PART V

ARCHAEOLOGICAL CONSERVATION IN ULAANBAATAR, MONGOLIA
2006 Field Season

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Archaeological conservation activities typically take place during the excavation and study phases of an archaeological project, and range from involvement in the field recovery of artifacts, basic stabilization of excavated finds – including aspects such as cleaning, consolidation, reassembly, as well as housing for safe transport and storage – and other preparations that allow these important materials to be studied and enjoyed in the future. This report describes the artifacts conservation activities of conservators from the Smithsonian's Museum Conservation Institute (MCI), particularly during a short period of residency in the capital city, Ulaanbaatar, during the 2006 field season of the Joint Mongolian-Smithsonian Deer Stone Project (DSP).

BACKGROUND

MCI conservators have been part of the Deer Stone Project since 2004, and began assisting with archaeological conservation challenges in the field in 2005. That year, both the DSP and the Khanuy Valley Project on Early Nomadic Pastoralism (KVP), led by Drs. Francis Allard and Diimaajav Erdenebaatar, benefited from conservation involvement in the lifting and stabilization of newly excavated artifacts. With official permission, two artifacts and several samples from KVP excavations were temporarily transferred at the end of the field season for further conservation and analysis at MCI, which is currently in progress. Conservators' participation in the 2006 field activities was arranged as a collaboration between these projects and MCI, through a specialized program for archaeological conservation under Beaubien's management, with financial support from the Smithsonian Institution, including a research grant from the Office of the Under Secretary for Science, and the Samuel H. Kress Foundation.

OVERVIEW OF THE 2006 FIELD SEASON

The conservation team was composed of Harriet F. (Rae) Beaubien (senior objects conservator), Leslie G. Weber (conservation fellow), and Basiliki Vicky Karas (contract conservator, 3D scanning). Beaubien and Weber arrived in Ulaanbaatar with the majority of the DSP team on June 1. For the third year, the DSP organized a professional symposium for presentation of current archaeological and ethnographic research in Mongolia, including presentations by Beaubien and Weber. The symposium was accompanied by a day of practical workshops, followed by a one-week consultancy, with a focus this year on paper-based materials, led by Nora Lockshin (conservator, Smithsonian Institution Archives), and on taxidermy specimens, led by Paul Rhymer (exhibit specialist, Smithsonian's National Museum of Natural History). These events have provided an active forum for bringing together the conservation and museum community in Mongolia, and facilitated the interactions and collaborations that are features of the activities that took place during the 2006 field season.

Departing Ulaanbaatar on June 6, the DSP team, including Mongolian archaeological

professionals and students, accompanied by the KVP team, began their research activities in northern Mongolia. The primary focus for Beaubien, Weber and Karas (who had arrived June 5) was the field documentation of ancient deer stones using 3D scanning technology among other more conventional recording methods. The conservation team concentrated on documenting 28 deer stones at the Khanuy Valley site KYR119 (these were not scanned), over 14 deer stones at Ushkiin Uver in the environs of Moron, and 1 deer stone at Ulaan Tolgoi near Erkhel Lake. These activities are described more fully in a separate report.

Conservation of artifacts was also a part of the season's activities, especially during a short period of residency for Beaubien and Weber in Ulaanbaatar between June 30 and July 13 at the end of the field season. During that time period, we were able to spend some time with staff at the Cultural Heritage Center, the hub of the conservation community in Ulaanbaatar. The CHC is charged with registering the historical and cultural monuments of Mongolia, which includes a program of molding and replicating key sculptures, as well as restoration; current projects include cleaning and mounting leather garment and other costume elements, and stabilization of flaking paint on polychrome sculpture. These provided opportunities to discuss conservation materials and methods, and possibilities for future training.

Conservation of newly excavated materials is of growing interest in the Mongolian archaeological community, not just among DSP colleagues based at the National Museum of Mongolian History but also within the Institutes of Archaeology and of History (components of the Mongolian Academy of Sciences). The KVP began incorporating conservation in both field and laboratory operations during the 2005 field season, in collaboration with MCI conservators. In July, we continued our work with this team in a laboratory setting, using a 3rd floor office room provided by Dr. Erdenebaatar at the Institute of History, where the project's field supplies and excavated materials are stored. This season, the KVP team and the French-Mongolian team excavating Gol Mod (1), another Xiongnu cemetery, had an opportunity to interact closely for the first time. The team, which included a conservator, was carrying out lab work at the Institute of Archaeology nearby, allowing a fruitful exchange of ideas about the artifacts, as well as future archaeology-conservation collaborations in Mongolia.

