# Western Science Seeks Cultural Knowledge


## Summary

Baskets are important not only amongst the Cahuilla, but for Native peoples throughout the west and northwest regions of the United States. It seems fitting then to focus the eyes of conservators on baskets and other items made from plant materials in the collection of the Agua Caliente Cultural Museum. This exhibit demonstrates the kinds of discoveries that UCLA graduate conservation students made in the investigation and treatment of Native baskets and sandals in the Museum's collection.



AGUA CALIENTE CULTURAL MUSEUM

# Introduction

Since 2006 the UCLA/Getty Master's Program in Archaeological and Ethnographic Conservation has maintained an exceptional relationship with the Agua Caliente Cultural Museum, one in which conservation graduate students apply technical knowledge and cultural insights into the examination of museum objects. Every second year in a specialized course taught by Prof. Ellen Pearlstein, UCLA Conservation students have enhanced the material documentation, answered questions about cultural attribution, and created more stable and exhibitable museum objects as a result of research and treatment steps.

In Spring 2011, Abe Sanchez, master weaver and plant expert, taught students from the UCLA/Getty Masters program how to make whole juncus twined basketry

The focus thus far has been on archaeological and historic basketry and other items made from plant fiber, ivory, painted wood and textiles. Past outcomes have permitted items to be placed on display, and in 2009 students prepared an exhibition of Agua Caliente Cultural Museum collections at the Young Research Center Library at UCLA. In 2011, students examined five historic baskets and one archaeological sandal, and described their work by preparing not only in-depth documentation for the museum archive, but images and text designed to inform the museum going public.

~Ellen Pearlstein

# Salish Basket

## Salish Basket: Materials and Techniques

*Image 1*: Salish basket from the ACCM collection

This basket comes from an area commonly known as the Plateau region of North America, home to the Salish-speaking bands of Indians. The basket's region of origin is helpful in identifying materials and techniques used in its construction. Traditional Salish basketmakers were the leading manufacturers of coiled and imbricated basketry in the Northwest. Coiled basketry involves the sewing of a vertical element, known as a stitch, around horizontal coil bundles.

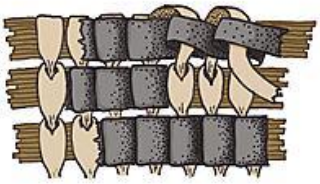


*Image 2*: Diagram of imbrication commonly used on Salish coiled basketry, with decorative imbrication (gray), stitches (cream), and coil bundles (dark brown)

**Decorative Elements: Imbrication**

Imbrication, a common technique used by the Salish peoples in traditional basketry, involves a strip of decorative material being laid parallel to the coil element, and folded back on itself. The folded edge is then caught by the next stitch, with the strip then folded back over the stitch again, resulting in small squares of decorative material covering the vertical stitches (*image 2*).

**Common Materials**

Cedar tree roots are one of the most common materials used in Plateau coiled baskets. The roots are dug, stripped of bark, and split for use, creating a long, thin, and pliable material.

The red and black material used to create the imbrication on this basket is probably cherry bark, which can be identified by the small pores visible on the surface of the bark, called lenticels (*image 3*). Cherry bark was often made black by burying it in deposits of decomposed plant matter.

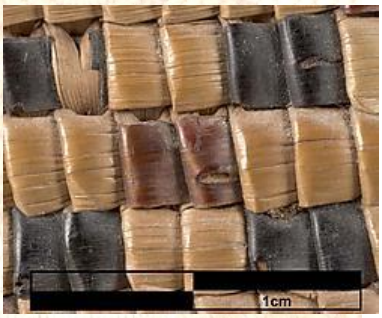



*Image 3*: Detail of imbrication on the Salish coiled basket, with the cherry bark lenticels clearly visible

## Basketry Repairs in Conservation

**Frankenstein Mends**

Basketry repairs, commonly called "Frankenstein mends," involve the application of a supportive element perpendicular to a tear. Generally, the mends are made of small pieces of rolled up Japanese tissue paper, a thin material made of plant fibers (*image 4*). While

*Image 4*: Japanese tissue paper, rolled into "stitch-shaped" Frankenstein mends, prior to application

Japanese tissue paper is white, mends that are present or visible on the external surface of the basket may be toned with paint to match the basket surface, while those on the interior are often untoned so that they can be easily identified.

