

## Chapter 22

### DISINFECTION OF A WAX MOULAGE COLLECTION USING GAMMA RADIATION

P. VASQUEZ, P.S. SANTOS, M.L.E. NAGAI, A.C. DELGADO VIEIRA  
Nuclear and Energy Research Institute — IPEN/CNEN,  
São Paulo, Brazil  
Email: pavsalva@usp.br

#### 22.1. INTRODUCTION

From the mid-nineteenth to the mid-twentieth centuries, wax moulages were important teaching tools in dermatology. Moulages were used in teaching and served as a source of information and documentation on skin diseases. To produce wax moulages, a plaster cast was taken directly from an area of an affected patient's skin. After applying a thin layer of plaster, the mould would be removed [22.1]. Pure beeswax, which was sometimes blended with carnauba wax and natural resins, was then poured into the mould.

Coloured pigments were used, and artists finished the designs by applying human hair or hair-like textures, which were individually implanted with a heated needle. The models were meticulously painted with translucent oil paint to replicate the minutest details of the skin.

The advent of colour slides in the 1930s led to the replacement of wax moulages as a teaching resource in medical schools. Nevertheless, many museums and medical schools retained their collections.

The wax collection of the Historical Museum of the Medical School at the University of São Paulo holds reproductions of dermatological diseases and skin lesions crafted for educational purposes. The moulages in the collection were made from plaster casts taken from corpses.

The majority of the pieces were in a good condition, but approximately 25% of the collection was damaged; the damage included cracks, broken parts and scratches. Several items were affected by insect infestations and mould growth. In addition, some wax moulages had xylophagous insect infestations of the wooden boards upon which they were mounted.

Wax objects are complex to conserve because they are often sensitive to solvents [22.2]. As a result, conventional treatments involving chemicals to mitigate contamination are not recommended.

To address the contamination of the moulages, the chosen treatment involved the use of ionizing radiation at IPEN. This method aimed at effectively disinfecting the infested models and preserving the structural integrity of this unique collection.

### 22.2. PREPARATION OF THE TREATMENT

The treatment began with a conservation assessment that included a thorough visual inspection of all the items in the collection. During the survey, contaminated objects were separated for treatment at IPEN.

All of the moulages underwent identification, measurement and photography within the museum. Subsequently, as a collective measure, the models were carefully packed and transported to IPEN for irradiation with gamma rays (Fig. 22.1) in accordance with the treatment protocol recommendations [22.3].

Owing to the challenge of distinguishing between insect or fungi contamination of individual objects, a uniform absorbed radiation dose of 10 kGy was applied to ensure comprehensive disinfection of all items, since doses of up to 10 kGy can be used for the disinfection of cultural heritage objects [22.4].

This approach aimed at guaranteeing the efficacy of the treatment and preserving the integrity of the wax models, thereby contributing to the long term conservation of the collection.

### 22.3 AFTER THE TREATMENT

After the irradiation, all of the items were cleaned by the conservation team to remove dust and general contamination. In some cases, restoration measures were carried out.

The insect-damaged wooden boards were replaced with a new design that would more effectively conserve the moulages and optimize their display. Acrylic cabinets with controlled humidity and an anoxic atmosphere were built to house the collection.

The strategic approach not only contributed to the long term conservation of the pieces but also enhanced the overall presentation and accessibility of the unique and valuable collection (Fig. 22.2).

The objects are now on display at the Prof. Carlos da Silva Lacaz History Museum and, as a result of the preventive conservation measures taken after the irradiation, no new incidents of contamination have occurred in the collection.



FIG. 22.1. Wax moulage processing at the  $^{60}\text{Co}$  Multipurpose Gamma Irradiation Facility at the Nuclear and Energy Research Institute.



FIG. 22.2. After the irradiation and restoration process.

## 22.4. CONCLUSIONS

It was important to preserve the originality of the wax moulages. However, owing to the ageing of the wax, natural changes, such as faded colours, were

acceptable [22.5]. Because these are historical teaching instruments, preserving their integrity was essential to preserving their history. As a result, it was important to select a safe decontamination treatment that did not affect the appearance of the objects.

Museums have a responsibility to safeguard and preserve their cultural heritage and to ensure the custody, security and visibility of their collections. This entails curating and maintaining collections, providing appropriate storage conditions and facilitating access by researchers and the public through exhibitions and other educational programmes. By upholding rigorous standards of conservation and accessibility, museums fulfil their mission of preserving cultural heritage for future generations and promoting the understanding and appreciation of diverse cultures and histories.

Ionizing radiation is a valuable tool for the preservation of cultural heritage. As demonstrated, its application is effective in combating biological agents such as insects and fungi, which can pose significant threats to artefacts in museum collections. The use of ionizing radiation is a reliable method for decontamination and ensures that cultural and historical artefacts are protected from harm without compromising their structural integrity or original characteristics. This approach underscores the importance of employing advanced technologies to safeguard and extend the lifespan of valuable cultural heritage items for future generations.

## REFERENCES TO CHAPTER 22

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