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CONSERVATION AND COLLABORATION TO UNDERSTAND A *TIPONI*

Nancy Odegaard

Abstract

In this paper, the collaboration of a conservator and several specialists is discussed with regard to the identification, description, and preservation of an archaeological funerary fragment of painted fiber. Specialists verified the identity of the associated components. Information obtained from the conservator's technical study also enabled a cultural representative to interpret an otherwise unclear and mysterious object. This collaboration also identified the limitations of any conservation action and established that destructive analytical techniques and the introduction of additional materials such as consolidants were prohibited. A realignment treatment enabled the conservator to preserve the object in the state of deterioration found at the time of its excavation, thereby permitting accurate reburial. Together the technical study, realignment treatment, and a cultural comparison provided information that substantiated the preservation of cultural behavior spanning a period of almost 1000 years. This conservation effort was not intended to preserve the physical form of the object. Rather, through analysis and careful realignment it preserved an understanding of the object based on technical details that the conservator was particularly suited to obtain.

Background

In 1990 the environmental engineering firm of Dames & Moore was contracted by the State Office for Environmental Quality to survey and carry out a bio-remediation project of a site in eastern Arizona. The project was ordered after at least 25,000 gallons of gasoline and related by-products leaked from tanks and began appearing in the backyard ponds of down-grade property owners in the summer of 1989. These included high concentrations of benzene, toluene, xylene and ethylbenzene contamination.

The project area included a previously unknown prehistoric cemetery site. Though the contaminated land was privately owned, the Arizona Antiquities Act stipulates that a Notice of Intent to Disturb Human Remains must be filed with the Arizona State Museum (ASM). Under Arizona Revised Statutes § 41-865, the Arizona State Museum is mandated to assume the role of finding and consulting with tribal representatives regarding human remains that are determined to be over 50 years of age and from unmarked graves. In addition, Tribal Resolutions from the Hopi and a Statement of Cultural Affiliation from the Zuni were relevant to the project.

Once it had been determined that the burials were not contaminated and could be removed from the site, the bio-remediation firm subcontracted the archaeological excavation to employ professional methods to expose, map, photograph, and remove the burials. During the

excavation, information on the mortuary practice was derived from the skeletal remains and associated funerary objects. Deposits such as pottery were studied in order to identify the cultural affiliation and occupation dates of the site. Though not associated with the particular burial discussed in this paper, ceramics were associated with all of the other burials and ca. 1050 A.D has been suggested as the site date. Normal excavation techniques require that all remains and artifactual material be left until an entire burial is ready to be cleared. Thus, even extremely fragile, fragmentary, and pigmented objects may be left exposed for relatively long periods. Because conservation expertise is rarely solicited or available, most archaeologists working in the Southwest are inexperienced with organic material other than bone, and few practice the removal of objects by block lifting. This particular object was lifted onto the cardboard backing of a notepad and wrapped with aluminum foil. Notes made by the excavators indicate that their preliminary interpretation of the object was based on position and suggested that it may have been clothing. The fragmentary object was transported to a textile specialist for further examination and identification. In 1995 the textile specialist requested a conservation study because the object was painted and was not a textile.

Conservation Study

Accompanying the fragmentary mass of painted fibers were six pages of field notes and two 3 x 5 inch color in-situ photographs (Figure 1). The field notes indicated that the individual was an adult male (based on the pelvis) that had been placed in matting with the head positioned to the east, torso laid on the back, and legs flexed. The photographs and field sketches reveal that the object was placed in association with the proper left hand and over the groin area. The project archaeologists also reported that two turquoise pendants were located near the object and a small number of beads were scattered throughout the burial. They note that extensive disruption by rodents had taken place.

Under the Native American Graves Protection and Repatriation Act (NAGPRA), any interventive activities, such as excavation, examination, study, analysis, and reporting on associated funerary remains require respect and sensitivity. During the conservation study several object components were revealed, identified and verified through the collaboration of numerous specialists. Having status as an associated funerary object with a claimed cultural affiliation from the Zuni and Hopi tribes, the object could not be added to, restored, altered, preserved, or sampled using destructive techniques. The human remains, the 2 turquoise pendants and various beads did not accompany the fragment and were not examined in the conservation study.