**Adhesives Commonly Used For Basketry Repairs**

Basketry repairs are often adhered with wheat starch paste or methylcellulose. These natural polymer pastes are used because they have an organic, cellulosic structure that is very similar to and compatible with basketry materials (*image 5*). If these pastes do not have strong enough tack, polyvinyl acetate emulsions may also be used, although these are not as easily reversible.

*Image 5* : Wheat starch paste, prior to straining for use


*Image 6*: Shows the two tears repaired using Frankenstein mends on the interior of the Salish basket

**Repairs on a Salish Basket**

For the Salish basket from the Agua Caliente Cultural Museum's collection, Frankenstein mends were applied to the damaged corners and the torn right side of the basket. Japanese tissue paper was adhered with a mixture of wheat starch paste and methylcellulose in a 1:1 ratio in deionized water. Mends were left untoned for easy identification of the repairs (*image 6*).

– Dawn Lohnas

# Tlingit/Haida Basket

## The Role of Collaboration in Art Conservation

*Image 1* : A Tlingit basket from Agua Caliente Cultural Museum's collection prior to conservation by the UCLA/Getty Masters student

Through examining an object, a conservator may learn a great deal about its tangible or physical properties, such as materials used, manufacturing techniques, and issues of damage. However, this examination may not reveal its intangible or non-physical properties, such as cultural use or where it was made. By collaborating with experts, multiple and varying viewpoints may contribute to understanding the life history of an object.
However, in some cases, a definitive conclusion may not be possible.

**Where was this basket made?**

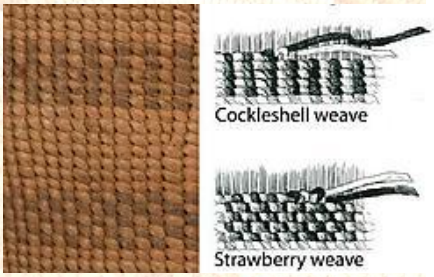



*Image 2* : A close-up image of the basket next to a diagram of the cockleshell weave and the strawberry weave

This is a common question conservators will ask while examining an artwork or artifact. In the case of this basket, opinions are divided on which part of the Northwest Coast this basket is from and which cultural group made the basket.

*"…both the Tlingit and Haida (from Southeast Alaska) used spruce root extensively, as well as the two patterns of dyed decoration: strawberry weave and cockle shell weave" (Image 2).*

– Steve Henrickson
Curator, Alaska State Museum

*"I would identify this basket as Tlingit…because of the jog-down at the base…" (Image 3).*

– Rebecca Andrews
Collections Manager, Burke Museum, Washington

*"This basket is probably not from the Tlingit or a neighboring Northwest Coast tribe…I would put it in Oregon or southern Washington."*

– Bryn Potter
Independent Curator, Basketry Specialist
BBP Museum Consulting

*Image 3*: Tlingit baskets are woven upright while Haida baskets are woven upside down. Due to this, the jog created with a change in stitch or color is characteristic. The "jog-down" in the basket from Agua Caliente Cultural Museum collections is usually attributed to the Tlingit.

*"If the stitches go up on the left and down on the right, then it is probably Haida" (Image 4).*

– Teri Rofkar, Tlingit weaver, Alaska

*Image 4*: A close-up image of the stitches on the basket from Agua Caliente Cultural Museum collections

Cultural attribution of objects with unknown makers is often difficult and complex. Cultural traditions, such as basketry weaving, are rarely static and particular to a single group. Intermarriage, sharing, and borrowing of techniques and designs are common occurrences. Additionally, baskets have a life of their own. Through trade and the tourist market, a basket may be created in one region yet purchased and used in another. This is particularly true of the Tlingit, who were traders and traveled a great deal. This cycle of travel and changing of hands may be repeated multiple times throughout the history of an object. Through research and observation, several clues may help direct the attribution of an object. In the case of this basket, the majority of expert opinions indicate it to be from the Northwest Coast and made by either the Haida or Tlingit. However, one should keep in mind that consensus was not achieved on which culture the basket is from. The attribution of objects with unknown makers is an educated guess, and there is always the possibility of mistaken identification.

