くかぶり、貝や蒔絵の色調を鈍いものにしてる。

正面の蒔絵の人物や船など貝の部分にも同様の処理が見られる。おそらく貝の剥離の進行を止めるため、使用した修復材料が変質し白濁したものと考えられる。(P82)

胴部は全体に塗面の退色が著しく、本来は黒色であったものが褐色に変色し、各所に縦方向に流れるような染み状の色斑が発生している。これらは塗膜の表面に結露した水分が流れ、再度乾燥するという状態が繰り返された結果ではないかと考えられる。塗膜表面を観察すると細かな断文が一面に入り、艶が失せている。このような塗膜の劣化は、手油や水などが不用意についた程度でも取り返しのつかないダメージとなりかねない。(P83)

軸部は木地の乾燥に塗膜がついていけず激しく剥離している。胴部との接合部には膠が吹き出しており、結露による水分の抜けない状態が長期間継続したのと考えられる。基壇の塗膜の劣化は特に激しく、断文に加えてその隙間に何らかの汚れが食い込んだ状態が見られる。脚部は水分の影響からか、ほとんどの塗膜が下地から崩れるように剥離している。(P84) (P85)

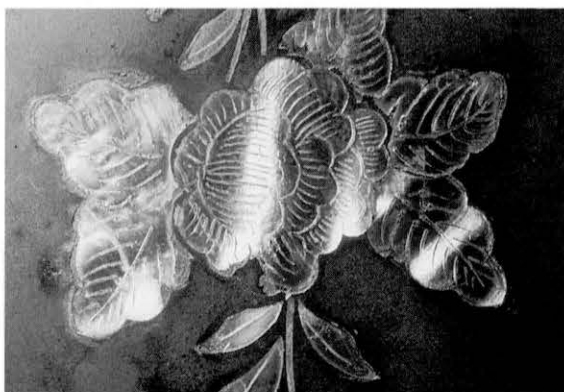
修復

修復は、日本の国指定文化財に適應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国立文化財研究所第一修復技術研究室長、加藤寛氏、所蔵館アシュモリアン美術館教授、オリバー インピー氏と協議した上で実施した。

1. 本作は塗り直しを目的として簡略な修理が施された途中の状態であることから、全ての補修材料を除去し原状に戻すこととした。
2. 剥離した貝については接着のみとし、欠損した貝の後補はおこなわない。
3. 金具の欠損は補わない。
4. 塗膜は復元せず、下地の状態で仕上げとする。



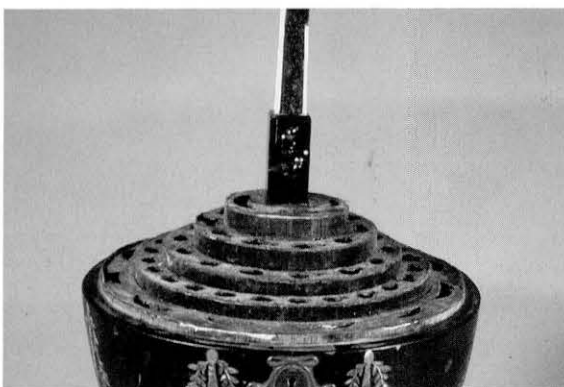
72 ナイフアーン全景 修理後
"Fupei Makie Knife-urn" after restoration



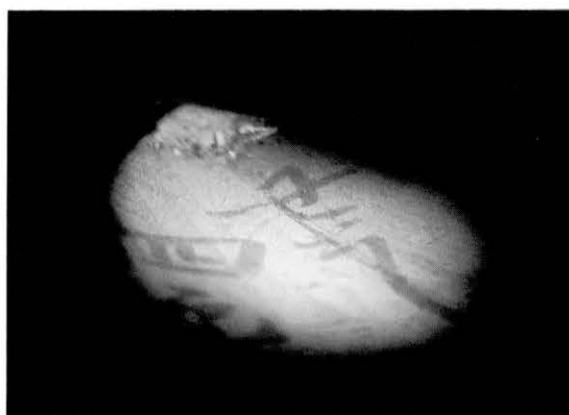
73 胴部 切貝と毛彫
Kirigai on the body and kebori on kirigai



74 蓋を上げた状態
Knife-urn with the lid raised



75 緞壇の状態
Condition of the velvet on the tiered stand



76 本体正面裏の墨書
Inscription on the back face of the body

以上の点を基本方針として、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、修理法を検討した。

修復工程

- 1 全体を毛棒で掃き、隅や蓋裏に残留した埃を払い落とした。
- 2 竹箆に純水を含ませた綿布を巻き付け、ごくわずかずつ汚れを落とした。
- 3 剥落の危険のある箇所には細かく切った雁皮紙を糊貼りし仮止めを施した。
- 4 蓋部に被った下地材を刀で僅かずつ削り落とした。(P86)
- 5 塗膜が現れてきたところで綿棒にごく少量の酢酸エチルを含ませ、溶けたパテ剤が広がらないように注意し、綿棒に吸い込ませるようにして表面に残った僅かな残留物を取り除いた。塗膜は細かな断文が無数に入った状態のため不用意に溶剤を使用すると溶けた材料が断文の中に入り込み、汚れを拡大する危険があるため注意が必要である。(P87)
- 6 パテ剤を取り除くと黒色の充填剤が詰め込まれた亀裂が現れた。背面側の亀裂には充填されていない材料であることからパテ剤が使用される以前におこなわれた修復の際、充填された材料と考えられる。僅かに水分を含ませると表面からゆるみ始める特性があるのと、溶けると同時に独特の臭いがあり膠と考えられた。黒色の由来は何らかの顔料が含まれているというより未精製の膠を使用したものと考えられる。なおパテ材と黒色充填材は東京文化財研究所の早川典子氏に分析を依頼した。分析の結果からパテ材はガラスバルーンが含まれた充填材であり、黒色充填材は膠の可能性が高い事が判明した。(P88) (P89)
- 7 亀裂内の充填材はすべて除去する事にしたが、亀裂が蓋裏まで貫通しているため作業に先立って蓋裏のピロードをはずした。痛んだ繊維部分は背面から和紙の小片で補強し、さらに全体に和紙を裏打ちした状態で保存した。
- 8 充填された黒色の膠は水分で軟化させ除去する事とした。小型のハンドドリルで1ミリ程の穴を作り、この穴に水を含ませ膠を膨潤させながら徐々に削り除去した。
- 9 充填剤を除去すると大きな亀裂が現れた。フタの円周97センチに対しこの亀裂は65センチの長さがあった。正面から左面にかけての歪が激しく最大で水平方向に3ミリの隙間が生じ、垂直方向に1ミリの段差が見られた。蓋背面側は甲面の反り面に縦方向の大きな亀裂が生じ、そのまま側板の接合部を押し広げた状態で固定されていた。
- 10 玉縁に取り付けられた4本のラミンと思われる丸棒は修復材料として不適切と考え、刃物で全て削り落とした。