The components identified in the conservation study included:

1) fiber: The overall structure of the painted fragments was incomplete, semi-flexible, flattened and with very little integrity remaining. Photographs taken during the field

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excavation revealed that the object overlaid the human remains of the burial and that structural distortion and breakdown of the fiber had occurred, particularly on the underside and side edges of the object. General deterioration of the fiber consisted of rot, cuticular cracking and separation, and collapse of the stem. At first, the grass fibers appeared to be laid horizontally side-by-side in layers that were not interwoven. Approximately ten parallel elements formed the unit with partial stacking of additional elements. Further examination suggested that the shape may have been cone or cylinder-like with the structure of the object held in place by wrapping and overlapping of the fibers, or perhaps the fibers had been used to wrap around something no longer present. No evidence of adhesive joining or mechanical attachment, such as stitching, was found. The grass stem material was identified by Phil Jenkins of the University of Arizona Herbarium as giant drop-seed (*Sporobolus giganteus*), a tall grass having long spike-like panicles. Accounts of indigenous use indicate that it is an easily harvested food grain and that the stems are used in making *pahos* (prayer sticks) during the Hopi Soyal Ceremony (Dorsey and Voth 1901: 20). It grows at an elevation of 2500 to 6000 ft. and is common in the area of the site (Kearney and Peebles 1960:112-114).

2) Bone: Numerous medial and proximal phalanges (finger bones) appeared to be directly associated with the object and a fragment of the distal (lower) end of the femur (upper leg bone) was also present. This association suggests that the object was held in the left hand. The identification of these bones was verified by ASM Curator of Physical Anthropology, Walter Birkby.

3) Insects: The anterior body region or cephalothorax, the first appendage (base of the pedipalps), and partial legs (base of coxal area) of a spider (*arachnid*) were revealed. University of Arizona Curator of Entomology, Carl Olsen, verified the identification and added that the spider probably crawled into and was associated with object prior to the burial.

4) Seeds: Small dark colored spheres located throughout the artifact mass were identified as Amaranth (*A. cruentus*) by comparison with known specimens in the ASM collections. ASM Curator of Archaeobotany Suzanne Fish tentatively verified the identification. Accounts indicate that use of the edible seeds is ancient in the Southwest.

5) Feathers: The fragments of feather suggest that dark flight feathers were split along the shaft and that feather-halves were inserted horizontally between the grass layers so that the barbed area would extend outward from the fiber structure. There is some evidence that fragments of downy feather were inserted between the grass and paint layers throughout the structure. The fragments of feather were desiccated, brittle, matted, cracked and disrupted. Their identification as feather fragments, perhaps eagle or duck, was suggested by Tom Hules, ornithologist of the University of Arizona Ecology and Evolutionary Biology Department.

6) Pigments: Several examples of matte paint (coatings with high pigment volume concentrations in ratio to the binder volume in the same sample; Hansen et al. 1993:xiii),

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(without color mixing) that extend over several stems; thus, a generally vertical design that is complimentary to the vertical application of the brush strokes was formed. There is strong evidence of multiple paint layers, possible refreshing or overpaint. While a recognizable color design could not be identified, four stripes of black lines appear to form a pattern as they cross two stems in the lower center portion of the specimen.

Pigments used on the object include white (calcium carbonate), black (carbon), red (hematite), and blue/green (basic copper carbonate). The identification of these pigments was verified by Aniko Bezur of the University of Arizona Materials Science Department using environmental scanning electron microscopy and electron dispersive spectrometry (Hitachi E-SEM). Environmental scanning electron microscopy is a relatively new introduction to the art conservation field and offers a solution to the problems of moist and nonconductive samples (Stulik and Doehne 1991). The identification of an additional shiny and blackish pigment was identified as specular hematite based on visual and comparative observation and polarized light microscopy. Munsell numbers for the red color are 7.5 R/ 3 Value/ 6 Chroma and 7.5 G/ 8 Value/ 4 Chroma for the blue/green.