**How was this basket used?**

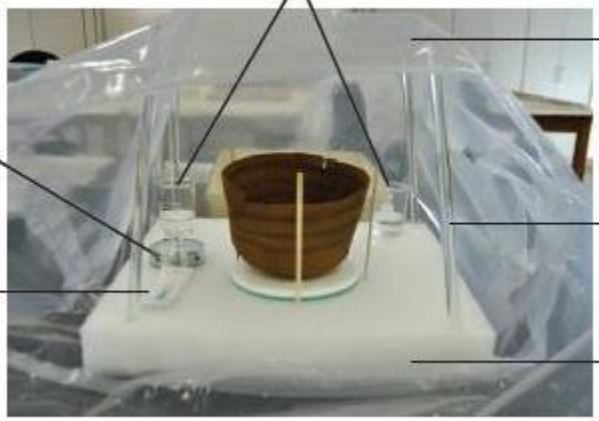
Information gained while collaborating with specialists about an artwork or artifact may help determine how the basket was used. The collaboration may also influence conservation treatment. While conferring with Teri Rofkar, a Tlingit basket weaver from Sitka, Alaska, possible berry stains on the exterior were discovered. This discovery led to an educated guess that the object was probably used as a berry basket. The raised start, or bulge, at the bottom of the basket may occur during construction due to either haste or lack of skill. Traditionally, the berry basket would be humidified and the raised start pushed in to create a flat base. Teri requested that this step be completed during conservation treatment out of respect for the basket.

## The Humidification Chamber

**Solvent** - *the liquid will evaporate, filling the chamber with water and ethanol vapors, thereby increasing the humidity.*

*A* **dial hygrometer** *is an instrument capable of measuring the relative humidity of the chamber.*

*A* **cobalt strip** *can also indicate the relative humidty of the chamber.*



*A* **plastic sheet** *is sealed to create an airtight chamber.*

*A* **framework**, *which can be made of glass rods, gives structure to the chamber.*

*A* **platform** *can be made of Ethafoam, an inert foam.*

– Lily Doan

# Cahuilla Sandals

## Cahuilla Sandals: Construction Method

*Image 1*: A pair of Cahuilla sandals from Agua Caliente Cultural Museum's collection

These two woven sandals are made from plant materials with cordage laces and skin (possibly leather) straps. According to the museum records, the sandals were found inside an *olla* along with a deer hoof rattle on a shelf in a cave in Coyote Canyon by Harry Bergman in 1932. They were then on display at the Bergman Museum until its closure in 1993. In 2007, the Agua Caliente Cultural Museum purchased the sandals from Harry Bergman's grandson.

The construction methods used to create the sandals was discovered by using X-radiography.