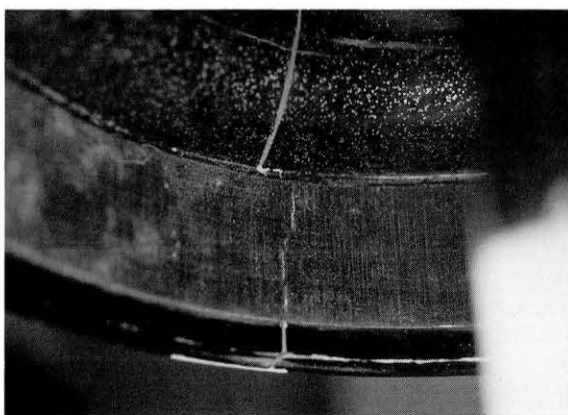
77 本体正面裏の墨書
Inscription on the back face of the body



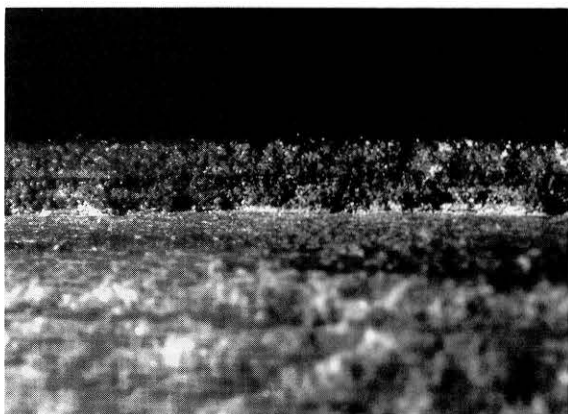
78 蓋正面の状態 修理前
Condition of the front of the lid before restoration



79 蓋背面の状態 修理前
Condition of the back of the lid before restoration



80 蓋内部の状態 修理前
Condition of the inside of the lid before restoration



81 下地断面 X5撮影
Layers of the foundation (x 5)



82 蓋髪部 蒔絵と貝の表面に残る被膜の状態
Condition of the urushi coating on the makie and surface of raden (lid)



83 胴部の塗膜の汚れ
Stain on the urushi coating (body)



84 軸部の塗膜剥離
Lifted urushi coating on the foot



85 基台部の汚れと損傷
Stain and damage on the foot and base



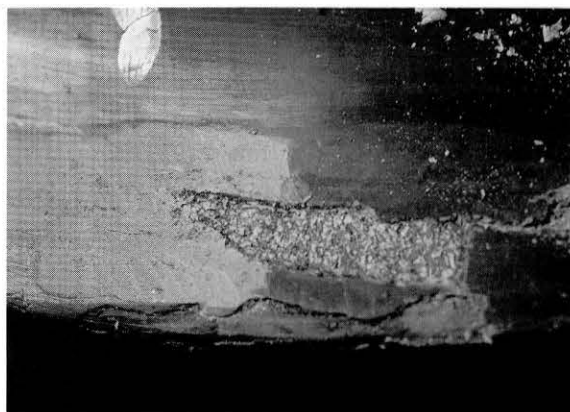
86 蓋背面の充填材の除去
Removing the filling material with a knife (back of the lid)



87 蓋背面の充填材の除去
Removing the filling material by ethyl acetate (back of the lid)



88 充填材の下から現れた亀裂
Crack found under the filling material



89 黒色の充填材
Black filling material



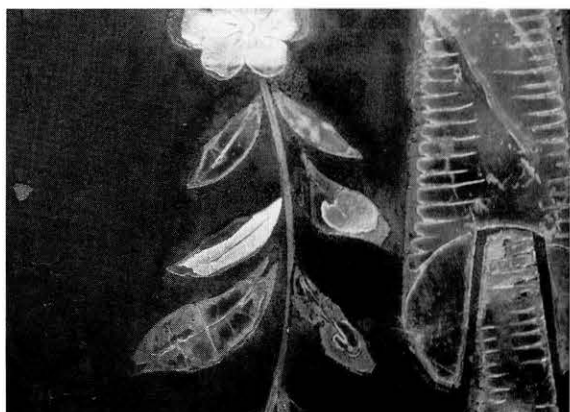
90 貝表面の汚れの除去
Removing traces of previous restoration from the surface of shell pieces



91 蒔絵表面の汚れの除去
Removing traces of previous restoration from the surface of makie



92 胴部塗膜の汚れと劣化
Removing traces of previous restoration from the urushi coating on the body and the condition of deterioration



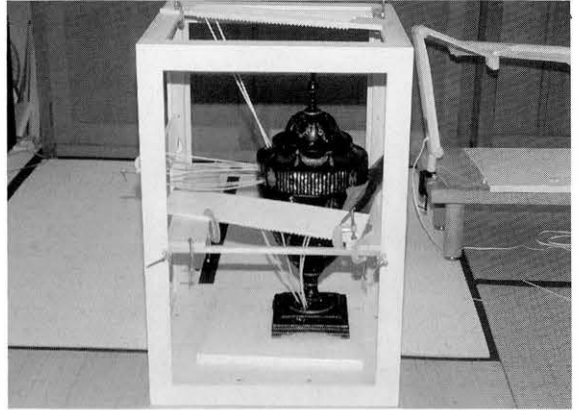
93 固め後の塗膜の状態
Condition of the urushi coating after consolidation



