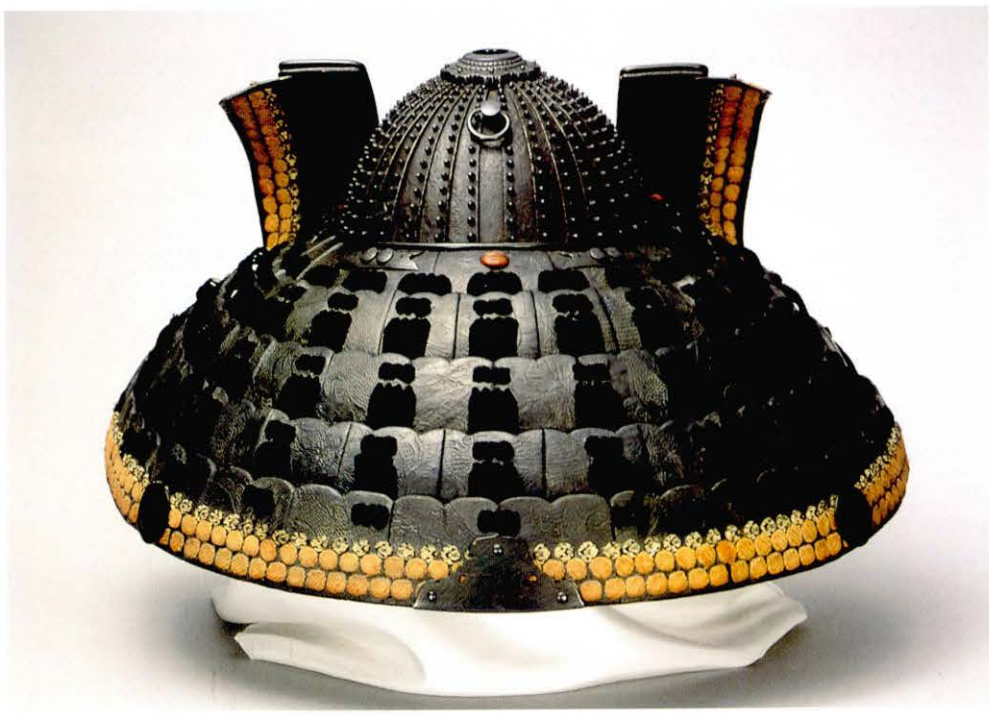
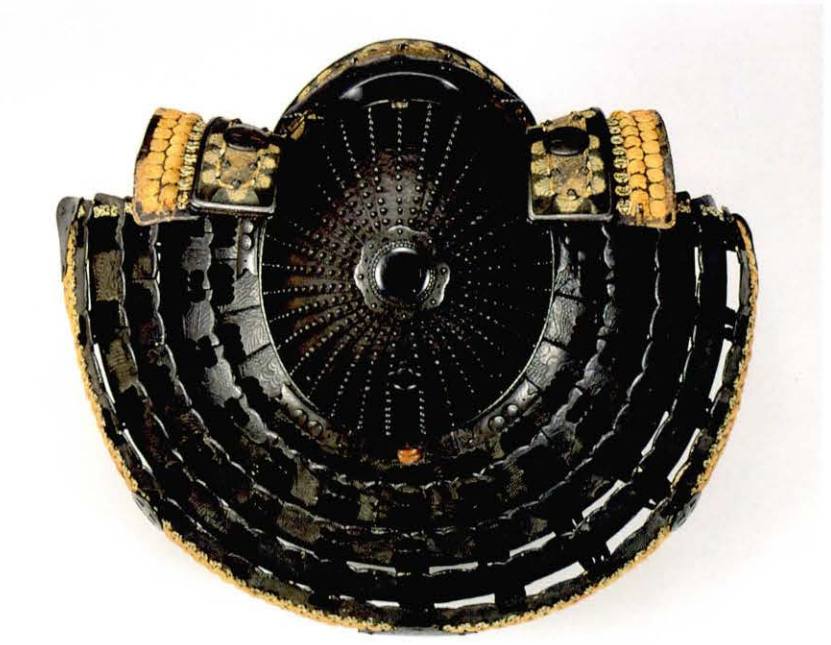
9　兜正面　修復後
Kabuto (Shimazu family), front, after restoration

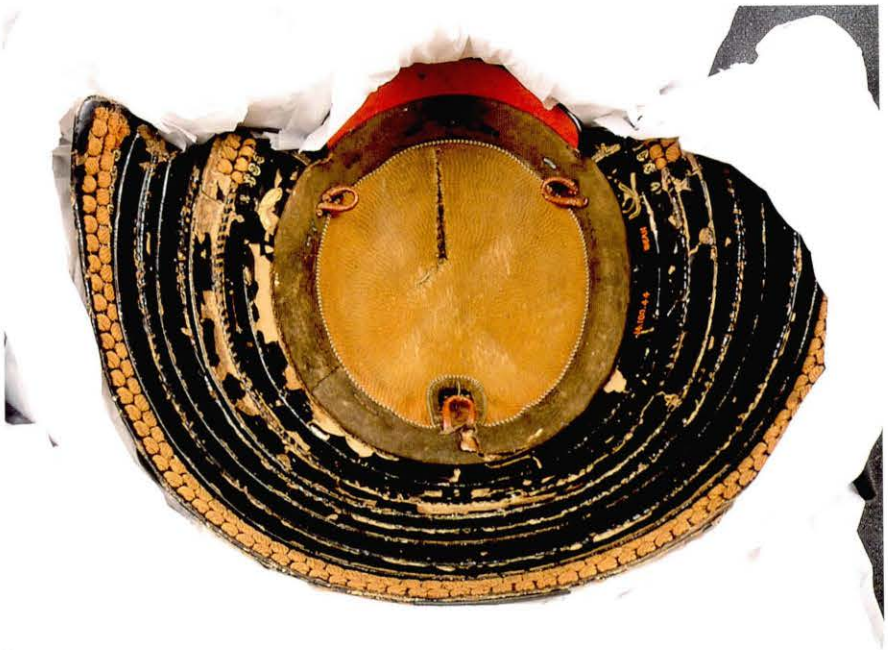


10　後面　修復後
Back, after restoration

11　右側面　修復後
Right side, after restoration



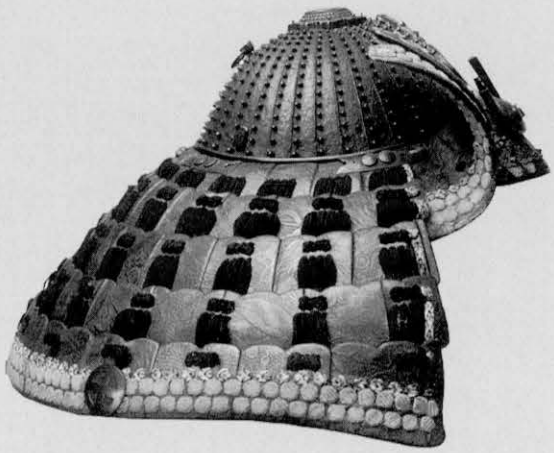
12　真上面　修復後
From above, after restoration