The following section provides information about the specific conservation actions undertaken.

ARTIFACT CONSERVATION

Fig. 1 Dr. Francis Allard (3 July 2006)

Conservation attention was given to artifacts identified as priorities in discussions with Dr. Francis Allard (KVP director) [Fig.1] and Bryan K. Miller (Gol Mod 2 field supervisor) [Fig.2], both of whom were either present or in close consultative contact with Beaubien and Weber during all phases of the conservation work. Our focus was on artifacts recovered from excavations of the Tomb 1 complex at Gol Mod 2, an important Xiongnu period cemetery dating between approximately 300 BC and 200 AD. [Note: The numbers for Tomb 1's 27 satellite burials were adjusted in 2006 to make their designations consecutive, vs. field numbers given in order of excavation. The new numbers are as follows: Burials 1-6 (unchanged), 7-21 (previously 9-23), 22 (previously 7), 23 (previously 8), 24-27 (unchanged).]

The conservation process was documented through daily notes

Fig.3 Bryan Miller [8 July 2006]

written in a notebook and on conservation forms (one for each artifact) with detailed descriptions of any actions. Digital photographs were taken to document artifact condition before, during and after these actions. Copies of the report and a CD of conservation images were prepared for distribution to primary project personnel for the project archives. The original notebook and supporting documents are archived at MCI, in Suitland, Maryland, under *MCI 6048*.

The conservation actions for each artifact are summarized below. For reference, an overview of general conservation principles and procedures, including selection of conservation materials and methods, is provided in the Appendix; those materials used for this project are detailed, along with procurement source.

GM2-1-21.C – *Iron lattice decoration (block lifted segment of coffin wall), Burial 21*
(previously GM2-1-23.8C, Burial 23)

This artifact, block-lifted by Beaubien and Karas during the 2005 field season, was a conservation priority for Beaubien and Weber in 2006 [Fig.3]. Its iron components, found in associated with degraded wood, include two strips (GM2-1-21.C-1 and C-2, each made up of pieces a-h) and 3 quatrefoils (GM2-1-21.C-3, C-4 and C-5).

Summary of conservation actions in 2005. The west wall, composed of tangent walls of the inner and outer coffins, was left relatively undisturbed during the excavation of Burial 21 (then 23) in order to preserve the layout of iron lattice decoration on the outer surface of the inner coffin, sandwiched between the walls. (It is thought to be of a similar type to that found on the exterior surface of the inner coffin of Burial 27, excavated in 2004; in this case, the iron pieces were removed as loose pieces following photographic documentation.)

Fig3 Blocklifted segment, resting on its interior side [3 July 2006]

The block-lifting of a 110 cm segment of the wall was carried out on 15 July 2005 by Beaubien and Karas. The general preparation for lifting involved protecting the wall surface with aluminum foil, pressed to conform closely, and then applying plaster-impregnated gauze bandage, wetted with water, to form a continuous layer, which would form a rigid conforming support once dry. The wall segment leaned outward, so the bandage was layered on to the interior side first; this was followed by bandage application on the deeply undercut exterior side. During this process it became apparent that the outer coffin may have been partially removed by the excavators, potentially disturbing the decoration. Several loose iron pieces were found; these were tucked against the wall, within the plaster jacket, but no longer in their original position. To lift the jacketed segment, the soil underneath the wall was loosened and the block was gently tilted back on to its interior surface, resting in a large tray. Aluminum foil was wrapped around the exposed edge, and duct tape was strapped around the block in several places along the length. The artifact was subsequently transported at the end of the 2005 field season to the KVP storage container behind the Institute of History building in Ulaanbaatar (reference: *MCI 5974*).