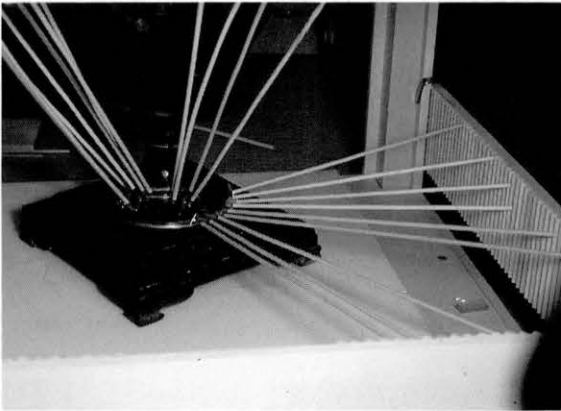
94 膠の含浸
Impregnating animal glue under the shell pieces



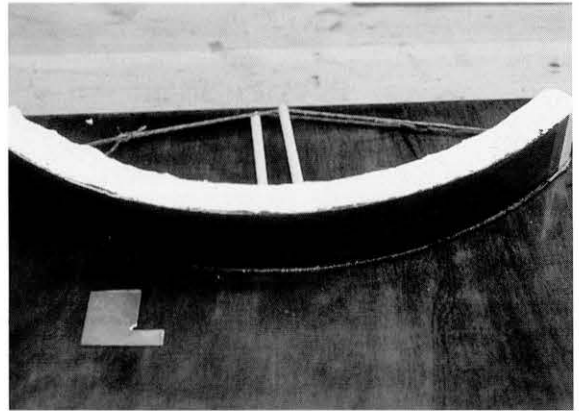
95 麦漆の含浸
Impregnating *mugi-urushi*



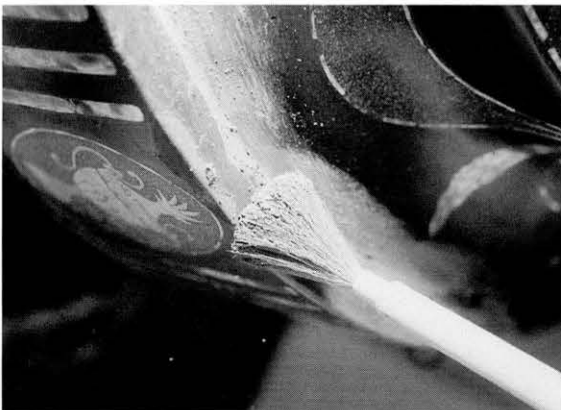
96 芯張りによる貝の接着
Press stabilizing shell pieces with *shimbari* sticks



97 芯張りによる塗膜の接着
Press stabilizing *urushi* coating with *shimbari* sticks



98 石膏型による玉縁の制作
Making the rim on a plaster mold



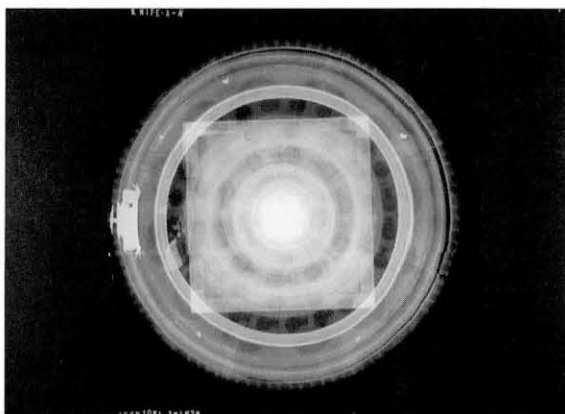
99 珩藻土による蒔地
Sprinkling diatomaceous earth



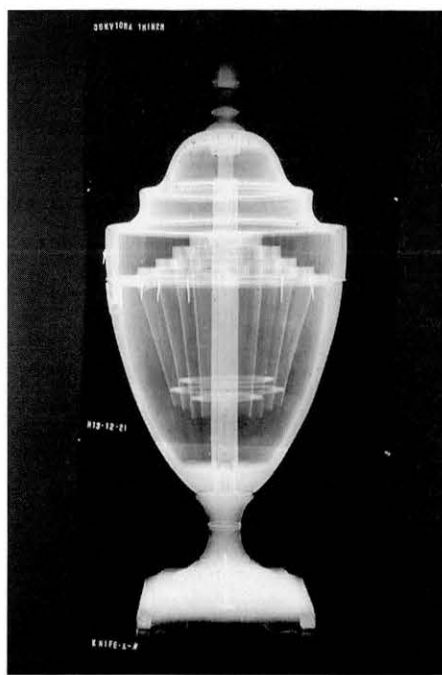
100 蒔地の固め
Consolidating the diatomaceous earth



101 蛍光X線による金属分析
X-ray fluorescent analysis of *makie*



102 上面からのX線透過撮影
X-ray radiography from the top



103 右側面からのX線透過撮影
X-ray radiography from the right



104 構造の断面図
Structural drawing of the knife-urn

11 貝と蒔絵に固着している白濁した被膜は非常に強固で、溶剤をテストしたがアルコールで僅かに落ちる程度で、かんばしい効果は期待できなかった。このため貝の際部分に固着した固まりは刀で削り落としながら純水を含ませた綿棒で崩すようにしながら除去した。この部分についても資料を採取し分析を試みたが変質が激しく同定は困難であった。(P90)

12 蒔絵部分に付着した被膜も同様に時間をかけて純水と綿棒で被膜を膨潤させながら除去した。この部分は微塵貝の仕立の上に平蒔絵を行い、さらに黒漆と金の付描としているため、摩擦による摩耗の危険が伴い、作業には最大限の神経が要求された。(P91)

13 塗膜表面の劣化に対しては黒呂色漆に生正味漆を混ぜ合わせた漆に適量の溶剤を加え、貝を汚さないよう配慮しながら、蒔絵筆で細かな断文に漆を浸透させた。この作業を漆の濃度を変えながら3回繰り返す事で艶と強度を回復することができた。(P92) (P93)

14 本作に見られる段差をともなった木地の亀裂は、乾燥による木質の総体積の減少が原因である。当初、加湿による修正を試みたが十分な形状の回復が期待できなかったことから、外からの圧力による修正は不可能と判断し、充填による安定を選択した。まず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。塗膜が安定したのを確認した後、亀裂部に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充填した。刻苧は一度の充填で乾く厚みに限度があるため数回に分けて行った。塗膜表面に近くなるに従ってより細かな木粉を使用し、表面処理に備えた。