7) Binder: The non-volatile portion of the painted colors could not be confirmed. The appearance under magnification suggests that the primary vehicle (the liquid portion of paint in which the pigment is dispersed) was probably water or perhaps saliva for the blue/green, white, black, and red colors. This was based on the visible lack of adhesion between paint layers, flashing (patches of higher or lower gloss found at laps in brushed coatings), thickness, darkening, gloss and information from various ethnographic studies.

In the lower right corner specular hematite appeared as micaceous pieces in a dark, viscous, and amorphous material that resembled a visible binder. Tests done under the stereo microscope suggest that this material softens with water but not alcohol and was applied as a type of flow coating (the paint is poured or allowed to flow over the object without brushing). Though the appearance is similar to pinyon pitch [a diterpenoid], the material is more likely a honey (a Hopi suggestion) or yucca (*Yucca baccata*) fruit syrup [a polysaccharide](a Zuni suggestion).

Though most of the bees in the Southwest are solitary, and social honeybees (*Apidae*) were not available before European contact, there are two possible sources for honey (Buckman 1996). One is the bumblebee (*Bombus sp.*) which although it is social (produces honey), is highly aggressive and stinging. Another possibility is that the honey was a trade item originating from the south (now part of Sinaloa, Mexico) where the stingless and social *Trigona* species bees existed.

A test for the presence of simple sugars (Stulik and Florsheim 1992) was modified to avoid destruction of the sample and was run against commercial honey and a blank. Despite the fact that the sample size was small (.0001 gr versus the 5 mg recommended) and unground

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fact that the sample size was small (.0001 gr versus the 5 mg recommended) and unground (so that it could be returned to the piece), the test reaction produced a slight color formation. However, the test result was considered inconclusive because the sample reaction was difficult to see as blue-green. A confirmation using gas chromatography to separate the sugar mixture, and a mass spectrometer with chemical library to identify the ions in the compound in a magnetic field and get the molecular mass of the compound itself, would have required destruction of the sample. Members from the Cultural Preservation Committee of the Zuni tribe were asked about the object in 1996 but did not approve further destructive analysis testing.

Deterioration of the paint was more complex. The overall matte appearance and lack of physical integrity suggested that little binder was present (Figure 2). The rough paint surface also suggested that wide range of particle sizes may have produced increased voids or porosity in the film that made the paint more reactive to the deteriorative elements of the burial and excavation environments. Chalking, the presence of a loose removable powder evolved from the film itself at or just beneath the surface (Hess 1965:436) was evaluated using the American Standard Testing Method (ASTM) D 659. The test involved the comparison of paint transferred to a fabric against a photographic reference. Using the standard method of evaluating degrees of resistance to chalking ASTM D.659-44, the paints on the object were evaluated as white = no.6, blue/green >no.8, red >no.8, black = no.8, specular >no.8 (10 is low chalking and 1 is high). Flaking or the detachment of small pieces of paint film due to intercoat failure (Hess 1965:439) was evaluated using the ASTM D772-47 and overall the flaking may be designated as degree of No. 2 (10 is low flaking, 1 is high). In addition, the suggestion of fading or the physicochemical alteration of coloring matter made by comparison between the in-situ field photograph and condition during examination seems to be due to the accelerated chalking of the white calcium carbonate pigment.

Original Cultural Context and Use

Though the conservation study provided considerable technical information, identification of the object and further interpretation of its cultural use required further collaboration. Hartman Lomawaima, Hopi scholar and Associate Director of the Arizona State Museum, was asked to comment on the object. Though the painted fragments appeared to be culturally Puebloan, Lomawaima could not propose an identification without the information obtained through the technical study. Lomawaima considered the wrapped-like form of the grass fibers, the use of feathers and paint on the piece, and the association of the turquoise pendants as detailed in the conservation study. He then suggested that the object could be an object of record and function much like a talking stick or time capsule. He added that at Hopi, objects called *tiponi* are made of cotton wrapped into a cone-like shape. *Tiponi* have small objects such as feathers inserted and tied on as the structure is built up, they are painted, and they

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symbolizing life and physical nourishment are beneath the plumes. Lomawaima mentioned that during use they are carried in the left hand like a rifle that is held upward from the butt.