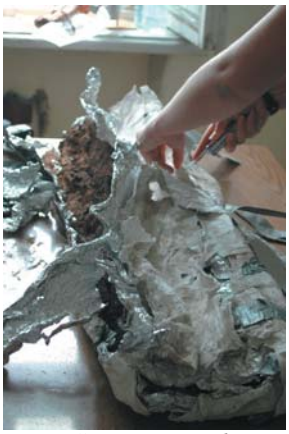

Fig.4 Cutting open the plaster jacket [4 July 2006]

Excavation of the block [3-6 July]. The plaster jacketed block containing the coffin wall segment was moved by Allard and Miller from the storage container to the laboratory room. Still resting on the side corresponding to the coffin wall interior, the block was opened by cutting plaster and tape along the edges to remove the uppermost material, exposing the coffin wall exterior [Figs.4-6]. This wood (degraded), obscuring the decorated inner coffin wall, was gently broken up with bamboo skewers and removed with brushes. Rootlets were cut with scissors and sand was brushed off until the corroded iron strapwork pieces were exposed. These had a plain surface, with a textile pattern pseudomorphed in the corrosion on the other side. The pseudomorphs, produced by contact between the iron and a textile, provide evidence that the exterior surface of the inner coffin wall was once covered with a textile; with iron pieces attached on top, the plain side represents the presentation surface.

Fig.5 Northern half (exterior) before conservation [4 July 2006]

Fig.6 Southern half (exterior) before conservation [4 July 2006]

As anticipated, the original layout had been significantly disturbed. A number of pieces were found concentrated near the base of the wall and others were found with the textile side facing up [Figs.7-10]. This may have occurred with the deformation of the coffin wall, caused by pressure from a log making up the coffin lid; this log was included in the block-lift and had partially covered the iron pieces [Fig.11].

Fig.7 Iron pieces exposed in the central area near the base of the wall (as seen from wall top) [4 July 2006]

Fig.8 Detail of iron pieces exposed in the central area near the base of the wall [4 July 2006]

Fig.9 Detail of iron pieces in the central area near the base of the wall, with small fragment showing side with pseudomorphs [4 July 2006]

Fig.10 Southern half with iron pieces exposed [4 July 2006]

Fig.11 Northern half after removal of iron pieces, showing wood from coffin lid articulated [5 July 2006]

Reassembly of the iron pieces [3-6 July]. The iron pieces were documented *in situ* as they were uncovered, then removed and laid out on trays covered with cotton cloth [Figs.12,13]. Approximately 43 pieces making up strips, 3 plaques (quatrefoils) and very small iron fragments were found; among the latter was one very small piece with attached gold foil. A flanged arrow head was also found (identified by Miller), along with an arrow tang fragment with wood pseudomorphs and a few curled dark grey paint chips. All removed wood and sand material cleared from the plaster jacket was checked for overlooked fragments, before it was bagged for discard.

Fig.12 Iron pieces from the northern half, during reassembly, shown with drawing of their as-found positions [4 July 2006]

Fig.13 Iron pieces from the southern half, during reassembly [4 July 2006]

Most of the iron pieces could be directly linked to other pieces. Pieces were joined using HMG adhesive (cellulose nitrate), which produced sufficiently strong joints, cured quickly and was very easy to administer from the tube onto the break face. The pieces were assembled in ca. 15cm lengths, to prevent overly long segments that would be prone to snapping. The glued segments were propped in a sand tray during adhesive drying.

To reconstruct the decoration pattern, the conjoining components were laid out**,** approximating their as-found location in the block. These formed two long strips (labeled GM2-1-21.C-1 and C-2) [Fig.14]**.** Although the pattern was somewhat collapsed and disturbed, the pieces making up the strips crossed over each other in one place, at the approximate center of the preserved strips. This suggested that they had formed a large X, a reconstruction supported by Miller who cited similar examples from other coffin wall decorations [Fig.15,16]. The textile pseudomorphs on the back sides (see *Technical notes* below).were critically important in determining the spatial relationships of the components, assuming that they had been affixed to a continuous piece of textile (or at least similarly aligned pieces). The weave pattern had pronounced facing threads in one of the weave directions, which allowed the iron components to be placed relative to each other, thus fixing their crossing angle. Non-conjoining pieces were positioned in best-guess positions, using such clues as strip width, corrosion appearance and textile pattern, in addition to find spot, to confirm location.