**X-Radiography**

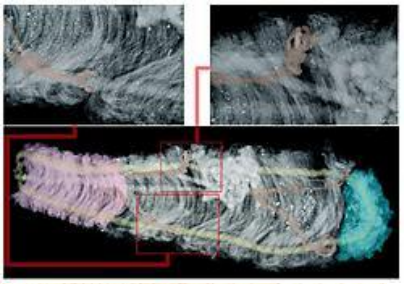
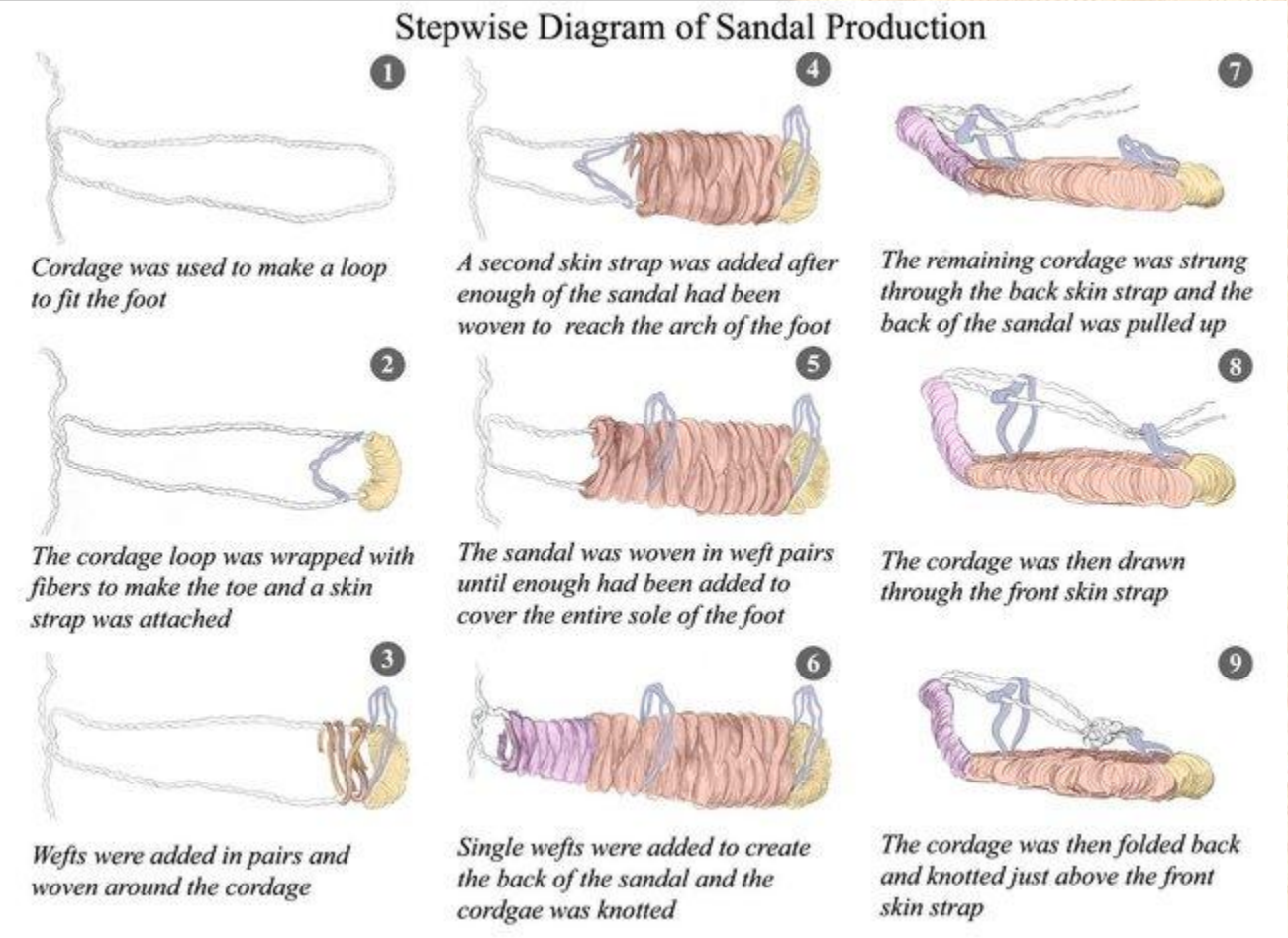


*Image 2* : X-ray of one of the Cahuilla sandals

Based on the X-ray (*image 2*), the sandal can be differentiated into three construction zones: the wrapped toe area (blue), the loose double weave of the center of the sandal (no color added), and the tight single weave used for the back of the sandal (pink). The cordage used as an internal support can also be seen (yellow). The details on the top show how the skin straps (brown) were attached.




## Plant Fibers Used in Sandal Production: Agave or Yucca?

The Cahuilla used both agave and yucca plant species to produce fiber sandals. According to some sources, Mohave yucca (*Yucca Schidigera*, or *hunuvat* in Cahuilla) was preferred for sandal production, but *Agave deserti* was also used. Since these plants are both prevalent, distinguishing whether Yucca or Agave was used tells us about material choices made for sandal production. In the case of these sandals, in depth analysis of the fibers was required.