15 刻苧の充填により木地が安定したのを確認した後、剥落した貝の接着と塗膜の接着を行った。薄貝の接着には、湯煎した粒膠を使用し、含浸の際、僅かにアルコールを混ぜることで浸透性を高めた。(P94)

16 塗膜の接着には水練りした小麦からグルテンを抽出し、生漆を混合した麦漆を使用した。漆との混合の際扱いにくく、でんぷん質が抜けているだけ水分量が少なく乾きが遅くなるなど欠点はあるが肌理が細かく、溶剤に麦漆を溶いた際にも分離が少ないなど、薄い塗膜の亀裂部への含浸には有効である。(P95)

17 ナイフアーンの形態にあわせた木枠を制作し、この中に器物を固定させ、木製の丸棒のテンションを利用して剥離部を定着させた。非常に曲面の出入りが激しい形態のため複数の丸棒が安定した状態で固定できるよう工夫が必要であった。剥離部と丸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。(P96) (P97)

18 削り落とした玉縁の復元にあたっては、本体上での作業が周辺を痛める危険が高いため、蓋側板のアーチにあわせた石膏型を作り、漆を染みこませた麻紐を二本心材として巻き付けた後、1ミリ厚の銅板で引き型をつくり数回に分けて下地を引いた。下地が所定の厚みに達した後、石膏に水分を含ませ玉縁を取り外し、彫金用の鑪で形態を整え麦漆で貼り付けた。さらに本体との隙間や不足分は刻苧で充填し、下地を篋付けし形態を整えた。(P98)

19 欠損した塗膜の修復については、修復部分が明快に見分けられるが全体として鑑賞の妨げとならないよ

No 3 は遠景の牛舎の屋根部分であるが、あらい丸粉が使用され、僅かに青みを帯びて見える。測定結果は97～98%の金に2～3%の銀であった。僅かな銀の含有量であるが、色相の違いは明らかである。

No 4 は帆船の帆の部分であるが、金の輝きが強い部分である。99%の金に1%の銀であった。

No 6、8、9までの金粉からは銀が検出されず94～97%の金に対し銅が3～6%とかなり強い銅の反応があった。No 4の金に比べ明快な金色の違いは感じられないが、僅かに赤みが感じられる。

No 2の上空の雲は輸出漆器の中でも風景蒔絵の場合必ず使用される技法と材料であるが、分析以前は腐食が進んだ銀粉との見方が定説であったが、分析結果は79%の銅に21%の亜鉛の数値となった。つまり真鍮粉の使用が確認された。

No 1は雲の中でもやや赤みのある部分であり、漆が薄く被った平目粉である。測定の結果はNo 2と同じの銅と亜鉛の反応があり、真鍮を原料とした平目粉も存在していたことが判明した。所々で僅かに見える金色が当初の真鍮の色であることから、制作当初の空は明るく抜けるような光景であったと想像できる。

鍍金具は、環の部分に真鍮材を使用し、本体および飾金具は全て銅材を使用していた。

次にX線透過写真の撮影から得られた情報をもとに内部の木地構造の解説を試みた。撮影は頂上部から1カットと右側面から3カットに分けておこなった。(P102) (P103)

蓋部は尖塔と蓋からなる。尖塔は2つの部材からなり、蓋裏にある円柱状の部材で柱とつながるとともに蓋を挟むようにして固定されている。蓋上部はふくらみのある上部と反り面の部分の2つの部材からなる。亀裂の方向から判断すると縦木を輻輳で挽き、組み合わせていることが分かる。杢目が不明瞭なため確定は出来ないが広葉樹材を使用していると考えられる。蓋鬘は桧材を横方向に木口を合わせるように8個繋ぎあわせ、内部を鑿で削り落とした後、外側のみ輻輳挽きとし、上部と接合していると考えられる。胴部は桧材を縦方向に8材繋ぎ厚めの底板を貼り付け、蓋同様に外側を輻輳挽きとしている。5段に重ねられたひな壇は最下段の胴に接する部分で5本の和釘によって本体に固定されている。内部は小割の桧の板材をつなぎあわせた4層の隔壁で仕切られ、底部分は3個のリングが壁と壁を支えている。隔壁は最も外側のもので48本、内側のもので18本の板材を繋いでいる。釘の影が全く見えないことから、接合には膠のみが使用されたものと考えられる。

基部は軸と座、基台、脚の4つの部材に分けられる。

軸と座は広葉樹材の輻輳引きとし、基台と脚は針葉樹材を使用している。基台の底裏から金属の丸棒が打ち込まれ座と軸が基台と強固に組まれているのが分かる。底裏には丸棒を打ち込んだ穴を隠すように金具が打たれている。

軸は胴部と接合する部分で角柱に加工された上、二枚柄継で胴部に組まれている。

修復後、細部の寸法を測定し三面図を作成した。さらにX線撮影から得られた資料をくわえ、木地構造をより理解するために断面図を制作した。(P104)

最後に所蔵館の湿度環境を考慮し、十分な厚みの桐材で保存箱を制作した。内部の底板は取り外し式とし

て、65%に調整した調湿材が2個収まるよう設計した。また、生成の正絹で油単を制作した。形状が複雑なため頭頂部と胴部用の二つのパーツに分けて制作した。

おわりに

近世の輸出漆器の損傷状態をみると、国内の伝世品と比べ保存環境の違いからであろうか、木地の極端な収縮からくる損傷が多く見受けられる。また、安易な修復のために更に傷みが進行したものも少なくないようである。それ故、経験したことのない損傷状態を前にして、修復を担当するものにとっては新たな発想と技術が要求されているのだと痛感している。

今回の修復を通じて得られた当時の高度な技法や材料の種類の多様性は、興味深い資料である。また、現資料は輸出用ではあっても工芸品として高いレベルを維持しており、現代の人々にも感銘を与えるものであったことが確認できた。本稿が今後の輸出漆器の研究の一助となれば幸いである。