Fig.14 Reassembled segments, aligned to form strips [5 July 2006]

Fig.15 Components positioned to show the reconstructed decoration [6 July 2006]

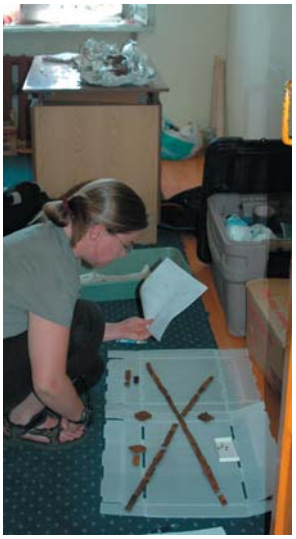

Fig.16 Weber laying out the components [6 July 2006]

Strip C-1 angles from the north end wall top toward the south end wall bottom, and consists of 8 components (C-1a through C-1h): 6 conjoining segments (a,b,d-g) and 2 non-conjoining individual pieces (c,h). Strip C-2 angles from the north end wall bottom toward the south end wall top, and is made up of 8 components (C-2a through C-2h): 5 conjoining segments (c-g) and 3 non-conjoining segment (a,b,h). The original position of the quatrefoils (labeled C-3, -4, and -5) relative to the iron strips could not be confirmed. Based on comparative information, they were placed in the open zones between strips, corresponding to their as-found location. Two found near the crossing point were placed above and below; the third, found at the southern end of the block, was placed centrally in the open zone south of the crossing point. For photography, conjoining segments were placed in contact; non-conjoining components were "floated" in approximate locations (without direct joins).

Storage housing [6, 8 July]. A protective storage box was fabricated, with the goal of making the pieces and their overall arrangement

accessible for further study. Unfortunately, the reconstructed decoration extended over an area of ca. 80 x 40 cm, which was too large a format to fit into the designated storage cupboard. With Miller's input, we made the following modifications to accommodate a smaller box [Fig.17]. Because the crossing area was the most important in the overall design, the strip components in this area were laid out in position. The segments that extended the strips toward their ends were arranged in the intermediary spaces. In the quadrant to the left of (or counterclockwise from) a crossing strip, the adjoining segment was laid out alongside it, followed by the next segment, and so on. There was sufficient space to position the quatrefoils in their appropriate quadrants. The pieces were laid out with the presentation (plain) side facing up, but oriented appropriately according to weave pattern on the back side.

Fig.17 Components arranged and secured in the storage box [8 July 2006]

The storage box was constructed of Coroplast, using sheet and pre-cut trays to form a base and lid; joins were made with hot-melt glue. The iron pieces were mounted on a rigid white Coroplast-type board; two corners were folded up to serve as handles to allow easy removal. This tray was lined with a sheet of Volara foam, adhered with hot-melt glue, which formed a soft layer on which the iron pieces were organized in the pattern described above. To keep all the components in place, 1 cm wide Volara strips were used to form fitted compartments, attached with hot-melt glue to the Volara surface. Each compartment was labeled with the component's number using a permanent black marker (Sharpie). A ziplock bag with the small loose fragments and other associated items was positioned in an available space. The stored iron pieces were covered with a protective piece of Tyvek; on it was a reconstruction drawing of the iron decoration fully extended, with segments labeled.

The space between the tray and the lid was filled with a pillow, made of a Tyvek cover stuffed with four layers of polyester batting [Fig.18]. This was attached to the inside of the lid using hot-melt glue. This pillow serves to fill up the empty space and to exert gentle pressure on the pieces to prevent any movement. The lid and base were held together by two cotton bands, which were glued onto the outside of the base and can be tied on top of the lid. The box was labeled with the artifact number, packing date, and "top" designation.

Fig.18 Storage housing, opened (left) and secured for storage [8 July 2006]

Technical notes. The iron pieces were mounted on the wood coffin wall, which had been covered with cloth, judging from textile pseudomorphs on their back (non-presentation) sides formed as follows. As the iron corroded, the corrosion products infiltrated the threads of the adjacent cloth. Although the organic fibers eventually decomposed (including all the portions of cloth not covered with iron pieces), the absorbed corrosion products had taken their shape through a mineralization or pseudomorphing process. The pseudomorphs (now a feature of the iron pieces) represent what would have been the non-presentation side of the textile. The individual threads are Z-spun and have a twist angle of about 45 degrees (estimated). The thread count is 19-20 x 5-6 per square cm. This results in what appears to be a coarse fabric in an unbalanced (or ribbed) plain weave, in which threads in one of the directions are dominant (a function of thread dimension or spacing tightness). On one of the iron strip fragments, a small patch of a very different textile pseudomorph was found on the front (presentation) side. It has an extremely fine weave with a shiny appearance, possibly once part of a silk cloth. Several fragments retain small protruding corrosion lumps on their back sides that may be the remains of the shafts of iron attachment hardware.