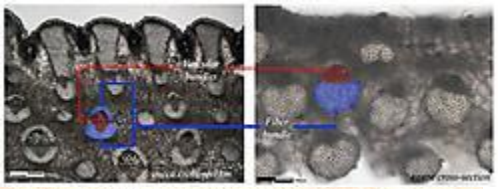


*Image 3*: a cross-section of yucca and agave
*Agave samples obtained courtesy of the Rancho Santa Ana Botanic Garden*

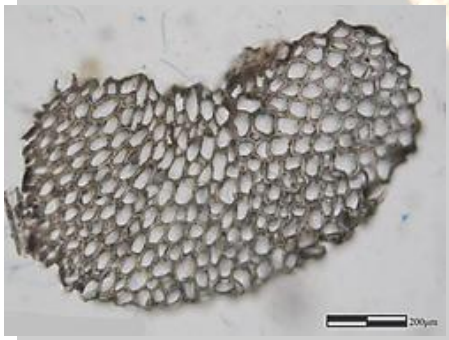


*Image 4* : A cross-section of fiber taken from the Cahuilla sandals, which looks similar to the cross-section of the agave leaf

**Differentiating Between Yucca and Agave: Cross-section Examination**

Cross-sections are prepared by cutting a leaf perpendicular to the central vein. The shape and distribution of the fiber and vascular bundles can be used to identify plants. Fibers are cells that give strength and support to the plant

(*image 3*). Vascular bundles are made of the conductive plant tissue that transports nutrients and water. The cross section of an element used to make the sandals reveals that the plant materials used were processed down to fiber bundles (*image 4*). Although there are no complete vascular bundles, the fibers appear similar in shape to those from the agave reference.

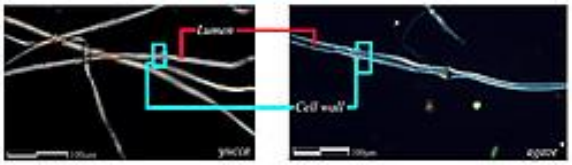



*Image 5*: Lumen samples from yucca and agave plants
*Agave samples obtained courtesy of the Rancho Santa Ana Botanic Garden*

**Differentiating Between Yucca and Agave: Single Fiber Examination**

The examination of single fibers from each of the samples shows key feature differences (*image 5*). The yucca has a regular lumen (the open space within a plant), while the agave has varying lumen thickness. The sample from the sandal appears more like the agave, but this many be due to deterioration (*image 6*).

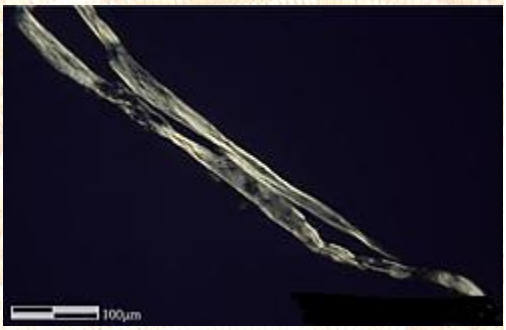



*Image 6:* Lumen sample from the Cahuilla sandal, which looks similar to the lumen sample of the agave plant

– Tessa de Alarcon

# Washoe Basket

## Washoe Basket: Cultural Attribution and History

*Image 1*: Washoe basket from Agua Caliente Cultural Museum's collection

The shape of this basket resembles the degikup form that was developed by Washoe basket weaver Louisa Keyser (dat-so-la-lee) in the late 19th century (*image 2*). Louisa Keyser was one of the earliest weavers of the style referred to as Washoe fancy basketry, developed for the curio trade under the patronage of Abe and Amy Cohn, who owned a shop in Carson City, Nevada. The early 20th century was marked by a great deal of innovation and experimentation in basket design amongst weavers using variations of the degikup form.

*Image 2*: Washoe weaver Louisa Keyser with two *degikup* baskets

However, by the 1930s, the close-stitched constructions that defined the fancy basketry style were gradually replaced by single-rod, gap-stitched baskets that were less time-consuming to produce and still very marketable to tourists and collectors (*image 3*). Because the gap-stitched construction limits the design possibilities, it was common for these baskets to be decorated with a pattern of contrasting dark bands.

