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# MUMMIES ON DISPLAY: CONSERVATION CONSIDERATIONS

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For centuries, museums around the world have exhibited human mummified remains. In many instances the remains were placed in the exhibit cases without an initial conservation assessment. Over time, the mummified remains decay in their cases without proper maintenance. The end result is total loss of integrity within the materials. Often times, museums lack conservation specialists, and exhibition staff not trained in conservation does the maintenance of mummies. These museum personnel need to understand the signs of decomposition so that they can detect early signs of conservation problems for proper maintenance over time. They must also make an initial assessment to prepare and maintain mounts that optimizes the conservation of the material while on display. Presented is an overview of a conservation assessment that the exhibition professional should be aware of in exhibiting human mummified remains.

**Key words***:* Museology, display of mummies.

*Por siglos, los museos alrededor del mundo han exhibido restos humanos momificados. En muchos casos, los restos fueron colocados en vitrinas sin una evaluación inicial del estado de conservación. A través del tiempo, los restos momificados se deterioran en sus vitrinas sin contar con la mantención apropiada, cuyo resultado final es la pérdida de la integridad de estos materiales. Muchas veces les falta a los museos personal entrenado en conservación. El personal del museo debe estar atento a los problemas de conservación , a objeto de implementar una mantención apropiada a través del tiempo. También debe hacer una evaluación inicial para preparar y mantener montajes que optimicen al máximo la conservación de los materiales en la vitrina. Se presenta una revisión general de la evaluación de conservación con la que un profesional debe familiarizarse cuando exhibe restos humanos momificados.*

***Palabras claves****: Museología, exhibición de momias.*

What makes a mummy valuable? I think we would all agree that the value of human mummified remains is the research and educational information they provide to the scientific community as well as the general public. It is this research and educational purpose that makes mummies valuable components of natural history collections. To look to their ongoing worth in the museums of the future, we must look to the field of conservation for approaches to preserving this material without compromising the specimens' integrity for research.

Unfortunately, throughout the years, the treatment and handling of human remains in museums did not meet the same high standards as fragile decorative art. But, isn't this material just as, if not more, fragile than many delicately handled ceramic vessels or even the funerary offerings found buried with a mummy? It is this question that both the research and exhibition staff within a museum must always keep in mind when working with mummified remains.

The mishandling of fragile human mummified remains starts their downward slide in value. An example of this occurred with a mummy that was shipped from Arica, Chile to Lincoln, Nebraska in the late 1800s. Although the mummy appears to be in good shape

on the outside, CT-scans of the mummy show mechanical breakage within. This is especially true of the neck region where a crack has formed. These problems are probably due to the posture of the mummy on exhibit, in storage, and during shipment which put subtle pressures on the neck. The mummy had also been unwrapped prior to exhibition, losing any support from the bundle (Meier et al. 1998). Keeping a mummy bundle intact, however, presents many different kinds of conservation concerns for either collection storage or the continued more problematic storage known as exhibition. A typical South American mummy bundle contains cloth, ceramic, leather, bone, shell, metal, fiber and wood artifacts besides the mummy. Each type of artifact has specific needs for preservation. In addition to the problem of taking care of a diversity of artifacts, the mummies sometimes decay. The process of decay can take many years, but the end result is the loss of an important specimen.

If you look closely at a mummy on display you can often see the clues to decomposition. Tiny holes in the skin and a brownish dust on the floor of the case are strong indicators of insect activity.