GM2-1-22.33 – ***Copper alloy disk, Burial 22*** (previously GM2-1-7.9/33, Burial 7)

Fig.19 Disk with organic remnants on upper side and cushion from below [6 July 2006]

Fig.20 Stone beads (22.33A) and cordage fragments (22.33B) associated with the disk [4,6 July 2006]

This unusual disk with associated materials [Figs.19, 20]was excavated in July 2004, and is the closest comparison to another found in 2005 in Burial 21 (previously Burial 23), which is currently being analyzed and conserved at MCI, on loan from the Mongolian Academy of Sciences (reference: *MCI 6005*).

One surface is covered with organic remnants composed of multiple textile layers, including a possible fur layer and a leather patch. The textiles and fur adhere together but are detached from the disk. The leather patch is also only loosely sitting on the disk. Two stone beads (GM2-1-22.33A) were originally sitting underneath the leather patch, but were removed and stored in a ziplock bag. Other items associated with the disk are a cord fragment (GM2-1-22.33B) and other textile fragments (GM2-1-22.33C), which seem to be part of the textile that covers the disk. The disk (with no organic remnants on that side) rested on a cushion of what seems to be compressed plant material. In addition to the main mass, loose material originating from this mass are stored in several small ziplock bags. All the components (disk, textile-fur layer, leather patch, plant material cushion) have been taken apart for examination several times since excavation, and are no longer in their exact as-found positions.

Documentation [6 July]. The disk was photographed by Weber both as a whole with all components in place, as well as with the covering textile-fur layer, the leather patch and the underlying compressed plant material taken off [Figs. 21,22].

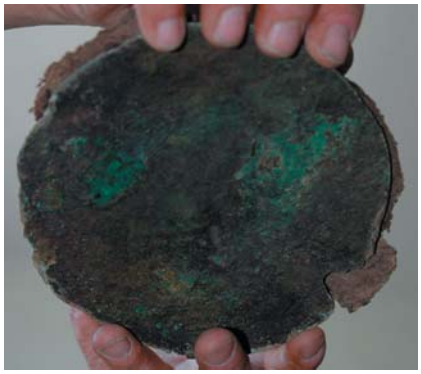

Fig.21 Disk underside [6 July 2006]

Fig.22 Upper surface of disk with organic covering removed [6 July 2006]

Protective housing [6, 8 July]. The disk and associated components were re-housed by Beaubien within a plastic lidded box, divided into three levels to hold the disk and all associated materials.

The plant material found beneath the disk was housed in the bottommost level [Figs.23, 24]. A container was made from two polystyrene weighing dishes, cut and taped together. A piece of Volara foam was glued to the bottom for cushioning. The plant material was placed in piece of Tyvek, which was folded loosely over the top. The walls extend just above the level of the contents, so that the shelf forming the next level provides a protective roof.

Fig.23 Dish to house organic cushion [8 July 2006]

Fig.24 Bottommost level of the bin, with shelf for middle level [8 July 2006]

The disk and its organic remnants were housed in the middle level on a shelf created with Coroplast sheet. Its sides were folded down to form supporting walls, which fit snugly between the edges of the container (below) and the bin long sides. The tray for the disk consisted of a rigid Coroplast-type square [Fig.25]. A central prop was added for easier access, if removal of the disk was necessary. The prop was created with an inverted polystyrene dish (cut down to form a low platform), with a Volara cushion; this was taped to the tray. Four bumpers, placed around the perimeter, were created using curved strips of archival board. These were covered with Volara and glued to the tray; with the disk in place, there was ca. 2 mm clearance from the fragile edges. Finally, all these elements were covered with a single piece of Tyvek tissue (tacked in place) to form an inert, smooth, minimally abrasive surface for the disk.