13　内側面　修復前
Inner side, before restoration

14　内側面　修復後
Inner side, after restoration

兜（島津家伝来）



品名：兜（島津家伝来）
所蔵：メトロポリタン美術館
寸法：最大長44.2cm　最大幅52cm　高さ27.4cm
所蔵番号：14.100.44

兜（島津家伝来）

漆芸修復家
田口　善明

品名：兜（島津家）
所蔵：メトロポリタン美術館　アメリカ合衆国
法量：最大長44.2cm　最大幅52cm　高さ27.4cm
所蔵番号：14.100.44

はじめに

在外日本古美術品修復協力事業（工芸）のうち、アメリカ合衆国・メトロポリタン美術館所蔵　兜（島津家）の保存修理が、東京文化財研究所第一修復アトリエに於いて10か月余りを経て平成15年３月20日に完工した。

この報告書は、保存修理で得られた新知見を記録にまとめたものである。現資料の保存修理にあたり、文化財修理　小澤正實氏の協力と共に助言を頂いた。

概要

日本の甲冑は武器の発達や戦法の変化により、各時代毎に様々な材質、技法、形態、意匠が変化し続けた。

平安、鎌倉期では騎馬から弓を射る騎馬戦が主流となり、経験に基づき創意工夫された新形式の大鎧が作られるようになった。

南北朝の時代は山城が多く築かれ、戦いも局地戦や城攻めが主流となり、徒歩戦に向いた甲冑が求められた結果、足掻きが自由で軽量な胴丸と腹巻が主流となった。

応仁の乱期では、胴丸、腹巻は装飾性に富み華麗であり、兜は筋兜から阿古陀形筋兜へ移行した。以後、日本各地では騒乱が絶えず、戦闘は組織化された足軽部隊が主流となり、戦闘方法も長槍、鉄砲の使用による徒歩中心の集団戦となるにつれ甲冑の製作も簡便化が要求された。

鉄砲の出現により、甲冑は従来の良い点を残し大きく改良が成された当世具足が作られるようになった。当世具足は身体の各部分を隙間無く防護する事に重点をおいた甲冑である。

この当時、各大名や武将の間では、斬新で奇抜な意匠を凝らし、個性的で、かつ実用本位の兜が流行した。

江戸時代の初期には、鉄砲の技術的向上により、甲冑の鉄地を厚くしたものへの試し撃ちが流行した。この、弾痕がつけられた甲冑を様具足と称した。

室町時代後期から江戸時代前期頃までは実用的で簡略された兜が多かったが、以後は平和な時代が続き、甲冑の必要が無くなると、反って懐古的復古調で装飾的な甲冑が好まれ製作されるようになった。

甲冑は武士の戦場における晴れ姿であり、死装束でもあったので先祖の魂のこめられた遺品として家名継承のしるしとされた。

現資料も、南北朝時代後期から室町時代前期にかけて製作された島津家の遺品である鉄鉢を用い、江戸

時代後期に懐古的復古調で製作された兜である。しかし、江戸時代も末期になると、西洋式戦法などが採用された事によって、機敏な動作が重要となり、甲冑の必要性が薄らいできた。

現資料の特徴として眉庇、吹返、しころの部分には、木のローラに文様を刻み込み、紙や革などを挟み込んで圧縮し凹凸の文様を付けるエンボス技術を用いて文様が付けられた革が用いられており、歴史を辿ると500年程前のヨーロッパに遡る。王侯貴族、寺院などの壁や天井に使われていた装飾革壁が17世紀の半ばに日本に渡来し、金唐革と呼ばれ大変珍重された。しかし、現資料のしころ部分に施された凹凸の文様表面には黒漆が塗られており、ヨーロッパの唐革には見ることの出来ない日本独自の漆唐革となっている。

漆は石器時代に接着剤として用いられ、縄文時代には塗料として、装飾的に黒漆と朱漆などで鮮やかに色分けされた土器、木胎漆器なども出土している。このように数千年も昔から接着剤や塗料として用いられてきた漆は、ウルシオール、水分、ラッカーゼ、ゴム質からなり、ラッカーゼが空気中の酸素を吸収し、ウルシオールを硬化させる（温度20～25℃、湿度75～85%がラッカーゼの最も活発に働く湿温である）。

漆は完全に硬化すると、酸、アルカリ、溶剤などに侵食される事なく、防水性、防腐性に優れている。漆を塗布する事により素地表面を丈夫にし、また、装飾として塗られた漆には螺鈿、蒔絵、彫漆、沈金、キンマなどの多くの加飾技法が生み出され素地表面を飾った。特に蒔絵は日本独自の技法であり、他の国では見る事は出来ない。

この様に、優れた素材である漆を国の存亡を左右する武具に施す事は極めて重要かつ自然のことであり、我が国独自の、華麗で重厚感のある甲冑が各時代毎に誕生した。

日本で出土した最も古い貴重な資料として意味をもつ漆塗りの武具に静岡の伊場遺跡から発掘された、弥生後期に儀式用として使用されたと思われる木製品で漆が塗られた短甲の残欠がある。表面には幾何学文様が彫られ朱漆と黒漆で色分けされており、土に帰らずに残ったのは、極めて異例である。

形状・品質構造

現資料は、鉄鉢を除き、室町時代の様式を尊んだ懐古的復古調で製作されている。

鉢の形状は、総高27.4cm、底径前後44.2cm、左右52cmであり、鉢の板の矧ぎ方は後正中の板から左右に重ねて矧いでいき最期は前正中板に当る部分で張り留めていく方法で製作され、鉢の裾には腰巻板をまわす。

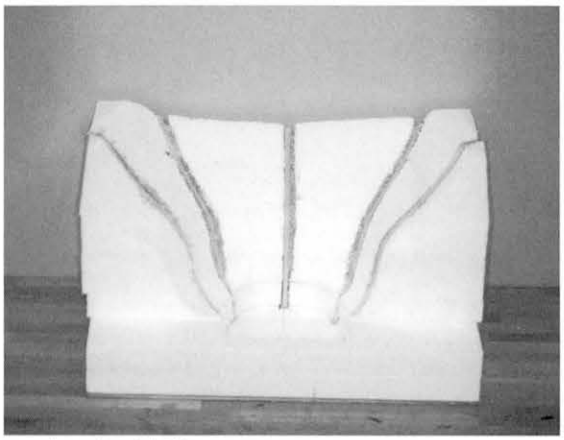
星は鉢の矧板を留める鋲頭のことで、現資料のように細かな星がたくさん打たれたものを特に集縮、糠星などと言う。

現資料は、三十二間星兜であり、全体に462の星が打たれてある。鉄鉢に打たれてある462箇の内、江戸時代後期頃に新しく打たれた星が、前正中の矧板の３枚、後正中の矧板の２枚、腰巻に接した矧板の周辺に139箇認められた。

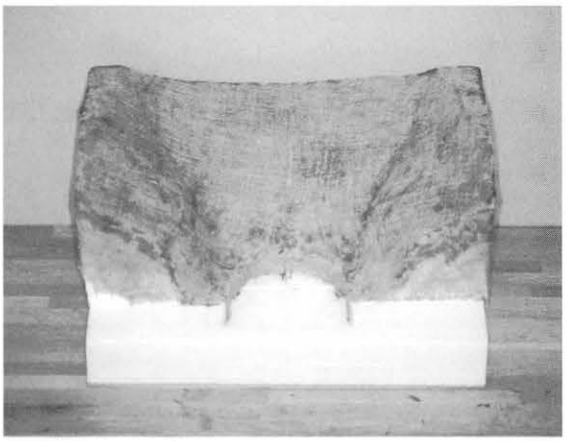
八幡座の葵座には毛彫りが施され７㎜の高さがあり、星鋲をもって鉢に貫かれ鉢裏で留められている。その上の孔を中心として菊座を重ね、小刻座付玉縁の順に成っており総高1.65cmの装飾的な八幡座である。天辺孔の内径は2.2cmある。