Sometimes mixed in with the dust are the carcasses of the insects that produced the debris. Other kinds of decomposition don't always leave clues for the naked eye to pick up. Mold and bacteria contribute to mummy decay, growing on the surface of the organic tissues, digesting the decomposing material in their immediate vicinity. Unlike insects, they do not burrow below the surface. Mold is usually inactive on a dried specimen such as mummified skin, but the mold spores are still viable. When the environmental conditions are right they can start to damage the skin and spread to other organic materials in the area. The presence of an active mold growth is a strong indication that seriously high relative humidity is occurring. Mold rarely grows unless relative humidity is 65% or higher. Most molds will grow between 4°C and 30°C, but not without the high relative humidity (Strang and Dawson 1991). High temperatures from internal case lighting and windows can also cause the mummified skin to stiffen and become more susceptible to breakage and chemical breakdown. The chemical destruction of mummified tissue can also occur through exposures to air pollution often high in large cities and industrial areas. Sulfuric acid can result from sulfur emissions combined with fog. Potentially, sulfuric acid produced in the right atmospheric conditions can break down the proteins of the mummified tissue.

## Prevention

What can be done? Ideally before any mummy is considered for exhibition, a thorough exam, including CT scans, needs to be conducted to determine the stability and conservation needs of the mummy. If insect damage or other kinds of decomposition are found, a treatment needs to be started right away to stop any further degradation. Pesticides can be used, but aren't highly recommended. This is due to the fact that not enough is known about how the pesticide chemicals effect the chemical composition of the specimen. They also provide a risk to anyone handling the specimen after treatment (Williams et al. 1989). Materials and chemicals, including adhesives, preservatives and pesticides, should not be used without knowledge of the effects on the ultra structure, chemical makeup, and genetics of the specimens, thus safe guarding their research integrity (Williams and Cato 1995).

Freezing is another option for pest control with mummified material. However, precautions must be taken to ensure that no formation of ice crystals occurs within the mummy causing subsequent water damage during the thawing phase. The freezing process is not recommended as a preventive method of pest control, but only as a means of eradicating a viable problem. (Raphael 1994) This process is also problematic if you are dealing with a mummy bundle containing inorganic as well as organic types of materials.

Another successful means of treating specimen decomposition in collections, that is relatively safe for both organic and inorganic materials with no side effects, is the

anoxic (no oxygen) environment. Nitrogen, a relatively inexpensive gas, is used to replace the oxygen in the specimen's enclosure. In the late 1980s this use of an oxygen-free environment for mummy conservation was taken a step further and incorporated into an exhibit case designed by the Getty Conservation Institute. The Getty Conservation Institute's case design is being used in Cairo to stop the oxidation and microbial deterioration of the royal mummies that are on display. An oxygen scavenger is used in conjunction to the nitrogen to ensure an oxygen-free environment. This case design was also adapted to display another Egyptian mummy in the collection of the Biblioteca Museu Victor Balaguer in Spain (Agnew and Levin 1996).

Unfortunately, an anoxic environmental display case is not inexpensive. If your museum's budget can't afford the expense of an anoxic case, modifying a simple more inexpensive case design or modifying existing cases to provide a micro environment that discourages the perpetrators of deterioration from reaching your mummy, would be recommended. A microenvironment case meets these criteria: 1. it is sealed as much as possible from the exterior environment, 2. it is constructed on the interior from inert, stable materials, and 3. it is fitted with a material to buffer rapid changes in relative humidity. A common buffering material is silica gel. Equipment for monitoring the environment in the case is also a critical component needed to insure that the microenvironment is kept stable. A micro environmental case design, custom mounting of the mummified material for total support, along with constant monitoring of the mummified specimens while on display, can be the most appropriate preventive conservation measures a museum can enforce for the materials' preservation.

Keeping the integrity of human mummified remains is the key to the preservation of these specimens. From the start, obtaining as much knowledge through CT scans, x-rays and thorough exams will signal the collection staff to immediate conservation needs of the mummy before it goes on display or into a collection. It is this information that must be taken into consideration by the exhibits staffs with advise from the collection or conservation staff to provide the best care for the mummies while on display. It is also critical for collection staff to have this information so they can help train exhibit maintenance staff in handling and monitoring the mummies. The education of the exhibit staff on mummy conservation concerns is important because it becomes the responsibility of the exhibit staff as much as the collection staff to help maintain the integrity of the mummified material. We need to strive to have a mummy be as valuable the day it comes off exhibit as the day it went on.

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