

## 12) 郷土玩具の安定化処理および修復

### 高田人形と的

気仙地方の旧暦3月の雛節句では、女の子は土で作った雛人形を飾り、男の子は野山で弓矢を持って「的打(まどぶ)ち」をして遊ぶ風習がありました。子供の健やかな成長を願って買い求められた高田人形と弓矢は、2月に行われる「節句マチ」とよばれる市などで売られていました(金野1991)。

高田人形と的(まと)は、救出後、乾燥、くん蒸が施されたものの、通常環境では資料形状保持及び劣化防止が困難なため、新たな脱塩処理方法が確立されるまでの間、1年以上ガスバリア性袋に封入し保管されていました(図1)。

### 高田人形の安定化処理と修復

高田人形は堤人形や花巻人形などの影響を受け幕末ころから作られたと考えられている郷土玩具で、農家や左官職の人々が農閑期を利用して製作してきました。1960(昭和35)年頃になると他地域で作られた丈夫な焼き物人形が出回り、衝撃に弱い高田人形は廃れていきました。高田人形は多くの場合粘土に苧を入れてつなぎとし、焼成せずに完成品としました。前後2枚型からなり、側面のつなぎ部分を粘土で補強し、底に反古紙を貼り、顔料で彩色仕上げをしています。

被災した高田人形は未焼成のため水に溶け易く、多くが溶解しました。震災前陸前高田市立博物館では、薄葉

紙で梱包し収蔵していたため、薄葉紙が資料表面に固着し、彩色層損傷の原因になりました。構造上脆弱な首部での折損が多くみられ、泥の塊と化したもの、側面部で剥離し押しつぶされたものなど、ポリ袋入りの一個体を除き他はすべて破損していました(図2)。救出された断片を観察し、胴部の模様や断面の形状で一個体と判断できる資料から優先的に安定化処理と修復に取り掛かりました(図3)。その後、つぶれながらも比較的形状が明瞭に残っている資料を選別し処理をしていきました。

土製で未焼成の高田人形は、現状のまま水に浸漬し脱塩処理を行うのは不可能でした。このため、3~5%に調整したアクリル系合成樹脂水溶液に浸漬し、素材強化を行いながら塩分除去を実施しました(図4)。低濃度水溶液から順次高濃度水溶液へ短時間の浸漬と乾燥を繰り返して、素材強化の状況を目視観察しました。浸漬実施回数は資料の状況に応じ異なりますが、概ね3~5回です。

脱塩・強化処理が終了した断片はエポキシ樹脂で接合・復元し、周囲の色と違和感がないように、アクリル絵の具で古色仕上げしました(図5)。つぶれた状態の資料は、再度低濃度のアクリル系合成樹脂水溶液に浸漬後、半乾燥し相当量水分が残った状態で、粘土で作製した保持型に当てながら形状を徐々に補正しました。欠失箇所は、保存してある断片から該当するものを探して接着・復元しました。断片が見つからない欠失箇所は、ガラス繊維を板状にエポキシ樹脂で加工し、欠失箇所の形状に合わせて接着、エポキシパテで充填し形状復元しました(図6)。

## 12) Stabilization and Restoration of Folk Toys

### Takata dolls and archery targets

In the Kesen area, there were customs for *hinasekku* (Doll Festival), a day in March in the old Japanese calendar. On that day, girls displayed dolls made of clay, and boys practiced archery with a bow and arrow outdoors. The Takata dolls and the bow and arrow set were purchased by people wishing for the healthy growth of their children at “*sekku machi*”, a market that opened in February (Kinno 1991).

The recovered Takata dolls and archery targets were dried and fumigated after being salvaged. However, since it had been difficult to preserve their original forms and to prevent degradation in a normal environment, they were sealed in gas barrier bags and stored for more than a year until a new desalination method could be established (Fig. 1).

### Stabilization and restoration of Takata dolls

It is generally believed that Takata dolls began production around the end of the Edo Period based on the Tsutsumi dolls and Hanamaki dolls of nearby regions. These folk dolls of Takata were created by farmers and plasterers during times of low agricultural production. However, more durable earthen dolls crafted in other areas began to be circulated in the region around 1960, and subsequently the easily damaged Takata dolls slowly phased out of production. In most cases, Takata dolls were made from clay mixed with fibers used for plastering as a binder, and were not baked in a kiln. The folk dolls were created using a two piece mold (front and back). The joined sections on the sides were reinforced with clay, recycled paper was attached to the bottom, and the dolls were given a finish of colored paint by coloring them with pigments.