後正中の板には、笠印の小旗が付けられたとされる笠印付鐶が付けられ、鉄鉢の低い位置に響の孔が4箇所付けられてある。

鉢の表全面に摺り漆が施され防錆処理されてあるので僅かに渋味のある光沢が見られる。

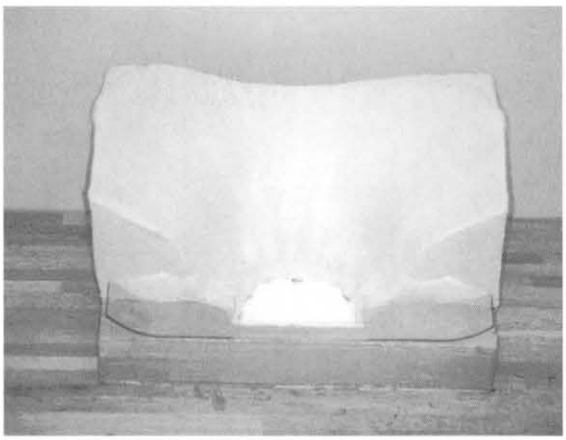


50　兜の受け台製作(1)
Making a working stand



51　兜の受け台製作(2)
Making a working stand

52　兜の受け台製作(3)
Making a working stand



53　兜の受け台製作(4)
Making a working stand

眉庇の形に沿って中央に渡り物の絵韋と周囲の小縁韋（こべりかわ）には菖蒲韋と呼ばれた韋が貼られ、絵韋と小縁韋は紺、萌黄、白、紅の4色の糸による伏組みで縫い付けられ、鋲頭が桜の形をした9箇の小桜鋲で留められており、際には金具廻りが施され、裏側には朱のビロードが貼られ鮮やかである。小縁韋（菖蒲韋）は、絵韋の補強と装飾を兼ねた、1㎝前後の縁韋で紺地に菖蒲文を白抜きにした韋である。

鉢裏には、鉄地に直接金箔が摺り漆で貼られており、直接鉢に頭が触れぬように十文字革が張られ、更にちりめん布の表面を細かく縫い上げることで丈夫にする、「百重（ももえ）刺し」と呼ばれる手法で縫われた布を用い、頭にかかる衝撃を緩和した内張りがされてある。

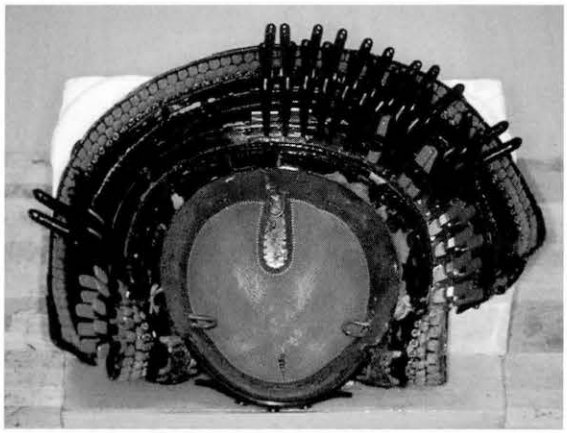
腰巻には、鹿革が貼られ、根割れの鋲で13箇所留められており、鹿革と内張りの突き合わされている部分に白と萌黄の二本の捻り糸を並べて縫い付けた蛇腹伏縫（じゃばらふせぬい）が施されてある。

兜を固定させるのに腰巻の左右側面中心からやや眉庇寄りに2箇所、後正中に1箇所の計3箇所に緒が取りつけられてある。

54　漆塗膜の養生
Facing the urushi coating

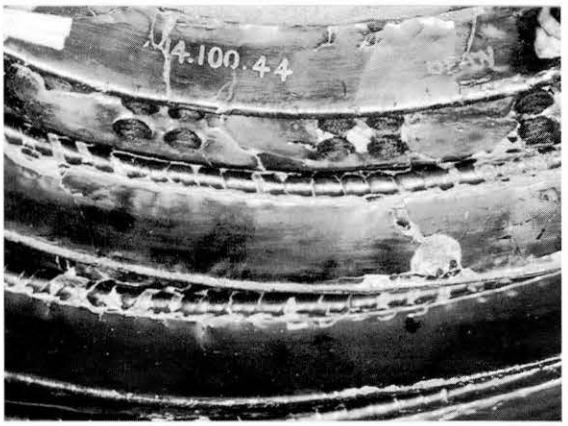
55　漆塗膜の接着(1)
Fixing the urushi coating

56　漆塗膜の接着(2)
Fixing the urushi coating



57　漆塗膜の接着(3)
Fixing the urushi coating

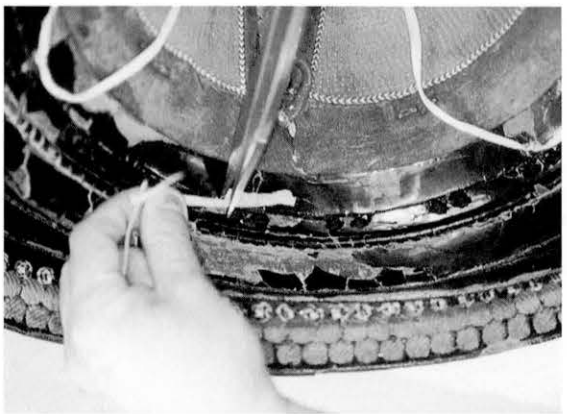
58　際錆(1)
Kiwasabi



59　際錆(2)
Kiwasabi

60　漆固め(1)
Urushi gatame

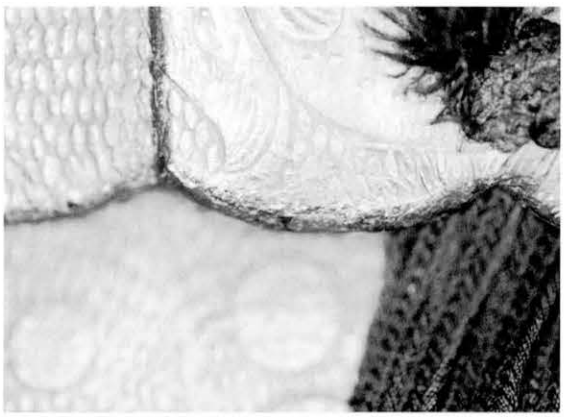
61　漆固め(2)
Urushi gatame



62　新補の足掻留め
Newly-added *agakidome*

63　兜表面の掃除
Cleaning the surface of the *Kabuto*

64　しころの補色(1)
Toning the *shikoro*



65　しころの補色(2)
Toning the *shikoro*

眉庇には鍬形と祓立の台を三光鋲で留め、３箇の鋲の上部には島津家の丸に十文字紋が刻まれており、鍬形台と祓立台には丸に十文字紋、花下り桐紋、唐草などが刻まれてある。

しころは、兜鉢の後頭部から頭にかけて防禦する小札の綴板をいう。上より鉢付の板、二の板、三の板、四の板、と名づけ、最下段を菱縫板と言い、菱縫板には畦目綴と菱縫が施される。畦目綴は色糸を数色組み混ぜた啄木組の組み糸を用い、菱縫は、斜め十文字の飾り縫いのことである。