謝辞

今回の保存修復にあたり多くの諸先生のご助言をいただきました。また、内部のピロードの修復に半田九清堂の半田幾子氏、木地構造の断面図の制作に千葉功氏、X線透過写真撮影には東京国立文化財研究所の三浦定俊氏、蛍光X線金属分析には同研究所の平尾良光氏、早川泰弘氏、修復材料の分析には同研究所の早川典子氏の協力をいただきました。保存用の桐箱は（株）増田桐箱店、油単は（有）東京修復工房の鈴木晴彦氏に指導を仰ぎ、池富幸子氏に依頼した。

ここに記して、皆様にお礼申し上げます。

On the Restoration of “*Fukei Makie* Knife-urn”
in the Collection of The Ashmolean Museum, Oxford

KATSUMATA Satoshi
Urushi Conservator

Inventory number: 1996-17

Period: Early 19th century

Measurements:

Diameter 32.5cm Height 74cm Weight 4230 g

Conservator: Katsumata Satoshi

The restoration of “*Fukei Makie* Knife-urn” (a knife-urn with a design of a port and its surrounding landscape in *makie*) in the collection of The Ashmolean Museum, Oxford was conducted as a part of the Project for Conservation of Works of Japanese Art in Foreign Collections from June 2001 to March 2002 at Restoration Studio 1 of the national Research Institute for Cultural Properties, Tokyo. The first year was spent mainly in cleaning and reinforcing the urushi coating and examining the structure and decorations, while the second year was spent in restoring the wooden substrate, treating the surface and making a drawing of the structure of the urn.

Description

“*Fukei Makie* Knife-urn” (hereafter referred to as “the Object”) is a wooden, black urushi-coated storage box for cutlery with the body in the shape of an amphora, a movable lid and a rectangular stand. The entire surface of the Object is decorated with *usugai raden* (thin shell inlay) and there is a design of a port and its surrounding landscape in *makie* at the front.

There are two knife-urns of the same shape as this Object in the collection of the Peabody Essex Museum in Salem, Mass., USA. From the end of the 18th century to the beginning of the 19th century, Holland chartered American ships several times to avoid attacks from British ships and continue trade with Nagasaki. According to the inventory of the Museum, one of these ships was “Margaret” (Capt. Samuel Gardner Derby) which sailed into Nagasaki in 1801 bearing the flag of Holland. Records show that there were many knife-urns exported from Nagasaki on this ship together with many urushi ware, ceramics and furniture. The Object is thought to have been one of the knife-urns and is very important as an export urushi ware whose year of manufacture may be determined.

It is believed that the word “urn” is used in the name of the Object because of its shape, which is similar to that of ancient Greek amphora, an urn used to preserve wine. The popularity of the neo-classic style of design in Europe during the 18th century is thought to have influenced the shape of this particular knife-urn (Photos 13 and 72).

Structure and Details

The lid consists of a dome-like section, a side panel, and a spire-like structure (hereafter, the spire) at the top. The upper part of the dome-like section is decorated with thin abalone shell pieces. The design in this part consists of 7 tassels with ropes made of flowers and leaves placed between them. In the lower curved section of the dome there are 8 tassels in *kirigai* connected by 8 drapes in *mijingai*. The side panel is decorated with 81 vertical strips of *kirigai* at even intervals. The top of each strip is rounded off while the bottom is curved in. The belt of these vertical strips is divided into 4 sections with oval motifs marking each section. The ovals are shaped by using *kirigai* technique and their insides are sprinkled with finely crushed thin abalone pieces. On the *mijingai* are various designs, such as vases, flowers or their combination, done in *hiramakie*. At the front of the body of the urn, there is an oval approximately 16cm high and 11cm wide which is made with *kirigai* of thin abalone shell pieces. In the oval, a landscape that seems to have been taken out of a copper engraving is decorated, using an extremely delicate *makie* technique. The entire landscape is decorated with *togidashi makie*. The sailing ship in the center, the body of the person on the right and the fence around the cannon barrel on the fort are made with *kirigai* and decorated with gold lines of *hiramakie*. The sail of the ship and the face and feet of the person on the right, the person on the left and the stone wall are decorated in thin *takamakie*. The rest of the body of the Object is decorated with 8 tassels and 8 flower-and-leaf ropes of various sizes, like those found on the lid. Small flowers made of thin shell pieces are scattered on the bottom of the body.

Today, there are only 8 knife-urns confirmed throughout the world that are shaped in this way, but none of them has such delicate *makie* decorations as this Object (Photo 14).

The foot that supports the body consists of two pieces, the foot and the base. Four thin rings of gold *hiramakie* divide the foot into sections. On the upper and lower sections is a decoration of flower-and-leaf ropes using thin shell pieces similar to those on the lid, while small flowers also using thin shell pieces are scattered on the middle section.

The stand is rectangular, as opposed to the circular form of the rest of the urn, with 4 legs in Japanese style. *Kirigai* lines mark the edges of each face of the base. Inside each curved face is a pair of flowers and leaves on a branch.

There are fine line carvings (*kebori*) on the surface of the flower-shaped shell pieces, making the flowers all the more expressive. The 161 flowers on the Object can be categorized into some ten types, including Japanese apricot, cherry blossoms, Chinese bellflowers and peonies. All of the thin shell pieces are made of abalone shells. The shell pieces are not broken into smaller pieces even in the curved portions; instead, they were processed into a thickness of approximately 0.08mm to 0.1mm (Photo 73) and fixed to the surface of urushi on which animal glue was first applied. By pressing the surface of the shell with a hot smoothing iron, moisture in animal glue would evaporate and the instantly hardened animal glue would cause the shell pieces to become fixed firmly.

The lid is joined to the body by a square rod that is inserted into another slightly larger square rod placed in the body of the Object. When the lid is lifted, the inner rod rises and when it reaches the highest point, 2 small pieces of curved wood attached at the bottom of the inner rod flip out to work as stoppers. To close the lid, the stoppers are pushed and the weight of the lid causes the inner rod

to return to its place within the outer rod. This is a very skillful structure. The inner side of the lid and the surface of the inner rod is decorated with *nashijifun* and finished with polishing (Photo 74).

The top part of the body is made of a concentric five-tiered stand with a total of 64 different sized holes so that twelve sets of silver cutlery of various sizes, such as knives and forks, could be stored with the tips facing upward. These tiers and the inside of the holes as well as the inner side of the side panel of the lid are covered with green velvet that has been lined with Japanese paper (Photo 75).