Since they had not been baked, the disaster-damaged Takata dolls were water-soluble, and many of them dissolved in the salt water of the tsunami. Because the folk dolls had been

wrapped in tissue paper while in storage at the RTCM prior to the disaster, the tissue paper affixed to the surface of the salvaged dolls and caused damage to the coloration layer. The neck parts were broken in many items due to their fragile nature. Some dolls turned into a lump of dirt, while others were crushed after coming apart on the sides. Except for one salvaged item which was stored in a plastic bag, all other items were damaged (Fig. 2). After observing the salvaged doll parts, stabilization and restoration was initially performed on the sets of pieces that could be identified as one single doll based on the patterns on the body parts and the cross-sectional shapes (Fig. 3). Subsequently, treatment was performed on the selected salvaged objects which retained their shapes relatively well despite having been crushed.

It was impossible to desalinate the earthen and unbaked Takata dolls by soaking them in water. For this reason, desalination was performed while reinforcing their materials by soaking the dolls in a 3% to 5% acrylic synthetic resin solution (Fig. 4). The dolls were first soaked in a lower concentration solution and then soaked in solutions with increasingly higher concentrations. Each time, the dolls were soaked for a short period, dried, and then the strength level of its materials was visually checked. While the amount of soaking depended on the conditions of the salvaged objects, most of the dolls had to be soaked three to five times.

The desalinated and strengthened pieces were joined together using an epoxy resin, and were given an antique finish using acrylics to make them blend in with the colors of the surrounding pieces (Fig. 5). Crushed objects were soaked in a low-concentration acrylic solution once again, partially dried, and then their forms were gradually restored while a considerable amount of moisture was still retained in them by pressing the dolls against a holding mold made from clay. Relevant pieces were chosen from the preserved pieces



図1 ガスバリア性袋に封入した救出断片  
Fig. 1 Salvaged pieces sealed in a gas barrier bag



図2 救出された断片  
Fig. 2 Salvaged piece



図3 付着した薄葉紙を除去しながらクリーニング  
Fig. 3 Cleaning a fragment while removing the attached tissue paper



図4 アクリル樹脂に浸漬し材質強化  
Fig. 4 Strengthening the materials by soaking them in an acrylic resin solution



図5 修復・復元後の高田人形  
Fig. 5 Restored and partially reproduced Takata doll

図6 復元途中の高田人形と粘土で作製した保持型  
Fig. 6 Takata doll being restored and a preservation mold made from clay



図7 竹枠から本紙を外す  
Fig. 7 Removing the front sheet from the bamboo frame

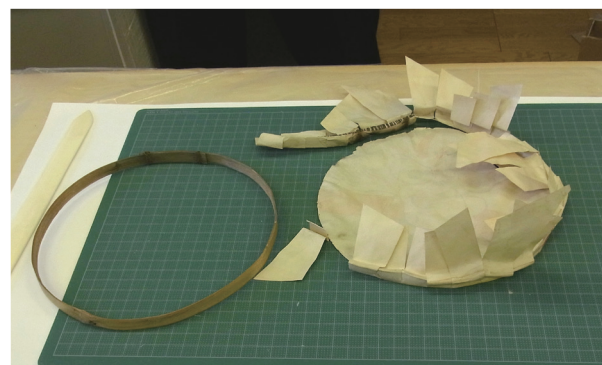


図8 解体した本紙と竹枠  
Fig. 8 Disassembled front sheet and bamboo frame

## 的の安定化処理と修復

的は「弓矢」として1975（昭和50）年頃まで弓・矢・的のセットで製作、販売されていましたが、矢の材料である鳥の羽が手に入りにくくなったことなどでその後衰退していきました。的は、カラ竹を薄く裂き巾1cm、直径約18cmの輪を作り針金で縛って竹枠とし、本紙が手描きの場合には鉛筆で下絵を描いて切り込みを入れ竹枠に嵌め込み接着した後、輪郭線を描き顔料で彩色を施し製作されています（注）。本紙は安価な洋紙を用い、裏面に折り込んだ切り込み部分が剥がれないように、雑誌などを丸く切った裏紙で補強されています。修復対象の的は、直径15～24cmで、製作年代が下の的ほど小さくなる傾向がみられます。表面の絵柄は鬼が菱餅に食らいついているものと、盃に食らいついている2種類があります。