札板の構造は、0.5㎜厚の一枚革を２枚貼り重ね、補強のため幅4.5㎜、高さ３㎜の楕円の形状をした鉄の芯棒を札板の長さに沿わせながら中央に置き、さらに芯棒の上下には3.5㎜間隔で２～2.5㎜の穴が空けられ、平状の革紐を穴に通し螺旋状に絡ませ札板と鉄の芯棒を繋ぎ止めている。

繋ぎ止められた札板の上面は、刻苧漆で盛り上げられ、二十数枚の小札が階段状に重ねられてあるように見せかけた手法がとられている。

刻苧で形が造られた上面部分には、花枝文様のエンボス加工が施された0.3㎜厚の薄革を覆い被せ、裏側の際に２㎜程折り込み、膠で貼られてある。

革紐で固定された鉄の心棒と、折り返された薄革の段差を埋めるために漆分の極めて少ない下地が2度、横方向に刷毛付けされ、表面が研がれており、黒漆が数度塗られている。エンボス加工された表側の韋の表面にも極めて薄く黒漆が塗られてある。

鉢付の板から菱縫板にかけて13箇所の寄素懸威が施され、上下の札が一定の間で伸縮できるよう工夫されている。しころの形態は、中途にふくらみのある饅頭の形に似た垂れ方の饅頭しころで、江戸時代に復古調で製作された古式とされる。

吹返は、眉庇の左右にみえる、しころが後ろに反り返った所で、現資料では５段あるしころのうち２段が吹返されている。しころの鉢付の板、二の板までをひねり返し、鉢付の板の吹返の内側に２枚目の札板が少し重ねられた状態で添っており、表面には、渡り物の絵韋の周囲に小縁韋が貼られ、絵韋と小縁韋の突き合わせ部分に紺、萌黄、白、紫、紅の色糸で飾縫いされた伏組が紐状に縫い付けられ、伏組の内側の周囲を小桜鋲で留め、中心よりやや上に島津家の丸に十文字紋が入れられた据文金具が取りつけてあり、吹返の際には金具廻りが施されている。

二の板の吹返には、しころの菱縫板の飾縫いと同じ畦目綴、菱縫がなされている。

法量

最大長44.2cm　最大幅52cm　高さ27.4cm

損傷状態

現資料は、しころの内側部分が著しく損傷し表側に返す事が出来ない危険な状態で搬入された。

頭裏には、百重刺しと呼ばれる布が貼られており、前正中部分の布地に意図的な裂かれが見られる。この布地には、銘見の孔が付けられてあるが、銘を確認する事が出来なかった為、意図的に裂かれた跡だと思われる。布の裂け目から鉄鉢に刻まれた銘を探したが確認する事ができなかった。

内側の腰巻に巻かれてある鹿革の後正中にL字に裂けた跡が見られる。

しころ部分の鉢付の板と二の板の部分において5箇所に札板の伸縮自在を留めている足掻(あがき)留めがされているが、吹返寄りの左右の2箇所を除き3箇所の足掻留めの革紐が欠失している。また、漆の塗膜部分に後補の修理箇所を数箇所確認した。

しころの裏側全体に塗られた塗膜表面に汚れが見られ、鉢付の板、二の板、三の板、四の板、菱縫板の部分には刷毛付けされた漆下地層に革の伸縮によって罅が全体に生じ浮き上がりが見られ、一部には塗膜の欠落と欠失がおこっている。また、この原因とは別に、しころの札板を上から下へ伸縮自在に連接している威がかえって災いし、威糸を通す為に空けられた穴の周囲の漆下地層にも同じ損傷が見られた。

特に、菱縫板と吹返に飾縫いされた畦目綴、菱縫いの周囲に塗膜の傷みが酷く飾縫いに沿って細かい浮きが帯状に広がり辛うじて付いている状態である。

兜の表側には、損傷がほとんど見られなかったが、左右の鍬形は失われており、祓立台内には、挿入されたままの前物が根元部分を残し残留してあるのが認められた。

兜を下顎の部分で固定させる忍の緒と総角が失われていた。

修理方針

甲冑は、鉄、革、漆、繊維などの素材が用いられた複合芸術である。現資料は特に漆と繊維が接する箇所の傷みが酷く従来の漆での接着を行った場合には、繊維を汚す恐れがあるので、主に膠を中心とした現状維持修理を基本に周囲との調和をはかった。

しころ部分の鉢付の板と二の板を留めている3箇所の欠失した足掻留めの皮紐を新しく補い、忍の緒、総角を新調し取り付けた。

現資料は搬入時、傷みが酷く表に返す事が出来ない状態だったので漆塗膜の接着を優先した。

修理工程と内容

(1)　調査および写真の撮影

現資料の素地や漆塗膜などの技法調査を行うと同時に現状を写真撮影によって記録にとどめる。また、傷んだ経緯を推測し最善の修理を行う為の調査を加える。

(2)　兜の受け台製作

兜の修理を行う為には、しっかりとした安定感のある兜の受け台が必要であり、ベニヤ板6枚を、兜の後方の断面の形におおよそ切りぬき、放射状に配置し骨格とした。骨格の間には発泡スチロールを差し込み、電熱カッターを用いて、ベニヤ板に沿っておおよその形に発泡スチロールを切り取り、鑢で調整し原型とした。

原型表面に樹脂と木粉を混合した物を篦付けし、40メッシュの麻布を１枚被せ乾燥させた。この作業を数度繰り返し原型表面を強化した。強化された受け台に兜を仮置きし、空隙を確認した後、その部分に樹脂と木粉を混合した物で充填を行ない、この作業を数度繰り返し、表側の兜の形に近づけた。

造られた受け台の表面に糊で美濃紙を４枚貼り重ね、兜を置いた時に、接した面が傷まない様に工夫した。

この受け台の特徴は、大部分が発泡スチロールで出来ているので軽く、要所は樹脂と木粉で強化されており丈夫な点である。修理作業を進める上で、軽量ゆえ自由に角度を変えられて、的確に修理が出来るように工夫した。

(3) 漆塗膜の養生

剝落した塗膜と剝落の危険のある塗膜箇所に小片に切った雁皮紙を糊で貼り、作業中での剝落を予防した。

(4) 漆塗膜の接着および掃除

漆下地の浮き上がった塗膜の接着に、柔軟性のある軟靭膠と三千本膠の２種類を用いた。含浸用として三千本膠20パーセント溶液を用い塗膜の強化と共に膠の被膜をつくり接着の効果を高めた。接着用として軟靭膠を用いたが、単品では扱いにくく三千本膠を加え調節しながらプラスチック・クランプで圧着をおこなった。クランプを解除後、圧着部分を確認し漆塗膜表面に付着した膠を丁寧に拭きあげ、押えきれない部分に対して再度接着を行なった。

※吹返と菱縫板に飾縫いされた畦目綴、菱縫の周囲の浮き上がった塗膜に膠を含浸する際、同時に繊維へ膠が浸透してしまうので、塗膜の圧着後、膠が浸透した繊維に対してスポイトで適量の水を加え、ティシュ紙を置き指で圧力を加え余分の膠を取り除いた。

(5) 際錆

下地は、極めて漆の分量の少ない膠下地に近い下地付けがされており、周囲の露出した下地との調和をはかるため、京都産の山科地の粉に三千本膠を加えた膠下地での際錆をおこない、余分な錆は綿棒又は、細い木棒の先端を鉛筆状に削りウエスなどの布を包み込んだもので丁寧に拭き上げた。