On the inside of the Object, on the back of the face with the landscape, which can be seen only from the opening made by the holes, are 3 rows of inscriptions in Chinese ink that seem to read, from the right, 丑とし, 四印前 and 清友作之. On the inside of the front of the lid also are 2 letters in Chinese ink, 四 (four) and 前 (front), which are believed to indicate serial number and alignment respectively. Professor Oliver R. Impey of The Ashmolean Museum introduces 5 knife-urns, including the Object, in an article in *Oriental Art* published in 1998. He mentions an inscription referring to a craftsman named Kiyotomo (清友) in one of the knife-urns, a privately owned one. He introduces Kiyotomo as a woodworker and suggests that the two urns must have been made by the same person (Photos 76 and 77).

Conditions before Restoration

The dome-like section of the lid had become detached from the side panel at the front while there was a large crack on the back of the lid extending from the dome-like section to the side panel. These damaged parts had been filled and covered with yellowish white foundation. In order to make this foundation level with the original coating, water resistant sandpaper had been used, causing tremendous damage to the surrounding original urushi coating (Photos 78 and 79).

When observed from the inside of the lid, the large crack at the back mentioned above had penetrated all the way inside and the velvet lining had become torn as well (Photo 80). A black material used to fill the cracks was observed along the edge of the velvet. The lid was held in place by the inner square rod mentioned earlier and the spire at the top. However, because the attachment was inadequate, the lid tilted forward. Furthermore, the lid would rotate easily and it was difficult to keep the front of the lid in line with the front of the body.

The rim at the bottom of the lid was made by raising the foundation and shaping it with a flat metallic board on which the outline of the rim was carved, but many cracks and missing parts had appeared in several places due to the opening and closing of the lid. Wood, chemical adhesive and sandpaper had been used to repair large missing areas by imitating the shape of the rim. For this reason, the surrounding urushi coating was also polished and the foundation was exposed. When the original foundation around the top edge of the side panel of the lid was observed, it was found that 3 layers of foundation, each with different sized particles, had been applied twice to form a foundation with the thickness of about 0.7mm. Compared with urushi foundation, this foundation is weak against moisture and for that reason is thought to have been made with animal glue (Photo 81).

The shell pieces used for decoration had become lifted at various places and many were already missing. The edges of the shell pieces on the surface of the side panel of the lid had become worn down from excess polishing in the process of maintenance. Also, the surface was covered by a thick white

cloudy film that made the color and shine of the shells and *makie* dull. The same kind of treatment was seen on the shells used for the persons and the ship in the front *makie* decoration. It was assumed that the coating material used to stop the lifting of the shell pieces had degraded, changed in color and lost its translucency (Photo 82).

The color of the urushi-coated surface of the body had faded significantly, and what had originally been black had become brownish at various places. There were also streaks running vertically. It is believed that these streaks were formed by repeated cycles of moistening, caused by dew condensation flowing down the surface of the coating, and drying. A closer observation of the urushi coating shows micro-cracks causing diffused reflection. Deterioration of the urushi coating such as this is very serious, and oiliness and moisture of the hand may cause irreparable damage, even with a slight touch (Photo 83).

The urushi coating on the foot had become severely lifted, since it could not keep up with the drying of the wooden substrate. At the section where the foot and the body are joined, animal glue had oozed out. It is believed that this was caused by moisture from dew condensation having accumulated here.

The deterioration of the stand was especially drastic. There were micro-cracks and it appeared that these cracks were filled with some kind of dirt. Most of the urushi coating on the legs had become lifted, together with the foundation, from the substrate, possibly because of moisture (Photos 84 and 85).

Restoration

Restoration was conducted in accordance with the principle of maintenance of the present condition applied to the conservation and restoration of designated cultural properties in Japan. Details of specification were discussed with Kato Hiroshi, Head of the Technical Standard Section of the National Research Institute for Cultural Properties, Tokyo and Dr. Oliver R. Impey of The Ashmolean Museum.

The following four points were determined as the basic policies of restoration.

1. Since the Object had undergone a process of repair, which was unfinished, intended to recoat the entire surface, it was decided that all the repair material would be completely removed and the Object returned to its original state.
2. The shell pieces that had become lifted or were lost would be refixed only and no new pieces would be added.
3. Lost metal fittings would not be remade.
4. The urushi coating would not be restored to its original state; *shitaji* foundation would be left as it is.

It was also decided that any problem that may arise in the process of restoration would be discussed among the members concerned and restoration method would be reviewed accordingly.

Process of Restoration

1. The entire Object was cleaned with a brush. Dust left in the corners and inside the lid was brushed

off.

2. The Object was then cleaned, little by little, with a bamboo spatula that was wrapped with a cotton cloth moistened with pure water.
3. Shell pieces and urushi coating in danger of falling were temporarily fixed by pasting small pieces of *gampi* paper with wheat starch paste.
4. Foundation material covering the cracks on the lid was scraped off, little by little, with a knife (Photo 86).
5. As the urushi coating appeared, foundation material still remaining on the surface was removed with a cotton swab slightly moistened with ethyl acetate. This was done carefully so that the solvent containing foundation material would not spread to the surrounding area. Since there were numerous micro-cracks on the urushi coating, there was a risk of the contaminated solvent permeating into the cracks. For this reason it was necessary to use the solvent carefully (Photo 87).
6. When the foundation material was removed, cracks filled with black filling material appeared (Photos 88 and 89). Since such a material was not found on the cracks at the back of the Object, it was believed that the black material had been used before the foundation material was used. Furthermore, the black material began to soften from the surface when moistened and gave off a smell. For these reasons it was thought that animal glue had been used and that the black color was caused not by a pigment but that it was the color of unrefined animal glue. The foundation material and the black filling material were analyzed by Hayakawa Noriko of the National Research Institute for Cultural Properties, Tokyo. As a result it was found that the foundation material contained glass balloon and that there was a great possibility of the black filling material being animal glue.
7. The filling material was completely removed from inside the cracks. However, since the cracks ran through to the inside of the lid, the velvet inside the lid was first removed. The damaged fibers of the velvet were reinforced with small pieces of Japanese paper. The velvet was further lined with Japanese paper and stored.
8. The black animal glue that had been used as filling material was softened with water and removed. A hole approximately 1mm was made with a small drill; water was added to swell and soften the animal glue so that it could be scraped off little by little.
9. After the filling was removed, large cracks appeared. Whereas the circumference of the lid was 97cm, the length of the crack on the front of the lid was 65cm. The crack was very severe from the front to the left side, the largest part being 3mm wide and 1mm high. On the back of the lid, there were two large cracks. One of them, a vertical crack, extended from the curved face of the lid to the side panel; the other was found along the joint of the lower curved section of the dome-shaped lid and the side panel.
10. Since the 4 wooden sticks attached to the rim was considered inappropriate as a restoration material, they were completely carved off with a knife.
11. The white cloudy film fixed firmly on the shell pieces and *makie* were very hard to remove. Several solvents were tested but only a little could be removed with alcohol and no promising effect could