処理した資料は海水損し、細かな砂が本紙と竹枠の隙間に入り込み、竹枠の針金の錆化、本紙の歪み・剥離・損傷、手描き文様の退色などの劣化が著しく進行していました。

処理に先立ち、対象資料6点の本紙と裏紙の材質調査および酸性劣化の有無をみるため、pH測定を行いました。その結果、いずれの資料も6.0～7.0の値を示し、書籍では中性紙と言われている紙も弱酸性を示すことがある（鈴木1993）ことをふまえると、酸化劣化の可能性は極めて低いと判断し、脱酸処理などは行わないこととしました。また、マイクロスコブで各資料の繊維を観察した結果、本紙と裏紙の材質は、広葉樹または針葉樹を加工した洋

紙であることがわかりました。

脱塩処理は的を解体（図7）して本紙、裏紙および竹枠に分けて（図8）行い、処理液が水道水の塩化物イオン濃度と同程度の値になった時点で終了としました。本紙は顔料の流出を避けるため、刷毛などを用いたドライクリーニング（図9）で砂や泥を充分除去した後、湿りを加えた吸い取り紙に挟み、脱塩処理を行いました（図10）。本紙の脱塩処理効果は間に挟んだ吸い取り紙の塩分量で評価し、上記の挟み込みによる処理を2回繰り返して終了としました。裏紙は本紙と同様にドライクリーニングした後、ポリエチレンネットの間に挟み、養生しながら流水と精製水による洗浄・脱塩を2回行いました。竹枠は12%次亜塩素酸ナトリウム水溶液10ccを2Lの水道水で希釈した液に30分浸し、その後、半日おき毎に水換えしながら4日間精製水に浸漬しました。

脱塩処理が終了した本紙は、損傷個所を楮紙で補強（図11）した後、裏面全体を1%のMCを用い楮紙で裏打ち強化しました（図12）。欠失個所のある資料は、市販の洋紙を欠失個所の形状に合わせて充填し、損傷個所の補強と同様の手順で楮紙を用い本紙と接着しました。裏打ちした楮紙は本紙の大きさに切り揃え、本紙にならって切り込みを入れ、錆びた針金をステンレスの針金に置き換え、整形した竹枠に2%のMCで貼り込みました（図13）。なお、修復したことにより本紙の図柄の大きさが0.1～1mm変化したため、図柄に合わせて竹枠の大きさを調整しました。その後、裏紙を2%のMCで接着・乾燥後、補強し

and attached to areas that had lost pieces. When there was no relevant piece, the area which the missing piece had occupied was shaped and restored in the following manner: glass fibers were processed into sheets using epoxy resin, then those sheets were attached to the area of loss according to its shape, and finally the area was filled with an epoxy paste (Fig. 6).

## Stabilization and restoration of archery targets

Archery targets were crafted and sold until around 1975 as part of a “bow and arrow” set which consisted of a bow, arrow and a target. However, the bow and arrow set gradually stopped being produced for several reasons including the increasing difficulty in obtaining the bird feathers that were used to make the arrow. The target was crafted by first tearing *kara* bamboo into thin pieces to create a 1 cm wide strip, which was made into a loop with a diameter of approximately 18 cm. This loop was bound with wire to make a frame. In the case of targets with hand-drawn designs, a rough sketch was drawn by pencil on the paper to be used as the front sheet, small cuts were made at the fringe, and then the paper was pressed in and glued onto the bamboo frame. Subsequently, the design outlines were drawn and then the design was colored (See Note). The front sheet was made of inexpensive paper and was reinforced with a round paper lining at the back to prevent the cut areas pressed in at the back from peeling off. The paper lining was created by cutting out a magazine or similar material. The targets involved in this treatment project had 15 to 24 cm diameters. The earlier the production year, the smaller the size tended to be. There were two designs used to adorn the front: a goblin biting on a diamond-shaped rice cake (a Japanese Doll Festival treat) and a goblin grabbing a *sake* cup with its teeth.

The objects treated in this project had been damaged by seawater. Fine sand had entered into the gap between the front sheet and the bamboo frame. A considerable amount of

degradation had progressed including corrosion products on the bamboo frame wires, front sheet deformation and discoloration of the hand-drawn designs.