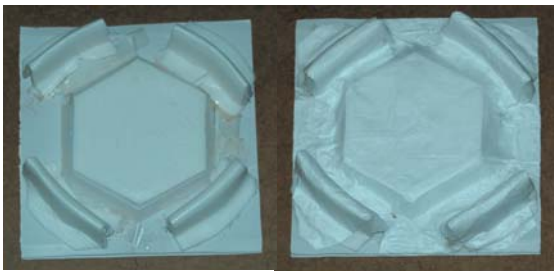

Fig.25 Stages of construction of the disk support [8 July 2006]

Fig.26 Disk housed in middle level of bin, shown with the padded shelf [8 July 2006]

A second Coroplast shelf was constructed, with a small cushion of polyester batting covered with Tyvek attached to its underside [Fig.26]. With its supporting walls resting on the lower shelf along the bin's short sides, this formed a protective compartment for the disk, the cushion gently immobilizing the organic deposit on its upper surface. The small bags of associated material were stored on top of this shelf, on the uppermost level. Finally, a pillow of batting covered with Tyvek was attached to the inside surface of the bin lid, in order to fill up the remaining space and help immobilize the bin contents [Figs.27,28]. The lid latches to the bin with two exterior clamps. The bin was clearly labeled with permanent marker.

Fig.27 Uppermost level of bin with bags of associated material [8 July 2006]

Fig.28 Storage bin with disk and associated materials [8 July 2006]

GM2-1-7 – ***Wood coffin corners, Burial 7*** (previously GM2-1-9.7, Burial 9)

Burial 7 was excavated in July 2004. The southwest and southeast corners of the coffin were kept as examples, preserving evidence of tenon construction. These had been stored in a small plastic lidded box [Fig.29].

Fig.29 Wood coffin corners before rehousing [3 July 2006]

Storage housing [8 July]. The artifacts were each wrapped in Tyvek to reduce abrasion and contain detaching fragments. Part of a Coroplast tray was used to create a rigid base for one of them, with a panel of Coroplast sheet to serve as a vertical support. A second level was created with a Coroplast sheet, which provided support for the second artifact.

GM2-1/4 – *Plaque, Burial 4*

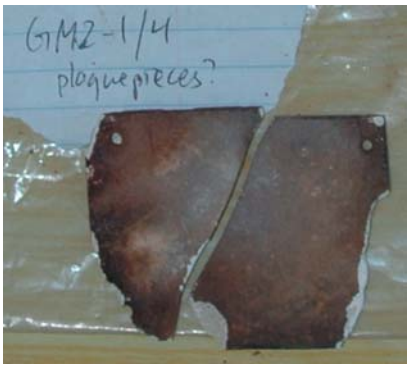

Fig.30 Plaque fragments [3 July 2006]

The two fragments, excavated in 2006, comprise a thin rectangular object with perforations, made of an unknown material [Fig.30]. All surfaces, including some of the breakage surfaces, are brown in color, except where the surface is damaged and crumbling; here the bulk material appears white. According to Andrea Steffen, the conservator for the French-Mongolia mission excavating at the Gol Mod (1) cemetery, the material is some kind of stone.

Sampling for material identification [8 July]. To identify the plaque material, a sample was collected from crumbled material in the bag. The sample was stored in a glass vial and brought by Beaubien and Weber to MCI for analysis. A mineralogical identification would be possible with X-ray diffraction analysis, guided by elemental information from energy dispersive X-ray analysis.

Other Activities

Fig.31 Rehousing iron objects [3 July 2006]

Other materials were examined and selected items photographed for comparative purposes, as part of the conservation actions described above [Fig.31]. Of particular interest were remains of the iron latticework recovered from Burial 27, the only other one besides Burial 21 with this decoration.

The examined materials were resorted and repacked in four containers as follows: small plastic lidded bin with Burial 7 items; medium plastic lidded bin with Burial 27 items (small bags); medium cardboard box with Burial 27 items (heavier bags); small cardboard box with Burial 27 animal bones.

The KVP collection of excavated materials is currently distributed between cabinet storage in provisional office space and outdoor container storage, both at the Institute of History. Planning was in progress to find secure storage at the University of Ulaanbaatar, with the advice of the conservation team.

APPENDIX: CONSERVATION PRIORITIES and PROCEDURES

The primary goal of conservation is to preserve as much about an artifact as possible – its material and its informational content – to enable it to be studied and appreciated in the future. The key preservation strategies focus on (1) stabilization actions, to eliminate or minimize potential agents of deterioration; and (2) elucidation actions, to make accessible and clarify important features (such as by cleaning and reassembly, and technical analysis).