The nineteenth century ethnologist Stephen (1936) provides extensive discussions and illustrations of the manufacture and use of *tiponi* at Hopi in the late 1890s. Stephen (1936:781-782) writes that

the *tiponi* were first obtained in the Underworld. Before the Hopi met together here, the chiefs each carried one. It is the mother of the people; in the interior are the seeds of all edible vegetation, all garden products, pinon nuts, cedar berries, every kind known to the Hopi. The feathers are eagle, turkey, parrakeet, yellow bird, all birds are typified or embraced. The cotton string wrapping is the garment; the bits of mother-of-pearl, turquoise, etc. tied around it, typify wealth...When people traveled in the early migrations, it guarded them.

Stevenson (1894:39-40) also provides some discussion of the manufacture of *I'arriko* at Sia Pueblo in the late 1880s (Figure 3). Stevenson (1894:9-40) writes that the *Ti'amoni* (meaning arch-ruler is instructed to make the *I'arriko* or supreme idol, which is

an ear of corn which may be of any color but must be symmetrically perfect, and not a grain must be missing, eagle and parrot plumes are placed in pyramidal form around the corn...The base of this pyramid is formed of splints woven together with native cotton cord and ornamented at the top with shells and precious beads. When completed there is no evidence of the corn, which is renewed every four years when the old corn is planted.

Additional discussion by Stevenson (1904:24,418-420), including several illustrations of *mili*, the sacred symbol of life and fetish of the Zuni, indicate that they are composed of seeds placed in the cavity of a perfect corn cob that is wrapped around. Feather plumes are arranged in specific order and pendants and beads are stung as a necklace for the object. Stevenson (1904:419) also suggests that four lines painted lengthwise are symbolic of the four regions.

It was suggested by Lynn Teague, textile specialist and Curator of Archaeology at the Arizona State Museum (1995), that because the date of the burial predates the cultivation of cotton (about A.D. 1100 for a noticeable scale of cotton production) among the Anasazi or Ancestral Pueblo Culture, it is likely that grass fibers may have been used for similar functions. She added that fiber matting blankets were reported for the burials, and that this is similar to the modern use of cotton textile.

Lomawaima was not certain how *tiponi* were positioned for burial but felt that a priest or chief would be buried with such an item if there was no person to inherit it. Previous

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discussions of *tiponi* from archaeological sites have been limited to non-burial stone examples (Roberts 1932:61; Lange 1944:447; Jeancon 1923:64).

Conservation Treatment

The preservation of sacred objects and funerary remains among the indigenous groups of the Southwest varies. For example, while the Zuni may not wish to repatriate human remains, since 1978 they have actively sought the return of the sacred wood sculptures that may be painted or include attachments of other materials called *Ahayu:da* or war gods (Ferguson and Eriacho 1990). The *Ahayu:da*, are allowed to continue the deterioration process through placement in a roofless building that permits a continued natural decay while preventing theft and vandalism. As part of this bio-remediation project, representatives from the Cultural Preservation Offices of the Zuni and Hopi tribes were notified and have participated in the planned relocation of the burials. As they would like reburial of all remains and associated objects to occur near the present site, negotiations are under way for a suitable location. In addition, requests for research of the associated funerary objects have required written review and permission of the tribes.

When this mass of unassociated fragments and pigment was received, an acid free cardboard tray was constructed to support the cardboard notepad backing that had become weak and limp (Figure 4). Examination under a stereo zoom microscope facilitated a preliminary identification of the materials of composition and clarification for the state of deterioration. Fragments from the object were selected for various analytical procedures with the understanding that all would be replaced on the object. Thus they were not fixed (permanently mounted) and were replaced after analysis. Based on the image presented in the in-situ photographs and evidence of structure observed on the fragments, the fibers were realigned mechanically (Figure 5).