Based on similarities in appearance and construction, it is likely that this piece is a Washoe basket of this later type. Its attribution is further supported by the oval shape of the basket's start, which is characteristic of Washoe basketry and distinguishes it from Paiute and Shoshone baskets (*image 4*).

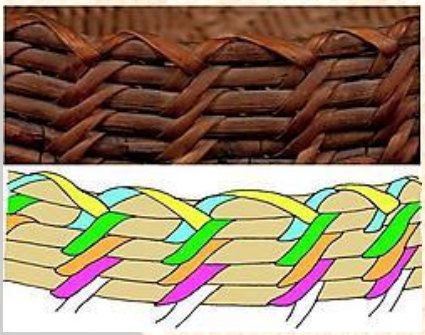


*Image 3*: Diagram showing gap-stitch coiling technique on a portion of the basket's rim. Each color represents one row of stitching. Stitches span two foundation rods (horizontal elements) and are evenly spaced, lining up in vertical columns. The perpendicular yellow stitching is a decorative finishing technique used on the rim

*Image 4*: Oval start as seen on the basket from Agua Caliente Cultural Museum's collection

## Washoe Basket: Conservation Treatment

The rim of this basket has suffered structural damage in the past, including breaks and losses to both the foundation rods (horizontal elements) and stitching fibers. The aim of the conservation treatment was to stabilize the damaged areas to prevent further breaks and losses from occurring.

*Image 5*: Local humidification of fibers

In many of the damaged areas, foundation rods and stitching fibers were warped and misaligned. In order to repair these broken elements, local humidification was necessary to impart flexibility to the fibers. Moisture was applied using damp blotter paper through a barrier of Gore-tex, which allows only vapors to pass through. These materials were held in place using hair pins (*image 5*).

*Image 6*: Joining broken fiber elements

Once the break ends were realigned, they were adhered together using wheat starch paste. This adhesive was chosen for its strength, reversibility, and compatibility with basketry fibers. Joins were clamped in place as they set using padded metal clips (*image 6*).

*Image 7*: Weaving Tyvek replacement stitching

One area of the rim was missing portions of two foundation rods and had lost much of the surrounding stitching (*image 8*). This made the rim susceptible to further damage. Stabilization of this area required the addition of replacement stitches to secure the rods. Narrow strips of Tyvek, a synthetic material with good long-term ageing properties, were toned with acrylic paints to nearly match the original fiber color. These strips were then woven through the existing basket structure to replicate the original stitch pattern where the additional support was needed (*images 7 and 9*).

*Image 8*: One portion of basket rim, before treatment

*Image 9*: Same area of broken rim, after treatment

– Nicole Ledoux

# Kumeyaay Basket Start

## Mold on a Kumeyaay Basketry Start

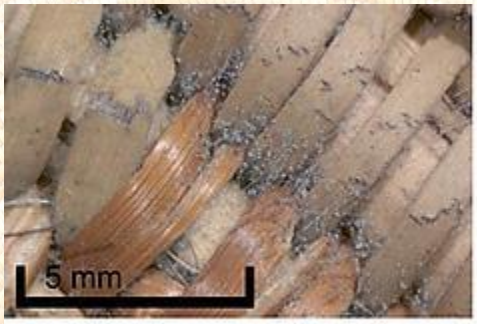



*Image 1*: A detail of the basket start, showing the mold

Molds can grow in damp, dark places. Many baskets in Agua Caliente Cultural Museum collectionw were once used by tribes for cooking and food storage, leaving behind tiny bits of food particles, which may some day be studied to provide valuable insight into their daily lives. As a result, mold is a constant concern, and humidity and temperature levels must be controlled to remain stable in Agua Caliente Cultural Museum's storage facility.

Molds can damage the surface and structure of individual objects and can spread from object to object within a collection, consuming nutrients through eating the collection materials. Understanding the structure of the mold and being able to locate it are important for the conservation of mold affected objects.