(6) 漆固め

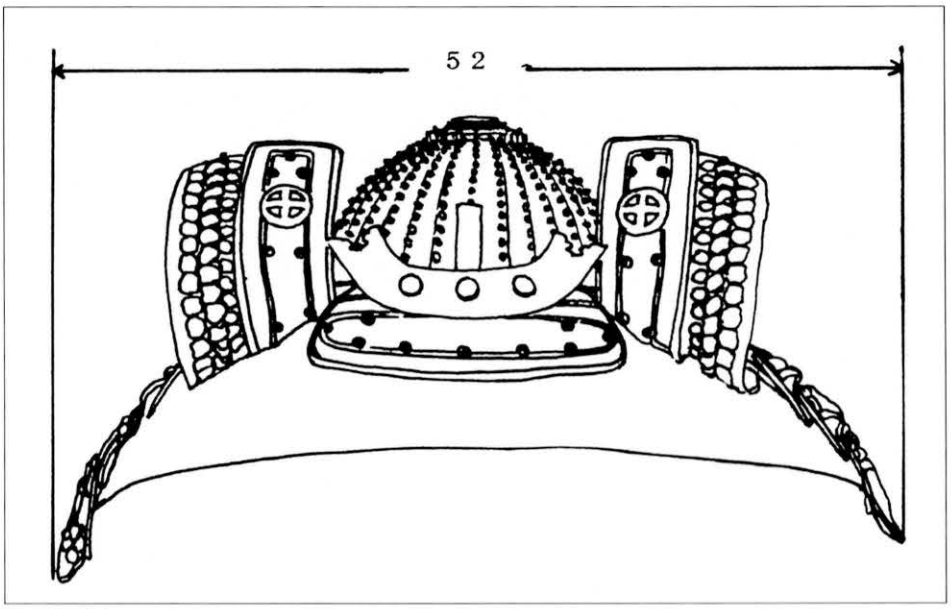
劣化した漆塗膜表面と下地部分を補強するため、クリーンソルで希釈された生正味漆を筆に含ませ、糸威を避けながら含浸をおこない、拭き上げた後１時間ほどおき、更に表面に残された漆を残さず拭きあげた。

(7) 新補の足掻留め

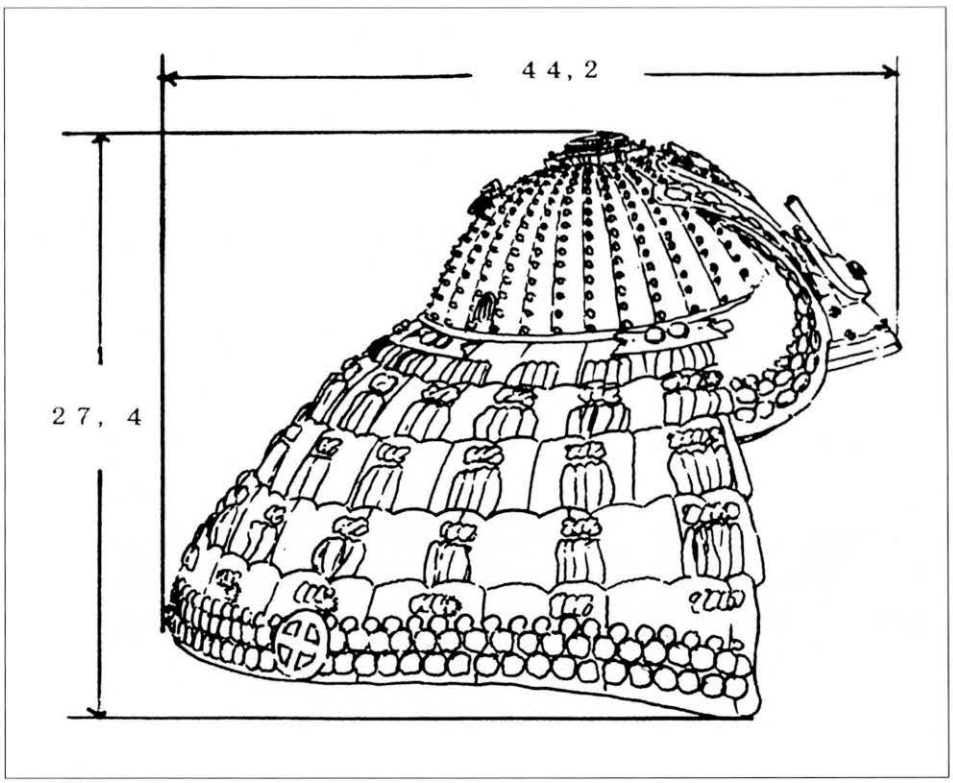
欠失した３箇所の足掻留め部分に鹿革の紐を取り付けた。

(8) 兜の表側の掃除

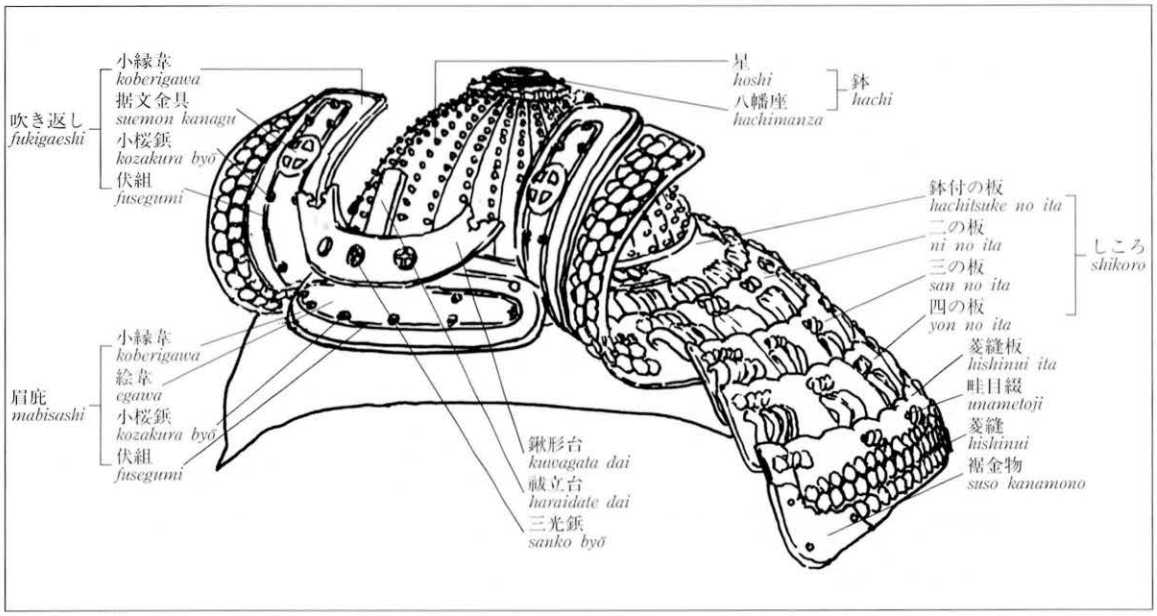
鉄鉢、しころ表面の塵や埃などは平刷毛または筆を用いて払い落とし、付着した汚れは、綿棒と、細い木の棒の先端を鉛筆状に削りウエスに包み込んだ布に、僅かな湿気かエタノール溶液を含ませて拭き上げた。