Prior to performing restoration, pH measurements were taken on 6 salvaged targets to identify the material of the front sheet and the back lining paper, and to check whether acid degradation had occurred or not. As a result, all items had pH levels between 6.0 and 7.0. Taking into consideration that mild acidity is occasionally observed in the type of paper used for books (commonly referred to as acid-free paper) (Suzuki 1993), it was concluded that it is highly unlikely that acid degradation had occurred. Accordingly, it was decided not to perform deoxidization or any other related treatment. It was also discovered from observation on the fibers of the salvaged objects using a microscope, that the material used for the front sheet and the back lining paper was a non-Japanese paper made by processing deciduous or coniferous trees.

The targets were disassembled (Fig. 7), and desalination was performed separately on the front sheet, the back lining paper, and the bamboo frame (Fig. 8). Desalination was considered complete when the chloride ion concentration level of the treatment solution reached a level close to that of tap water. To prevent the pigment from running, the front sheet was dried and then cleaned using a large brush to completely remove the sand and dirt (Fig. 9). Then, desalination was performed by sandwiching the front sheet with moisturized blotting paper (Fig. 10). The desalination results of the front sheet was assessed by the salinity of the blotting paper sheets used in the process. Desalination of the front sheet was complete after repeating the above described treatment twice. The back lining paper was similarly treated by dry cleaning. Then, after surrounding it with polyethylene nets, the lining paper was washed, desalinated, and cured, using running water and then purified water. This washing process was repeated twice. The

た個所や洋紙で補った欠失個所を日本画絵の具で補彩し (図14)、仕上げとしました (図15・16)。

注 的作りを最後まで行っていた鈴木繁文氏への聞き取り調査に拠る (2013年8月21日実施)。

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bamboo frame was soaked for 30 minutes in a solution of 10 cc 12% sodium hypochlorite solution in 2 L of tap water. Subsequently, the frame was soaked in purified water for 4 days while changing the water every 12 hours.

The damaged areas of the desalinated front sheet were reinforced with *kozo* (mulberry) paper (Fig. 11). Then, the entire back side was reinforced by lining it with *kozo* paper using 1% methylcellulose (Fig. 12). Targets with missing material were treated by filling the area with commercial paper cut into shapes to fill the gaps, which were glued to the front sheet using *kozo* paper and employing the same procedure used for reinforcing the damaged areas. The lined *kozo* paper was trimmed to the size of the front sheet, and then small cuts were made on the fringes in a similar manner to the cuts made at the fringe of the front sheet. The rusted wires were

replaced with stainless steel wires. Then the back lining paper was pressed in and glued onto the shape-adjusted bamboo frame using 2% methylcellulose (Fig. 13). Since the restoration work had caused the size of the front sheet design to change by 0.1 to 1 mm, the size of the bamboo frame was adjusted to the design. Finally, after gluing the lining paper with 2% methylcellulose and drying it, the reinforced areas and areas of loss supplemented with non-Japanese paper were colored using Japanese paint (Fig. 14) to conclude the restoration process (Figures 15 and 16).

Note: According to an interview of Mr. Shigefumi Suzuki, the last Takata target craftsman (conducted on Aug. 21, 2013).

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図9 本紙のドライクリーニング  
Fig. 9 Dry cleaning the front sheet

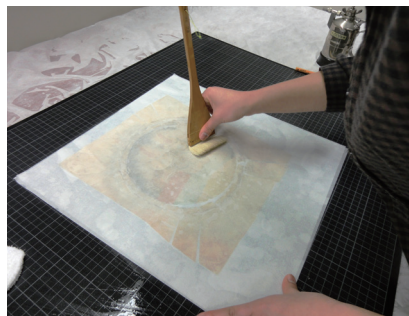


図10 本紙の脱塩処理  
Fig. 10 Desalinating the front sheet



図11 本紙損傷箇所を楮紙で補強  
Fig. 11 Reinforcing a damaged area on the front sheet using *kozo* paper



図12 楮紙による本紙の裏打ち強化  
Fig. 12 Strengthening the front sheet by lining with *kozo* paper



図13 竹枠に本紙を貼り込む  
Fig. 13 Pressing in and gluing the front sheet onto the bamboo frame



図14 補修箇所の補彩  
Fig. 14 Supplementary coloring of repaired parts

(front)

(back)

(front)

(back)



図15-1・15-2 修復後の表面・裏面  
Fig. 15-1 & 15-2 Post-restoration target (front and back view)



図16-1・16-2 修復後の表面・裏面  
Fig. 16-1 & 16-2 Post-restoration target front and back view