Conclusions

The conservation process for the *tiponi* was collaborative. Due to the legal status of this object and its implied cultural sensitivity, the conservation approach required: (1) a composition study utilizing non-destructive analytical techniques, (2) an assessment of the post-excavation deterioration process, and (3) a treatment that returned the object to its condition at the time of discovery be completed in a short period of time. Under more conventional museum circumstances the application of appropriate conservation techniques might have included consolidation, reassembly, and reconstructive restoration.

The context of the *tiponi* in a burial affords a discussion of ritual practices. Because the function and context of exotic or ritual objects may be derived through studies utilizing

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prehistoric, historic, and ethnographic parallels; it is necessary to have an accurate technical descriptions of objects that provide comparative details. In this particular case, the primary archaeological requirement for this object was identification. The technical study and realignment enabled a tribal representative to interpret the object and its function. The treatment enabled the conservator to preserve the object in the state of deterioration found at the time of its excavation, thereby permitting accurate reburial with the human remains. Together the technical study, realignment treatment, and cultural comparison provided information that substantiated the preservation of cultural behavior spanning a period of almost 1000 years. This conservation effort was not intended to preserve the physical form of the object. Rather, through analysis and careful realignment it preserved an understanding of the object based on technical details that the skills of the conservator were particularly suited to obtain.

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Figure 2. Detail of painted surface.

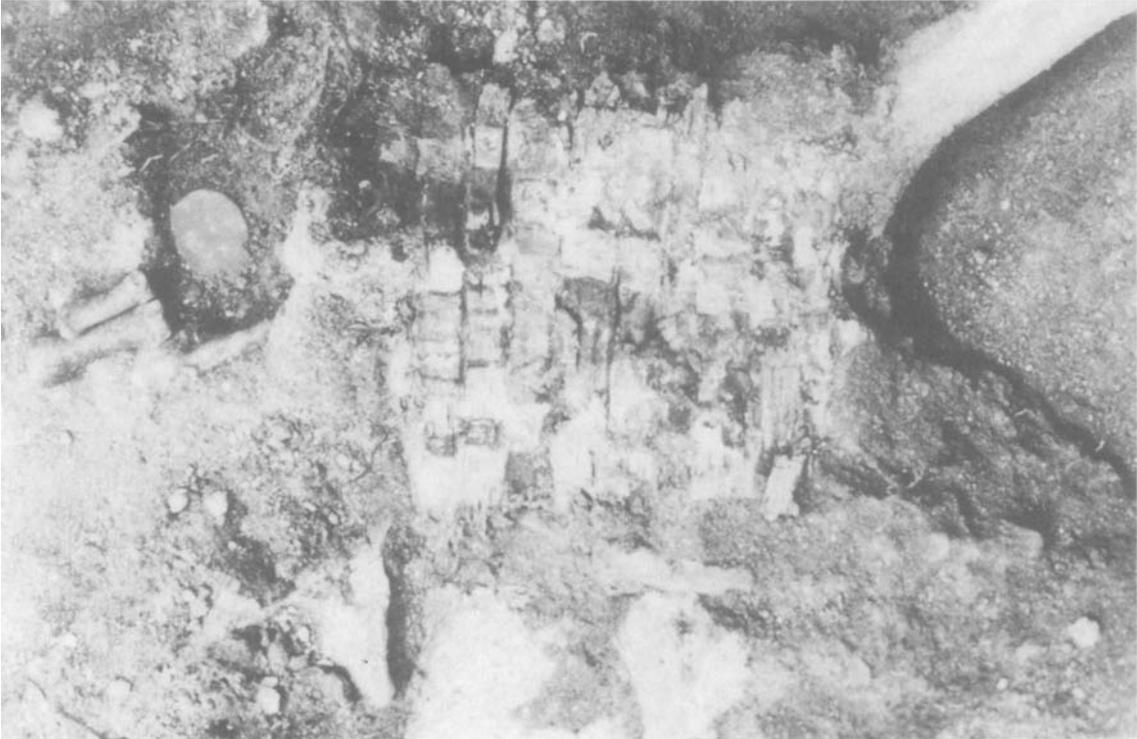


Figure 1. In-situ photograph of tiponi object.



Figure 3. Sia *I-ar-ri-ko* or prayer plume illustration (Stevenson 1894, plate IX).