

MUMMY CONSERVATION AND PALEOPATHOLOGY

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The curation of human mummified remains is discussed from the point of view of the paleopathologist. The preservation of a body (and samples) after its study involves: (1) The type of mummification process used, and the deterioration since (taphonomy); (2) Method of study utilized (radiology and/or non-destructive autopsy: maximizes information, minimizes damage); (3) Individualized restoration; and (4) Storage (including samples and documents): environment and pest-barriers. Finally, the respect that each human body deserves is emphasized, as well as the laws and beliefs of each nation. Some examples are given from Perú and the United States.

Key words: Museology, paleopathology.

Se presenta la curación de los restos humanos momificados desde el punto de vista del paleopatólogo. La preservación del cuerpo (y muestras) después de su estudio consiste en: (1) El tipo de proceso de momificación usado y el deterioro desde entonces; (2) El método de estudio utilizado (radiología y/o autopsia no destructiva: maximizando la información, y reduciendo al mínimo el daño); (3) Restauración individualizada; y (4) Almacenaje (incluyendo muestras y documentos): ambiente y barreras de insectos. Finalmente, se recalca el respeto que merece cada cuerpo humano, como también leyes y creencias de cada nación y se presentan algunos ejemplos de Perú y los Estados Unidos.

Palabras claves: Museología, paleopatología.

Paleopathology as a multidisciplinary field has broadened its scope during the last decades, from the description of pathologies in individual human remains, to the reconstruction of life among past communities. The richness of information stored inside the naturally dehydrated bodies of the Andean region has no parallel among anthropological collections in the world. Different studies permit recovered data from mummies regarding: lifestyles, nutrition, physical activities, conflict, cultural practices, mortuary practices and beliefs, medicinal plant use, health and disease indicators, among others. Despite its multidisciplinary nature, paleopathology usually deals with the degree of preservation or deterioration of their study subjects - due to the taphonomic process (Micozzi 1991), only before the analysis. Although there are precedents regarding the handling of mummy collections from a museological perspective (Madrid 1983), as well as different methodologies developed for their curation (Meier, this issue), it appears necessary that curatorial skills should contribute to the multidisciplinary nature of paleopathology, specifically in the Andean region. Although traditionally disarticulation and skeletonization have been common tools for the study of the Andean flexed mummies, alternative non-destructive or micro-invasive procedures should be considered as a norm not only on behalf of new conservation standards, but as a way to honor the dead themselves. More than 1000 Andean mummies have been studied in the former way during the last three decades; approximately 50% of all the mummies in Andean collections. Although it is true that most of those mummies were poorly kept at different museums, this situation should not validate the exclusion of preservation

measures during paleopathological studies. The slow and unperceived destruction of some important Andean collections should be avoided. A particularly dramatic and disastrous case occurred in Perú during the 1960s, when some human mummies were treated with an experimental oil substitute ([Urteaga-Ballón 1966](#)).

A non-destructive or minimally destructive autopsy was sought by Allison and colleagues while studying a particularly important mummy: the case of a child with tuberculosis that was proven to be the strongest argument for the existence of the disease in the Americas during pre-contact times ([Allison et al. 1973](#)). Their approach prevented the disarticulation of the mummy, and was carried out to preserve the museological value of the mummy ([Allison and Gerszten 1983](#)). The famous child is still on display at the Museo Regional (Ica, Perú). The position of this author is to promote this less destructive option for all mummy autopsies, while promoting the undisturbed appropriate storage of those that should not be autopsied at all. Mummies should be regarded as valuable and unique information repositories, analogous to rare books and encyclopedias.

Examples of Successful Minimal Autopsy Procedures

Late Nasca mummy (MNAA: Museo Nacional de Antropología y Arqueología del Perú, Lima; AF-78): female, approximately 30 years old at death, in good state of preservation. Cause of death: aspirative pneumonia. Studied through a non-destructive autopsy according to a protocol followed by a restorative process ([Lombardi 1992](#)). Despite the fact that most of her internal organs were removed and sub-samples histologically processed, her remains were for the most part preserved. The success of the procedure has permitted her to be included in a Peruvian travelling exhibit in the US ('Ancestors of the Incas'), as being an intact mummy.

Late Nasca mummy (MNAA, 67466): male, approximately 50 years old at death, in good state of preservation. Cause of death: probably tuberculous meningoencephalitis. Studied through a non-destructive autopsy technique ([Lombardi 1994](#)). Currently on display at the MNAA, Lima as an intact mummy.

Aleutian or Unangan mummy (culturally dated to approximately AD 1750): male, approximately 35 years old at death, intermediate state of preservation. Cause of death: probably strangulation. Currently in storage at MARI (Middle American Research Institute, Tulane University, New Orleans), without environmental control ([Lombardi 1996](#)). In this case invasive procedure was entirely avoided due to the condition of the mummy as a potential subject of repatriation, according to Native American Graves Protection Act regulations.

Egyptian mummy Got Tothi Aunkh (2950 BP): male, at least 50 years old at death, poor state of preservation. Cause of death: undetermined. Currently in a specially assigned study room at Jones Hall, Howard-Tilton Library special collections area, with climate control, Tulane University ([Lombardi 1998](#)). Non-invasive radiology and through direct osteology.