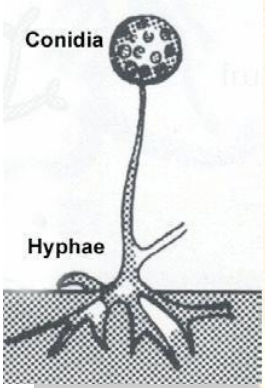



*Image 2:* A diagram of the conidia and hyphae

**The Structure of Mold**

Two of the easily identifiable parts of mold are the hyphae and the conidia. Hyphae are thread-like filaments and may extend below the object's surface. The conidia, rounded spores, occur during the reproductive phase of growth, triggered by exhaustion of nutrients or changes in light and temperature. The conidia's shape can help to identify the mold species (*Images 1 and 2*).

**Ultraviolet (UV) Photography and Mold**

UV radiation can sometimes help to identify areas of mold growth (*Images 3 and 4*). This is because the UV induced visible fluorescence of the mold may be different than that of the object. In the case of the basket start, the mold absorbed the UV (it appeared purple/black).


*Images 3 & 4*: Close-up of the basketry start taken in normal light and in UV induced visible fluorescence

## Approach to Mold Removal on a Kumeyaay Basket

The Kumeyaay closed coiled basketry start affected by mold can demonstrate the basic conservation steps for objects with mold. While these are basic guidelines, it is recommended to consult a conservator before attempting to treat a moldy object.

*Image 5*: The basket start in a polyethylene bag. The blue strip in the upper left corner measures relative humidity. The yellow beads (silica gel) remove moisture

Step 1: Safe Storage

Safe storage will stop additional mold growth and prevent the spread of the mold to other objects. Often this is as simple as placing the object in a sealed zip-lock bag in a freezer, though objects that are saturated with water need to be dried beforehand (*Image 5*).

Step 2: Remove the Mold

After creating safe storage and drying the mold, a conservator can then remove the mold from the object with a gentle brush and a vacuum with a HEPA (High Efficiency Particulate Air) filter that traps the mold particles.

Conservators working with moldy objects must always wear gloves and a breathing apparatus to minimize contact with the mold and possible mold spores.

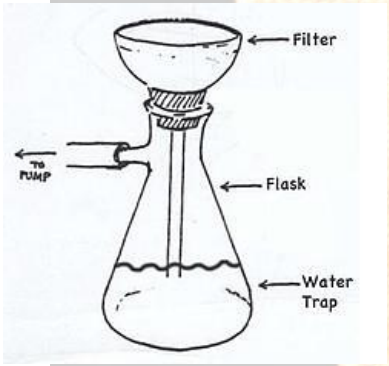



*Image 7*: Diagram of solvent table's vacuum and mold trap device. The object is supported on the filter, which is usually located within a table

Step 3: Apply Ethanol

Ethanol, lethal to mold, is applied using cotton swabs. In the conservation treatment illustrated, ethanol was pulled through the object—to eradicate any interior mold—with the help of a suction table. A suction table is like a flat vacuum, which will trap the mold spores in the flask's water (*Image 7)*.

After touching or interacting with an object contaminated with mold, it is important to wash ones hands and clean any tools and work space with a disinfectant to prevent spreading the spores.

– Robin O'Hern

# Makah Basket

## Makah Basketry: A Cultural Perspective

*Image 1*: Map of Northwest Coast showing territories of different tribal groups including the Makah

*Image 2*: Two Makah women and a boy sell baskets outside a Seattle department store, c. 1912

The Makah Tribe is part of the Northwest Coast cultural group and lives near Cape Flattery at the Northwestern tip of the Olympic Peninsula in Washington State (*Image 1*). There is no tradition of ceramic making for the Makah, rather, they relied on basketry for cooking, gathering and even to hold water. When a trading post opened in Makah territory in 1902, Makah weavers sold their baskets in exchange for food and other goods (*Image 2*). The most common type of basket made for sale was the small, lidded trinket basket that was commonly adorned with images of small birds, ducks, and banding.

*Image 3*: Base and Rim of the Makah basket from Agua Caliente Cultural Museum collections showing characteristics of Phase 2/3 design

**Materials and Techniques**

The baskets were typically woven from dyed and undyed bear grass twined over cedar bark warp using a wrapped twining technique found only on Makah and Nuu-chah-nulth woven baskets. As early as the 1860s, Makah women were producing small trinket baskets. Through time, the construction of the baskets changed –the bases and the rims became plaited and the bear grass was replaced by raffia, which had become commercially available in the 1930s. Based upon the materials and techniques, scholars have divided the dating of Makah baskets into three phases.