- be obtained. So the film firmly fixed along the edges of the shell pieces was first scraped off with a knife and then removed, little by little, with a cotton swab moistened with pure water. Samples were taken of the film for analysis, but it could not be identified because of severe deterioration (Photo 90).
12. The film on the *makie* was also removed in a similar way by softening and swelling it with pure water and cotton swab. Since this portion was decorated with *hiramakie* over *mijingai* and since there were lines drawn on the *hiramakie* with black urushi and gold, there was a great risk of wear caused by friction. So special care was needed for this operation (Photo 91).
 13. For the micro-cracks on the surface of the urushi coating, a solvent was added to a mixture of *kijomi urushi* and black *roiro urushi*. This mixture was impregnated carefully in doses with a *makie* brush so as to avoid the shell pieces. This operation was repeated three times, changing the density of urushi. As a result, gloss and strength of the Object were recovered (Photos 92 and 93).
 14. The cause of the cracks on the wooden substrate was believed to be shrinkage of the wood due to drying. So an attempt was first made to bring back the original shape, by adding moisture but it was evident that this would not happen. Since it was decided that adding pressure from the outside was not possible, stabilization by filling was chosen. To do this, first of all, the surroundings of the crack to be filled were reinforced by impregnating *mugi-urushi* diluted with a solvent. After confirming that the urushi coating was secure, *kokuso*, a mixture of hemp fibers and spruce wood powder in *mugi-urushi*, was filled into the cracks. Since there is a limit in the thickness of *kokuso* that can be applied at one time for it to dry, it was applied several times. At the same time the fineness of wood powder was changed, finer one being used closer to the surface. In this way, preparation was made for the surface finish.
 15. After confirming that the substrate had become stabilized from filling *kokuso*, the fallen shell pieces and urushi coating were fixed. To fix thin shell pieces, double boiled grain-type animal glue was used. By adding a little alcohol to it, the animal glue was made more permeable (Photo 94).
 16. To fix the urushi coating, *mugi-urushi* made by adding *ki-urushi* to gluten, which is produced by kneading flour in water, was used. The disadvantages of this adhesive are that it is difficult to mix with urushi and that it takes time to dry since the lack of starch component means that there is less moisture in *mugi-urushi*. However, the advantages are that the texture is finer and that it does not separate much even when a solvent is added to it. For these reasons, it is very effective when impregnating into cracks on thin urushi coating (Photo 95).
 17. A wooden frame was made to fit the shape of the knife-urn and the Object was secured in this frame. Using the tension of *shimbari* sticks, the lifted parts were press stabilized. Since the shape of the Object is very complex with many curves, it was necessary to devise a way to press stabilize by using many *shimbari* sticks. In order to press stabilize the lifted parts safely and precisely, 4 layers of synthetic resin sheets including polymethyl metacrylate and polyvinyl chloride were used as buffer material (Photo 96 and 97).
 18. To reproduce the rim that had been removed, a plaster mold of the side panel of the lid was made, since working directly on the Object may cause damage. Two hemp ropes soaked in urushi were wound around the mold to form the core of the new rim. Then foundation material was applied to

the core. Next, a copper plate 1mm thick cut into the shape of the rim was used several times to make the new rim. Once the foundation had reached a certain thickness, the plaster was moistened to remove the rim. The shape of the new rim was adjusted with a metal file and *mugi-urushi* was used to attach the rim to the side panel. *Kokuso* was filled in spaces between the body and the reproduced rim. Foundation was further applied with a spatula and the shape was adjusted also with a spatula (Photo 98).

19. In the restoration of the lost urushi coating, care was taken so that the restored portion would be clearly recognizable but that it would not disturb the overall appearance. *Rose-urushi*, made of *ki-urushi* and *roiro-urushi*, was first used as *shitazuke urushi*, which serves as an adhesive. Since the urushi coating of the Object had almost no gloss, finest particles of diatomaceous earth were sprinkled with a brush to make the foundation. In order to restore the legs, the Object had to be lifted from the working stand, making the Object unstable. So extra care had to be taken (Photo 99).
20. Color and gloss similar to those of the original were obtained by allowing *rose-urushi* to permeate into the foundation and then absorbing excess urushi with paper (Photo 100).
21. To repair the tilt and looseness of the lid, a thin cypress board with a taper was used. It was inserted between the joint of the lid and the inner rod and fixed with *mugi-urushi*.
22. The velvet that had been kept stored was returned to its original position. Cotton velvet was dyed and used for small sections where the original was missing. In order to protect the exposed inner side of the substrate of the side panel of the lid, from the effect of humidity, very thin urushi was made to permeate into the wood before re-lining. Care was taken to minimize the effect of moisture from the paste.
23. Since the velvet on the tiered stand had become raveled or lifted, fresh wheat paste was applied to the spaces and the cloth was lightly pressed.
24. Finally to prevent further lifting and falling of the urushi coating, a small amount of foundation was applied to the edges of the shell pieces and urushi coating. Excess foundation was wiped off. Thus, the restoration was completed.