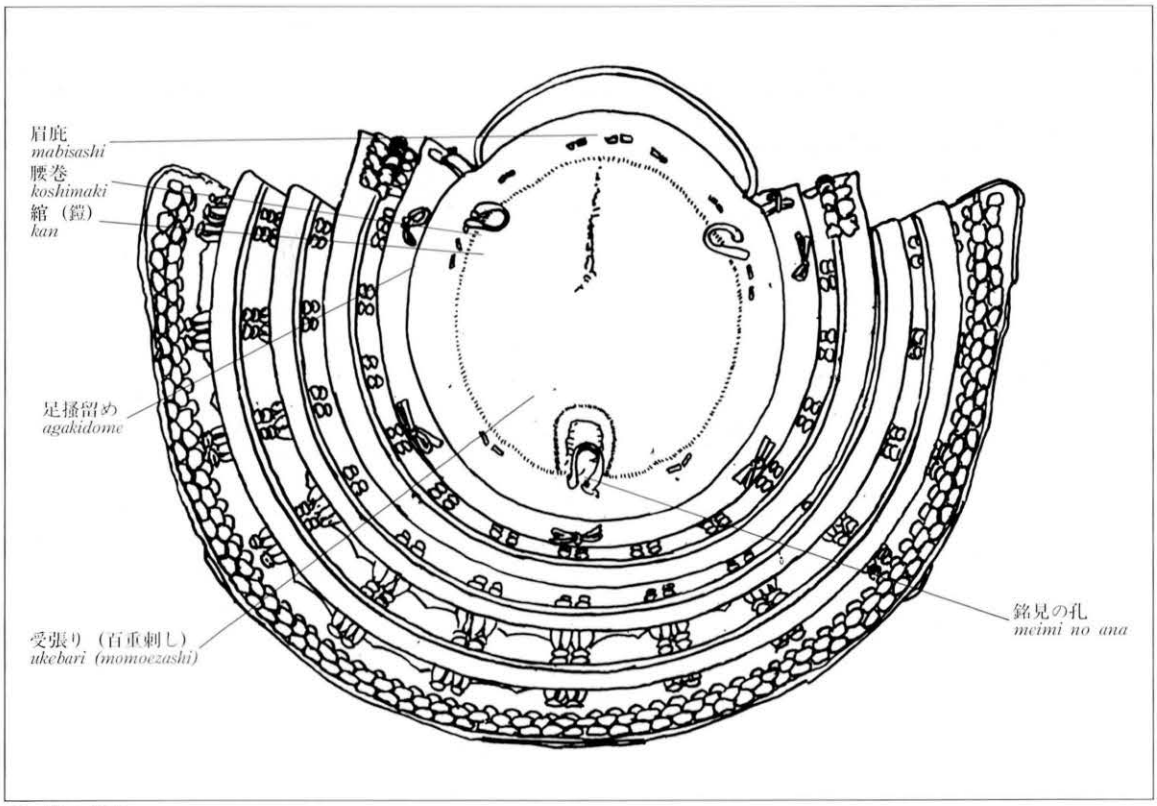
66　兜法量
Measurements (cm)



67　兜法量
Measurements (cm)



68 兜の名称
Parts of a helmet



69 兜の名称
Parts of a helmet

⑼　しころの補色

しころに施されたエンボスの表面には、塗られた漆が擦れによって剝げた部分が僅かではあるが見られ、この部分は墨に少量の膠を加えて溶き、筆で補色を行なった。

⑽　忍の緒、総角（あげまき）の取り付け

兜全体の雰囲気を損なわないように兜の忍の緒と総角には、古代の紅風に染め上げられた組紐を取り付けた。

On the Restoration of "*Kabuto*" of the Shimazu Family in the Collection of The Metropolitan Museum of Art

TAGUCHI Yoshiaki
Urushi Conservator

Name of the object : "*Kabuto*" of the Shimazu Family
Owner : The Metropolitan Museum of Art, U.S.A.
Measurements : Max. depth 44.2cm, max. width 52cm, height 27.4cm
Inventory number : 14. 100. 44

Introduction

Kabuto, a helmet, of the Shimazu family in the collection of The Metropolitan Museum of Art, U.S.A. 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 over a period of about ten months and was completed on March 20th, 2003.

This report presents records of new knowledge obtained from the restoration, which was conducted with the cooperation and advice of Ozawa Masami who specializes in the restoration of armors.

Background Information

Materials, shapes and designs of Japanese armor as well as techniques for their manufacture continued to change from period to period, with the development of weapons and changes in military tactics.

During the Heian and Kamakura periods (12th - 13th centuries) when cavalry-style fighting in which arrows were shot from mounted horses was the mainstream, new styles of armor were produced based on experience and inventive ideas.

In the Nambokucho period (14th century), many castles were built on mountaintops, and local fighting and attacks on castles became the mainstream. Since most of the fighting was done on foot, the need arose for lighter armor that would allow easier movement of the legs.

During the time of Onin no ran (Onin War, mid-Muromachi period, 15th - 16th centuries), armor became more decorative and elaborate, and the style of helmets shifted from *suji kabuto* to *akodanari suji kabuto*. From this time on, battles were constantly fought all over the country, and organized troops on foot called *ashigaru butai* became the main force. Since fighting was done mainly by groups on foot using long spears and guns, a simpler way of manufacturing armor became necessary.

With the appearance of guns, new, greatly improved armor was created while the good features of conventional armor were maintained. New types of armor were designed to protect every part of the body. It was also during this time that practical and unique helmets with strikingly original designs came into fashion among feudal lords and samurai commanders.

In the early Edo period (early 17th century), with the technical advancement of guns, it became more popular to make the iron substrate of armor thicker, and trial shootings were done to test their power. Armor with bullet marks came to be known as *samagusoku,* literally meaning armor (*gusoku*) like those that would withstand bullets (*sama* in Japanese meaning "like").

Although most helmets from the late Muromachi period to the early Edo period (mid-16th - early 17th centuries) were practical and simplified, as the country entered a long period of peace when armor was no longer needed, decorative armor reminiscent of the past began to be preferred and manufactured. However, by the end of the Edo period (mid-19th century) when the western way of fighting was adopted, importance on agility in battle caused the need for such armor to decrease.

Since armor is considered to be symbolic of the proud moment of a warrior's life in the battlefield as well as being his formal funeral outfit, it was transmitted from generation to generation as a family relic embodying the spirit of the family's ancestor and as a symbol of the succession of the family name.

The helmet restored in this Project (hereafter the *Kabuto*) was re-made in the late Edo period using an old iron helmet bowl, one of the relics of the Shimazu family manufactured sometime between the late Nambokucho period and early Muromachi period (sometime in the 14th century).

One of the characteristics of this *Kabuto* is found in the technique of embossing used for *mabisashi, fukigaeshi* and *shikoro* (the visor, side protector and neck guard, respectively). Generally in this technique, paper or leather is placed between wooden rollers on which a pattern has been carved so that the pattern would be embossed onto the paper or leather. This technique can be traced back to Europe of about 500 years ago when it was used to make decorative leather that covered the walls and ceilings of castles and churches. It was introduced to Japan during the middle of the 17th century and was greatly treasured as *kin karakawa.* The pattern on the embossed surface of the *shikoro* of the *Kabuto*, however, is coated with black urushi, something that cannot be seen in European embossed leather. Thus, a uniquely Japanese technique of *urushi karakawa* was used in this case.