Egyptian mummy Nefer-Atethu (3000 BP): female, approx. 15 years old at death, good state of preservation. Cause of death: probably due to childbirth complications. Currently located at Jones Hall, Tulane University ([Lombardi 1998](#)). The study of this individual was non-invasive, basically through radiological methods ([Hunt and Hopper 1996](#)).

The recommendations that follow are based on these experiences, and are particularly meant to benefit anthropological collections in South America, which are as unique as 'libraries' where all their 'books' are single copies. This protective

view of the collections should allow access to these important sources of information to colleagues-'readers' of the future.

Recommendations

The particular perspective that is presented here relies on the notion that paleopathology is part of the preservation process, and should be integrated as part of any curatorial effort toward study and preservation of human remains, and vice versa. Mummies should be regarded as information sources (book analogy). This particular view has importance for addressing societies without historical records, as is the case in the pre-Columbian Andean region. Books are dehydrated organic tissues also! The storage of undisturbed mummies in anthropological collections today will be the key for future development of the field, the advancement in technology will allow the future 'reading' of currently out-of-reach information stored in mummified human remains.

During paleopathological studies destructive methods should be avoided. Minimally-destructive autopsy methods ([Allison and Gerszten 1983](#)) could be complemented by sampling small amounts of mummified tissue ([Lombardi 1992](#)). Such an approach could allow 'consultation' of original sources, as well as replication and verification of our claims by future researchers, as is customary in any science. Human mummies in the Andean region are not a renewable resource.

Physical curation of mummies should be dictated by the requirements of each individual mummy, and according to the microenvironmental conditions that originally contributed to the body's preservation in situ (usually dryness and/or coldness). Original soil composition should also be a factor in the design of curation plans. In any case, the main objective would be to minimize the natural process of decay.

Factors to Consider for Mummy Preservation

Biological deterioration is basically, due to fungi (avoiding complete darkness, and with few exceptions, promoting ventilation, with constant low temperature and humidity), or due to insects ([Edwards 1981](#)). The direct application of chemicals or preservatives should be avoided if possible, because their presence could alter future molecular research or lead to unforeseen preservation problems. It is preferable to use several physical barriers (acid-free paper, bags, boxes, etc.). Mechanical or physical deterioration due to inappropriate storage, movement, handling, and environmental problems (humidity, rain, direct sunlight, etc.), must be avoided. Prevention plans must include contingencies in case of disasters (fire, flood, earthquakes, etc.). In the Andean region it is recommended to consider the natural environmental conditions of certain areas that promote preservation. In this regard storage in dry coastal valleys (e.g., Fundación Mallqui, Ilo) or in the highlands seems ideal, even from an economic perspective. Ideally, mummy collections or artifact assemblages should be preserved with their contexts and documents referring to their original archaeological context. Such a database should be enriched after each study of the remains.

References Cited

- Allison, M. J.
1973 Documentation of a case of Tuberculosis in pre-Columbian America. *American Review of Respiratory Diseases* 107:985-991.
- Allison, M. J. and E. Gerszten
1982 *Paleopathology in South American Mummies*. Virginia Commonwealth University, Richmond.
- Bachmann, K. Editor
1992 *Conservation Concerns: A Guide for Collectors and Curators*. Smithsonian Institution Press, Washington, D.C.
- Cunha, G. M. and D. G. Cunha
1971 *Conservation of Library Materials*. Scarecrow Press, Metuchen, NJ.
- Edwards, S. R.
1981 *Pest Control in Museums: a Status Report*. A.S.C., New York.
- Hunt, David R. and L. M. Hopper
1996 Non-Invasive Investigations of Human Mummified Remains by Radiographic Techniques. *Man in the Ice*: vol.3, Human Mummies: a Global Survey of their Status and the Techniques of Conservation, by Konrad Spindler et al., eds. Springer Co., Wien and New York.
- Lombardi, G.
1992 Autopsia de una Momia de la Cultura Nasca: Estudio Paleopatológico. Tesis para optar el título de médico-cirujano. Universidad Peruana Cayetano Heredia, Lima.
_____. 1994 Detección de Mycobacterium Tuberculosis en una Momia de la Cultura Nasca con Mal de Pott. Premio Anual de Medicina 1993, Universidad Peruana Cayetano Heredia, Lima. [[Links](#)]
_____. 1997 Evidence in Cultural Resistance: Paleopathological Study of a 18th Century Aleut (Unangan) Mummy. *Human Mosaic* 31:1-13. [[Links](#)]
- Madrid, A.
1983 Recomendaciones Preliminares para el Estudio de Momias del Área Andina: una Perspectiva Museológica. Simposium de Arqueología de Atacama, 10-15 enero, San Pedro de Atacama, Chile.
- Micozzi, M.
1991 *Postmortem Change in Human and Animal Remains: a Systematic Approach*. C.C. Thomas, Springfield, Ill.
- Urteaga-Ballón, O.
1966 Transformación Bituminosa de la Materia Orgánica y su Relación con el Origen del Petróleo. Museo de Paleopatología, Hospital Dos de Mayo, Lima.