<u>Phase 1 – 1860s</u>

In the first phase, the bases show a predominance of twining. The rims are also fully twined.

<u>Phase 2 – 1870-1880s</u>

In the second phase, the bases show greater use of plaited cedar bark elements. The rim is twined, but now also incorporates a strip of cedar bark.

<u>Phase 3 – 1890-1930s</u>

In the third phase, raffia is often used instead of the traditional bear grass and the base relies more and more on the use of plaiting. There is little diagnostic change to the rim.

## Structural Repair of a Makah Basket: Conservation Challenges

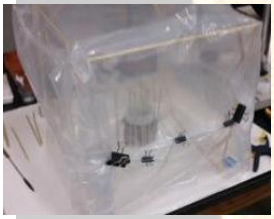
*Image 7:* Makah basket from Agua Caliente Cultural Museum collections prior to conservation treatment

One of the most concerning issues in dealing with the conservation of this basket was the damage caused to the rim. This damage appears to have occurred primarily from a singular event during which the rim and first few rows of horizontal elements from the top were violently crushed, causing the vertical warp elements in this area to snap into multiple pieces, and the horizontal rows of wefts to come free from the broken warp elements in this area.

The repair to the structure of the basket occured in a number of steps, including the addition of new materials to replace those which were lost or too heavily damaged to support the basket after re-shaping and mending.

Step 1: Supporting the Damaged Structure

A two-part circular form was created out of a heat molded plastic with a telescopic handle to push out the two pieces, thus lending internal support to the walls of the basket.



Step 2: Humidification

After some initial realignment of the broken elements, the basket was placed into a chamber at a controlled relative humidity of 70 to 73 percent in order to soften the fibres, allowing for the re-shaping of the basket and the mending of the broken elements.

Step 3: Mending and Realignment

After humidification, the rows involved in the torn area are looped back on to the broken warps where possible. When the warps were missing or too badly damaged, bamboo slivers where inserted to lend structural stability to the basket and to help realign the wefts.

These newly mended elements are held in place using Japanese tissue paper wound into thin strips called 'Franksensteins' and adhered using a mixture of wheat starch paste and methylcellulose. The adhesives were chosen because they will remain reversible using water and do not pose a danger to the object.

Step 4: Joining the Two Sides of the Tear

After aligning and mending the three rows at the top of the tear and the four rows under the tear, the two mended areas were joined using more frankensteins on both the interior and exterior face of the basket.

Step 5: Toning the Frankensteins

After mending is complete, the frankensteins are toned to a color similar to that of the basket to keep them from being visually obstrusive. The color was chosen to be close but not identical so that from afar, they are invisible, but from near, they can be seen.

– Cindy Lee Scott

# Primary Sources & Further Reading

We suggest the following source materials for further research on conservation techniques and materials.


**Cahuilla Sandals**

Bean, Lowell and Katherine S. Saubel. 1972. *Temalpakh: Cahuilla Indian Knowledge and Usage of Plants.* Malki Museum Press, Morongo Indian Reservation

**Haida or Tlingit Basket**

Busby, S. 2003. *Spruce Root Basketry of the Haida and Tlingit.* Seattle: Marquand Books, Inc.

**Kumeyaay Basketry Start**

Szczepanowska, Hanna. 1986. "Biodeterioration of Art Objects on Paper." *The Paper Conservator: Journal of the Institute of Paper Conservation.* London 10, 31-39.

**Makah Basket**

Glinnsman, Dawn. 2005. "Baskets of the Plateau, Northwest Coast, Subarctic, and Arctic." *By Native Hands: Woven Treasures from the Lauren Rogers Museum of Art.* Jill R. Chancey, ed. Seattle: University of Washington Press

**Washoe Basket**

Cohodas, Marvin. 1986. "Washoe Innovators and Their Patrons." *The Arts of the North American Indian: Native Traditions in Evolution.* Edwin L. Wade, ed. New York: Hudson Hills Press