Urushi was used as an adhesive during the Stone Age and as a coating material during the Jomon period (c. BC3000). Decorative earthenware colorfully coated with black and vermilion urushi and urushi objects with wooden substrates have been excavated.

Urushi, which has been used as an adhesive and coating material for over thousands of years, is composed of urushiol, water, laccase and polysaccharides. When laccase absorbs oxygen in the air, it hardens the urushiol. (Laccase is most active at a temperature of 20 - 25℃ and humidity of 75 - 85% Rh.)

Once urushi has completely hardened, it is resistant to acid, alkali and solvents. It is also highly water repellant and does not decompose because of microorganisms. By coating the surface of a substrate with urushi, the substrate becomes stronger. Urushi is also used for decoration, and many decorative techniques have been created such as *raden, makie, choshitsu, chinkin* and *kinma. Makie,* in particular, is a technique unique to Japan and cannot be seen in any other country.

One of the oldest and most valued objects among the wooden, urushi-coated weapons excavated

in Japan is pieces of ancient armor coated with urushi. Excavated from Iba Site in Shizuoka prefecture, the armor is considered to have been used in rituals during the late Yayoi period (3rd century). The surface is carved with geometric patterns and colored with vermilion and black urushi. It is very unusual that the object did not completely return to soil.

It is extremely important that urushi, an outstanding material, was applied to objects such as arms and armor that would have affected the outcome of a country. As a result, brilliant and dignified armor came to being throughout the history of Japan.

Outline of the Restoration

- Shape, materials and structure

The *Kabuto,* with the exception of the iron helmet bowl, was manufactured in a style reminiscent of the Muromachi period (late 14th - end of the 16th centuries). The gloss of the *Kabuto* is slightly subdued since *suri urushi* has been applied over the entire surface of the helmet bowl to protect it from corrosion.

The iron plates that form the helmet bowl of the *Kabuto* are arranged, one overlapping another and starting from the center of the back and moving to the right and left until they meet again at the center of the front. *Koshimaki,* a skirt-like piece composed of pieces of iron plates that are wrapped with leather, is attached at the bottom of the helmet bowl. Rivets called *hoshi* are used to join the plates. When small rivets are arranged in numbers, the style is called *nukaboshi.*

The *Kabuto* is what is known as a *sanju ni ken hoshi kabuto* and has 462 rivets in total. Of these, 139 were identified to have been used anew during the late Edo period. These were found on three central plates at the front, two central plates at the back and on the plate around the *koshimaki.*

The *aoiza* (the first layer of *hachimanza*), which is about 7mm thick, is decorated with *kebori*, or fine line carvings, and held down with rivets that penetrate to the inside of the helmet. The *kikuza* (the second layer) is placed around the opening in the middle of the *aoiza*. Then there is a washer-like piece. The total height of this decorative *hachimanza* is 1.65cm. The inner diameter of the upper opening called *tehen no ana* is 2.2cm.

There is a metal ring called *kan* on the center plate at the back which is said to have been used to attach a banderole. There are four holes known as *hibiki no ana* on the lower part of the helmet through which a code for tying the helmet to the head was passed.

In the middle of the *mabisashi* is a piece of Chinese designed leather called *egawa,* and surrounding it and parallel to the shape of the *mabisashi* is another piece of leather about 1cm wide used to reinforce the *egawa* as well as for decoration and known as *koberigawa. Koberigawa* is also called *shobugawa* if the design, as on the *Kabuto*, is that of iris (*shobu*) in white against a navy background. The *egawa* and *koberigawa* of the *Kabuto* are sewn together by a cord of four colors — navy, greenish yellow, white and red — and further held in place by 9 rivets in the shape of a cherry blossom. The edge of the *mabisashi* is covered with a metal fitting and the reverse side is covered with brilliant vermilion velvet.

The inside of the helmet bowl is lined with gold foil, which was applied directly onto the iron substrate by using *suri urushi* technique. There is an inner lining to prevent direct contact between

the head and the helmet bowl and to serve as a shock absorber. This lining is composed of a cross-shaped leather piece and a crepe cloth that is stitched finely on the surface using a technique called *momoezashi* to reinforce the cloth.

Deerskin is used for *koshimaki* which is held in place by 13 split rivets. The deerskin and the inner lining are sewn together with a twisted thread of white and greenish yellow, using *jabara fusenui* stitching.

Two metal rings are placed in the middle of both ends of the *koshimaki* slightly toward the *mabisashi*, and another one is found at the center of the back for use in fastening the *Kabuto*.

The sockets for horn-shaped helmet crest known as *kuwagata* and *haraidate* are attached to the *mabisashi* by 3 large rivets called *sanko byō*. The *jūmonji* family crest (circle with a cross in the middle) of the Shimazu family is engraved on these rivets. There are designs of the *jūmonji* family crest, paulownia and cascading flower crest, and floral scrolls on the *kuwagata* and *haraidate* sockets.

The *shikoro* is a set of overlapping layers of rectangular leather pieces called *kozane* that extend from the back of the helmet bowl toward the sides of the head. The layers are called, from the top to the bottom, *hachizuke no ita* (the layer closest to the helmet), *ni no ita, san no ita, yon no ita* and *hishinui ita* (the lowest layer). Two kinds of stitching may be seen on the lowest layer: *unametoji* and *hishinui*. The former is a type of stitching using strings of various colors braided in *takubokugumi* knotwork while the latter refers to decorative diagonal cross-stitching.

Structurally, the *sane ita* pieces consist of two pieces of leather 0.5mm thick on a horseshoe-shaped iron core piece about 4.5mm wide and 3mm thick. Holes about 2 to 2.5mm in diameter are made at intervals of 3.5mm along the core piece, above and below it. A flat leather cord is laced through the holes, spirally joining the *sane ita* and iron core. The upper surface of the *sane ita* is mounted with *kokuso urushi* to make it appear as if there are twenty some layers of *kozane*.

The *kokuso*-mounted surface is covered with a 0.3mm thin leather on which a floral pattern has been embossed. The edge of the leather is folded back approximately 2mm toward the reverse side and fixed with animal glue.

To smooth out the differences in level of the *sane ita*, which have been fastened with a leather cord, iron core and thin folded leather, two layers of foundation containing very little amount of urushi is brushed on horizontally. The surface is then polished and black urushi is applied several times. A very thin layer of black urushi is also applied on the embossed surface.

Yosesugake odoshi, a special way of fastening *sane ita* with a cord, is used at thirteen positions from the *hachizuke no ita* to *hishinui ita* so as to enable the leather pieces to expand and contract regularly. The style employed here is reminiscent of styles seen on helmets of earlier days. Since the shape resembles a bun, this type of *shikoro* is called *manju shikoro*, the word *manju* in Japanese meaning "a bun."

The *fukigaeshi* is that part of a helmet where the right and left ends of the *mabisashi* are curved back and extend to the *hachizuke no ita* and *ni no ita* of the *shikoro*. A second *sane ita* is attached to the part of the *hachizuke no ita* which also serves as the *fukigaeshi*. The surface of the *fukigaeshi* is also decorated with Chinese *egawa* and *koberigawa*, which are sewn together with a decorative *fushigumi* stitching using a thread of five colors—navy, greenish yellow, white, purple and crimson. On

the inner side of the *fushigumi* stitching and parallel to the stitches are rivets in the shape of a cherry blossom. Slightly above the center is *suemon kanagu*, a metal fitting, with the design of the Shimazu family crest of a cross inside a circle. The edge of the *fukigaeshi* is decorated with metal fittings.