In selecting conservation materials and methods to achieve these goals, certain key principles are followed. These include altering the original as little as possible to achieve the preservation goals. Passive (non-invasive) methods, focusing on protective storage and environmental control, are favored over ones that introduce new material, where possible. When interventive approaches are appropriate, a minimalist approach is favored. Conservation materials should meet high performance standards (e.g. being well-tested, stable over time, reversible if possible), be appropriate for the particular application and the issues presented by the artifact materials, and not inhibit further conservation or analysis. Documentation of all actions, including details of materials and methods used, is critical. Since these may result in changes of appearance or composition, this documentation adds information potentially significant to those conducting research using these artifacts.

Conservation actions beyond basic stabilization carried out in the field are typically deferred to a laboratory phase. In 2006, we were able to continue the technical investigation and conservation of an artifact that had received *in situ* attention during the excavation process. In 2005, a support to enclose the artifact for lifting was created with *plaster of Paris-impregnated gauze bandage*. During application, a barrier layer, such as *aluminum foil* (used here), is always used to protect the artifact materials and especially when easy release from the surface is desirable. Bandage strips are dipped in water to activate the plaster, and are smoothed in place to bond the layers; these form a rigid support upon curing/drying.

While plaster jacketing is sufficiently stable for storage on a temporary basis, it is preferable to fully excavate the enclosed artifact in a timely manner, both for reasons of accessibility and appropriate housing. Tools to excavate the artifact from its matrix are typically sturdy but unlikely (with proper handling) to scar or damage original materials, such as air puffers, bamboo skewers, and soft paint brushes. When fragments could be glued together directly, *HMG adhesive* was used; this dries quickly, is durable over a wide temperature range, and can be reversed easily with acetone.

Providing protective storage housings for artifacts remained a priority, particularly as a suitable storage location has not been finalized for the collection. Supports and enclosures were created with a range of stable synthetic materials to contain and securely prop artifacts for routine examination and handling, during transport and in storage. These included commercially available rigid plastic bins, *Coroplast* (stiff cardboard-like material), *Volara* (thin sponge-like cushioning material), and *Tyvek* tissue to provide a smooth cushioned surface adjacent to the object.

Conservation Products used in 2006

Coroplast™ (Coroplast): a corrugated board made of a polypropylene/polyethylene copolymer, used for making storage pallets, trays and boxes.

Sheet products are available in various gauges. Selected type: translucent, ⅛-inch thickness. *Vendor*: University Products, Talas and other archival suppliers.

Pre-fabricated trays are available by special order in a variety of sizes. Selected type: 10in x 12in x 2in, translucent, ⅛-inch thickness. *Vendor*: Coroplast.

Cotton ribbon, ½-inch width. *Vendor*: commercial sewing suppliers.

HMG™ heat and waterproof adhesive (H. Marcel Guest): a cellulose nitrate adhesive. It is readily reversible in acetone and is durable at high temperatures. *Vendor*: available pre-mixed in tube form from Conservation Support Services and other conservation suppliers.

Hot-melt glue: an adhesive composed of wax and ethylene/vinyl acetate copolymers, used in the construction of supports and storage containers (not artifacts). It is supplied in stick form and is administered with a hot-melt glue gun; the low-temperature variety is suitable for use with Tyvek. *Vendor*: plastics suppliers and hardware stores (low-temperature).

Polyester batting, used as cushioning or filling material. *Vendor*: commercial sewing suppliers.

Polyethylene and other rigid plastic lidded containers, such as Tupperware™, Rubbermaid™ and similar products. *Vendor*: household product stores.

Polystyrene weighing dishes, used to create housing container. Note that this plastic material is reactive to organic solvents. *Vendor*: Fisher Scientific and other chemical suppliers.

Tyvek™ 1422A and 1443R (DuPont): a vapor barrier made of spunbonded olefin, used as a paper substitute for wrapping and padding. *Vendor*: University Products and other archival suppliers.

Volara™ (Voltek): white cross-linked polyethylene microfoam, supplied in sheet form and used for non-abrasive padding. Selected type: white, ⅛-inch thickness.
Vendor: University Products and Cantwell-Cleary.