Table 1 X-ray Fluorescence Spectroscopy of "Fupei Makie Knife-urn"

No.	Part Analyzed • Color	X-ray Intensity (cps)								Possible Material	Chemical Composition of Materials (wt.%)			
		Ca-K α	Fe-K α	Cu-K α	Zn-K α	Ag-K α	Sn-K α	Au-K β	Hg-K β		Au	Ag	Cu	Zn
1	Front <i>makie</i> , top left, cloud, brown		105.1	202.3	72.5	0.2				Cu-Zn (brass) powder			79	21
2	Front <i>makie</i> , center, cloud, gray		52.3	38.4	14.2		3.9			Cu-Zn (brass) powder			79	21
3	Front <i>makie</i> , center left, roof of cowshed		93.1	5.5		0.1		34.8		Au-Ag powder	98	2		
3'	"		81.1	10.8		0.2		40.8		Au-Ag powder	97	3		
4	Front <i>makie</i> , center, sail		26.5	6.6		0.2	8.3	142.7		Au-Ag powder	>99	<1		
5	Front <i>makie</i> , center, water		112.8	4.1		0.2		1.7						
6	Front <i>makie</i> , center, person on the right, <i>hiramakie</i> line on raden	82.8	31.3	7.0				24.4		Au-Cu powder	94		6	
7	Front <i>makie</i> , center bottom, embankment		47.0	51.5	16.0	0.2		82.2		Au-Ag/Cu-Zn powder	99	1	82	18
8	Front <i>makie</i> , bottom left, waves		85.2	3.5		0.2		26.4		Au-Cu powder	96		3	
9	Lid, front right flower pattern	32.8	87.8	4.8				33.6		Au-Cu powder	97		3	
10	Front metal fitting, body		2.4	2076.9		0.2				Cu material			>99	
11	Lid, front metal fitting		5.1	2038.2		0.2				Cu material			>99	
12	Lid, front metal fitting, ring		16.0	727.8	214.7	0.2				Cu-Zn material			83	17
13	Body, top metal fitting		1.6	1468.6		0.2			3.7	Cu material			>99	

Analysis by Hayakawa Yasuhiro

Confirmation of the Materials and Structure

During restoration, *makie* powder and metal fittings at the front were analyzed by X-ray fluorescence. In addition, the structure of the substrate was confirmed by X-ray radiography.

Materials of various colors and particle size, used for *makie* decorations at 9 places from the front of the body and the side panel of the lid, were analyzed. metal fittings from. Four places were also selected The result of analysis is as follows (Photo 101, Table 1).

No. 3 is the roof of the cowshed in the distance that appears somewhat yellow. Coarse *marufun* is used. As a result of analysis, it was found to be composed of 97 to 98% gold with 2 to 3% silver. Although the silver content is little, the difference in hue is apparent.

No. 4 is the sail of the sailing ship. The gold shine is very strong. It was found to be 99% gold with 1% silver.

Gold powder in No. 6, 8 and 9 did not contain any silver. It was found to be 94 to 97% gold and 3 to 6% copper. Difference in gold is not as apparent as it is in No. 4 but it is slightly orange in tint.

No. 2 is the cloud. The technique and material used here are found in *makie* landscape decorations of exported urushi ware. Before analysis, it was believed that silver powder had been used and that it had changed color. But analysis showed that it was composed of 79% copper and 21% zinc. In other words, it was confirmed to be brass powder.

No. 1 is also from the same cloud, but from a part with a rather reddish tint. It is *hiramefun* lightly coated with urushi. Analysis also showed it to be a composite of bronze and zinc, proving that *hiramefun* using brass as its raw material also existed. Since gold color still seen at places on the cloud is the original color of brass, it may be imagined that the sky must have been very bright.

With regard to the metal fitting, brass is used for the ring at the front of the side panel while copper is used for its body and decorative part.

X-ray radiography was taken of the inner structure of the substrate. Four photographs were taken, one from the top and three from the right side (Photos 102 and 103).

X-ray radiography showed that the lid actually consists of four main parts: spire, dome-like section, cambering section and side panel. There are two sections to the spire. The spire and a cylindrical member on the inside top of the lid hold the lid in place. The cylindrical member in turn connects to the inner rod. Judging from the direction of the crack, it is clear that wood cut horizontally was shape formed on a turning wheel and assembled. Since the grain of the wood is not clear, it is not definite but the material used is believed to be from a broadleaf tree. For the side panel, 8 pieces of cypress wood are joined with the cut ends facing each other. The inside of the panel is chiseled off; the outside is shape formed on a turning wheel. The side panel is finally joined with the rest of the lid.

The body of the Object is double structured. The outer body is composed of 8 cypress boards, placed with the cut end facing up. The bottom board of the outer body is made of a thick piece of wood. Like the lid, the inner side of the outer body is chiseled off while the outer side is shape formed on a turning wheel. The inner body is composed of 4 nested cylinders made of cypress and the tiered stand. The outermost cylinder is made of 48 boards while the innermost cylinder is made of 18 boards.

There is no sign of nails having been used, so it is believed that animal glue was used as adhesive. There are 3 rings at the bottom of the inner body to hold it in place. The tiered stand is attached to the outer body by 5 long, square forged nails.

The lower part of the Object that supports its body is divided into four parts: the foot, base, stand and legs. The foot and base are made of a broadleaf wood and shape formed on a turning wheel. The stand and the legs are made of coniferous wood. A round metal rod is hammered in from the bottom of the stand to attach it to the foot. A metal fitting hides this metal rod. The part of the foot that is joined to the bottom of the body is processed into a square rod and attached to the body with 2 tenons.

Details of the Object were measured and drawings of the plane, elevation and side were made after restoration. Furthermore, data obtained from X-ray radiography were also used to make a drawing of the section of the Object in order to facilitate understanding of the structure of the substrate (Fig. 13).

Finally, taking into consideration the environmental condition of the Museum, especially its humidity, a storage box was made from thick paulownia wood. The bottom of the box was made in a double structure and the inside board was designed to be removable so that 2 moisture controlling agents could be placed to maintain 65%RH. A silk cover was also made for the Object. Because the shape of the Object is complex, this cover was divided into two parts.

Conclusion

A look at the condition of damage on exported urushi ware of the modern period shows that there is more damage caused by extreme shrinking of the substrate than is found on objects transmitted in Japan. This is probably due to the difference in the storage environment. Moreover, not a few of the damage seem to have worsened because of restoration carried without much thought. So we as conservators face damage that we have not seen before and are forced to improvise new techniques.

Knowledge about advanced techniques and diverse materials used around the time the Object was made, which was obtained through the restoration of the knife-urn, is very interesting. In addition, this Object is an outstanding craftwork, even though it was made for export, and impresses viewers even today. The present author hopes that this report may help in future studies of urushi ware for export.

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