The portion of the *ni no ita* that serves as a part of the *fukigaeshi* overlaps slightly with the inner side of the *hachizuke no ita* that also serves as a part of the *fukigaeshi*. Decorative *unametoji* and *hishinui* stitchings same as those used on the *hishinui ita* of the *shikoro* is found.

- Condition of damage

When the *Kabuto* was brought to Japan, the inner side of the *shikoro* was so severely damaged that it was dangerous to turn the helmet over to the position that it would normally be worn in.

The inner side of the *Kabuto* was lined with a cloth that had been reinforced with *momoezashi* stitches, but an intentional tear was found on this cloth in the center of the front portion. This intentional tear is believed to have been made in an attempt to read the inscriptions on the helmet even though there was a special opening on the cloth for that purpose called *meimi no ana*. An attempt was made again to look for the inscription on the helmet bowl from the tear of the cloth, but it could not be found.

There was an L-shaped tear at the center of the back portion of the deerskin on the inner side of the *koshimaki*.

There are five *agakidome* fastenings on the portion where the *hachizuke no ita* and *ni no ita* of the *shikoro* join in order to prevent the *sane ita* from moving about. However, with the exception of the two on the right and left of the *fukigaeshi*, the leather cords of three *agakidome* were missing. Also, there were several places on the urushi coating where traces of previous restoration were found.

The surface of the urushi coating on the entire inner side of the *shikoro* was soiled and the layers of urushi foundation that had been applied with a brush to the *hachizuke no ita, ni no ita, san no ita, yon no ita* and *hishinui ita* had become lifted due to the expanding and contracting of the leather; in some areas the urushi coating had peeled off and was missing. Aside from this, the very fact that the *sane ita* of the *shikoro* was connected from the top to bottom by *odoshi* lacing to give flexibility had caused damage, and there was similar damage on the urushi foundation around the holes made for lacing.

Damage to the urushi coating was especially serious around the decorative *unametoji* and *hishinui* stitchings on the *hishunui ita* and *fukigaeshi*. There was a belt of minute liftings of the urushi coating along the decorative stitchings so that the urushi coating film was barely clinging.

Hardly any damage was found on the outer surface of the helmet. However, *kuwagata* on the left and right were missing and their broken roots were found inserted in the *haraidate* socket.

The *shinobi no o* straps used to tie the helmet under the chin and *agemaki* were missing.

- Restoration policy

A helmet is an object of multiple genres of fine art using materials such as iron, leather, urushi and textile. Particularly in this *Kabuto*, damage was most serious in areas where urushi and textile join, and it was feared that the textile would be affected if conventional method of restoration using

urushi were to be applied to these areas. So it was decided to focus on restoration using animal glue and to make adjustment with the surroundings while basically maintaining the present condition

The three missing leather *agakidome* cords joining the *hachizuke no ita* and *ni no ita* of the *shikoro* were newly supplied and newly-made *shinobi no o* and *agemaki* were attached.

Since damage at the time of arrival was so severe as to make it difficult to turn the helmet over, priority was given to fixing the urushi coating film.

- Restoration process and content

(1) Investigation and photography

Investigation was made of the substrate and urushi coating film. At the same time, photographs were taken of the present condition for documentation. This is a necessary step in surmising the causes of damage so that the best plan for restoration might be made.

(2) Making a working stand for the helmet

In order to do restoration work on the helmet, a firm and steady working stand was needed. Six plywood boards were roughly cut out into parts of the shape of the *Kabuto*—its left, right and back sections—and placed in a radial to form the skeletal structure. Polystyrene foam was placed in the spaces of the frame and carved to match the shape of the plywood structure by using an electric heating cutter. Final adjustment was made by using a file.

A mixture of resin and sawdust was applied with a spatula to the surface of the mold. Then a 40-mesh hemp cloth was placed over it and dried. This step was repeated several times to strengthen the surface of the mold. The helmet was temporarily placed in the reinforced mold. After checking the spaces between the *Kabuto* and the mold, a mixture of resin and sawdust was filled into the spaces. This step was also repeated until the shape of the outer surface of the helmet was completed on the mold.

Four sheets of *Mino* paper were adhered to the surface of the completed mold with paste so as not to damage the surface of the helmet when it was placed on the working stand.

The characteristics of this mold lie in the fact that it is light, most of it having been made of polystyrene foam, yet strong, the most important parts having been reinforced with a mixture of resin and sawdust. It was designed to be light in weight so that appropriate restoration work might be done from different angles.

(3) Facing the urushi coating

Small pieces of *gampi* paper were adhered with paste to parts of the urushi coating that had become lifted or were in danger of exfoliating so as to protect them from any further exfoliation during restoration work.

(4) Adhering and cleaning the urushi coating film

To adhere the coating film that had become lifted from the urushi foundation, two kinds of animal glue were used, a more flexible *nanjin nikawa* and *sanzenbon nikawa*. A 20% *sanzenbon nikawa* solution was used for impregnation. This helped to reinforce the urushi coating and to increase adhesiveness by making a film of *nikawa*. Because it is difficult to handle *nanjin nikawa* by itself as an adhesive, it was adjusted with *sanzenbon nikawa* for application. Plastic clamps were used for

pressing. After removing the clamps and checking the applied areas, *nikawa* left on the surface of the urushi coating was carefully wiped off. Parts needing more pressing were re-adhered.

*When animal glue is impregnated to parts of the lifted urushi coating around the decorative *unametoji* and *hishinui* stitchings on the *fukigaeshi* and the *hishinui ita* of the *shikoro*, animal glue will also penetrate into the fibers. After pressing the coating film, animal glue was removed from the fibers by applying a small amount of water, then placing tissue paper over the fibers and pressing down with the finger.

(5) *Kiwasabi*

The foundation was very similar to a *nikawa* foundation that contains very little amount of urushi. In order to match the surrounding exposed foundation, a *nikawa* foundation consisting of very fine *jinoko* from Yamashina district of Kyoto and *sanzenbon nikawa* was applied to the edges of the coating film for *kiwasabi* treatment. Excess *sabi* was carefully wiped off with a cotton swab or a thin stick sharpened like a pencil and wrapped with a cotton cloth.

(6) Consolidating the urushi coating

To reinforce the surface of the deteriorated urushi coating and foundation, *kijomi urushi* diluted with Cleansol was impregnated with a brush, carefully avoiding the *ito odoshi*, and then wiped away. After leaving the surface to dry for about an hour, excess urushi was completely wiped away.

(7) Restoring the *agakidome*

Cords made of deerskin were used for the three missing *agakidome*.

(8) Cleaning the outer surface of the helmet

Dust on the surface of the helmet and *shikoro* was swept with a flat brush; stubborn dirt was wiped off with a cotton swab and a thin stick sharpened like a pencil at the tip, and wrapped with cloth slightly moistened with water or ethanol solution.

(9) Toning the *shikoro*

Urushi that had been applied on the embossed surface of the *shikoro* had peeled off at places due to abrasion. Chinese black ink mixed with a small amount of animal glue was applied with a brush for toning.

(10) Fixing the *shinobi no o* and *agemaki*

A set of cords dyed ancient red was used for *shinobi no o* and *agemaki*, taking care not to spoil the overall atmosphere of the helmet.