



Preservation of Taxidermied Animal Skins Involving the Use of Ionizing Radiation

Lupo C.¹, Oliveira M.J. A, Araujo M.S. Otubo L, Mello Castanho S.R, Vasquez P. A. S²

Nuclear and Energy Research Institute-IPEN-CNEN/SP. Av. Professor Lineu Prestes, 2242, - Cidade Universitária CEP 05508-000, São Paulo-SP Brazil.

¹ cacalupo@usp.br

² pavsalva@usp.br

1. Introduction

The great interest in the development of research involving ionizing radiation aims to significantly increase the preservation of the skins of taxidermied animals, both for scientific collections and on display, causing their infection and disinfestation, without altering their originality, reducing the use of chemical products, presenting safe and efficient technology. The preservation of taxidermied animals has been widely used for educational, scientific and museum display purposes. However, prolonged exposure to environmental factors or excessive use of chemical products to store these materials in the collection can affect the integrity of the skin. We investigated the effects of gamma radiation on the structure and composition of the skin of a taxidermied deer, with the aim of contributing to a better understanding of conservation processes and potential risks they may cause. Gamma radiation is an effective technique for disinfestation and preservation of taxidermied animal skins, but it is important that it is carried out by trained professionals and in compliance with rules and regulations. It is recommended that you consult specialists in gamma irradiation or irradiation services to determine the specific dose required in each case, taking into account all relevant factors.

2. Methodology

Selection of material for analysis and research development, sketch of the part used as a template;

Processing by ionizing radiation took place through applications of doses of gamma rays (cobalt-60). It took place at the installation of the Multipurpose Cobalt-60 irradiator, at the CETER-IPEN Radiation Technology Center. Doses of 1,3,5,10 and 15 kGy were applied.

Analytical techniques characterize and evaluate the effects of ionizing radiation when sampling a deer's skin according to the doses applied: Colorimetry, Scanning Electron Microscope (SEM), Optical Microscopy, Infrared Spectroscopy and Mechanical Traction Test.

- Colorimetry

Colors play a preponderant role in the descriptions and are important for identification. The chosen location was used for all dosages, and in the same position for reading the colorimeter, as shown in figure 1.



Figure 1- Equipment and sample analyzed before and after gamma irradiation

3. Results and Discussion

- Colorimetry:

Using Delta E 2000, to describe the distance and evaluation between two colors, which can vary from black to white, the coordinates of the CIELAB system are 3, where:

L^* refers to the evaluated luminosity, which can vary from black to white, and is the same L^* as the L^* to b^* color space, where a^* is the measurement in red-green chrome, and b^* is the measurement of chromium on the yellow-blue axis, the values are presented in table 1. The result presented in the table is represented as a curve in figure 2.

The color change was evaluated by an electronic colorimeter. Colorimetry measurements were made, after applying the doses of kGy (1,3,5,10,15) for analysis, the formula Delta E 2000 was used, (the values of L^* , a^* , b^* , are the references which compared to the kGy doses applied), we obtain the results of tolerance to ionizing radiation, on a scale, the higher the value, the more its color is altered. The lower the Delta E value means it has not changed. Therefore, it can be seen from the values presented in figure 2 that gamma radiation does not affect the color change.

Table I: Result table of numerical colorimetry data with different kGy doses

Animal	Amostra			
			(pele)	
kGy	L^*	a^*	b^*	Delta E2000
0	89,658	0,282	12,500	0,000
1	90,443	0,206	11,308	0,921
3	90,350	0,233	11,522	0,770
5	90,511	0,168	11,013	1,110
10	90,153	0,278	11,273	0,860
15	89,613	0,454	11,175	0,923
15 kGy 2ª	88,789	0,451	12,133	0,629

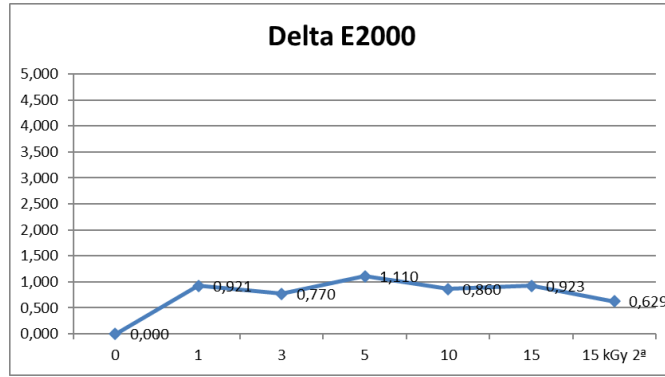


Figure 2: Color parameters (a) L*, (b) a* and (c) b*, before irradiation being repeated after 3 months of radiation.

- Scanning Electron Microscope and Optical Microscopy

This microstructural diagnosis is fundamental to analyze the morphology of the sample particles before and after gamma irradiation, as it allows understanding the correlations of microstructure, defects, properties and predicting the properties of the material when these correlations are established, Figure 3(A) 0kGy and the Figures 3(B) and 3(C) show the morphology of the skin with 10 kGy irradiation. Note that the morphological structures remain unchanged.

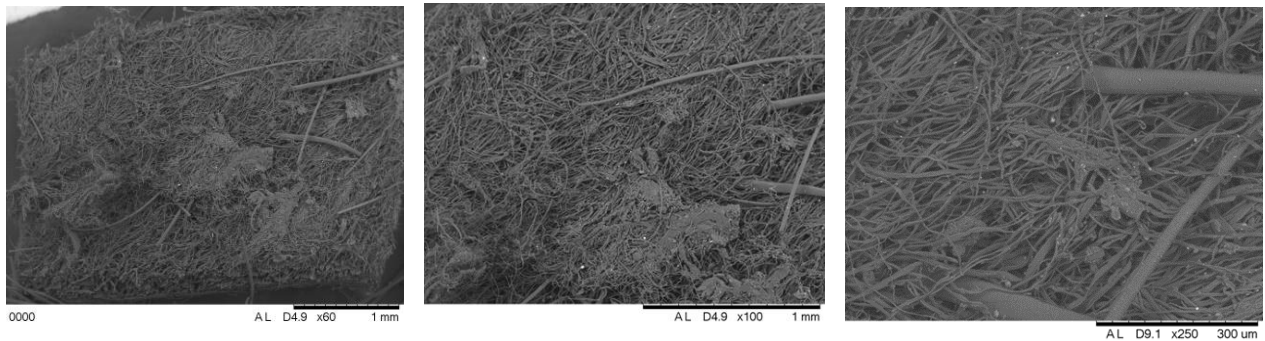


Figure 3: Coati skin - (A) -0kGy and (B) and (C)10kGy

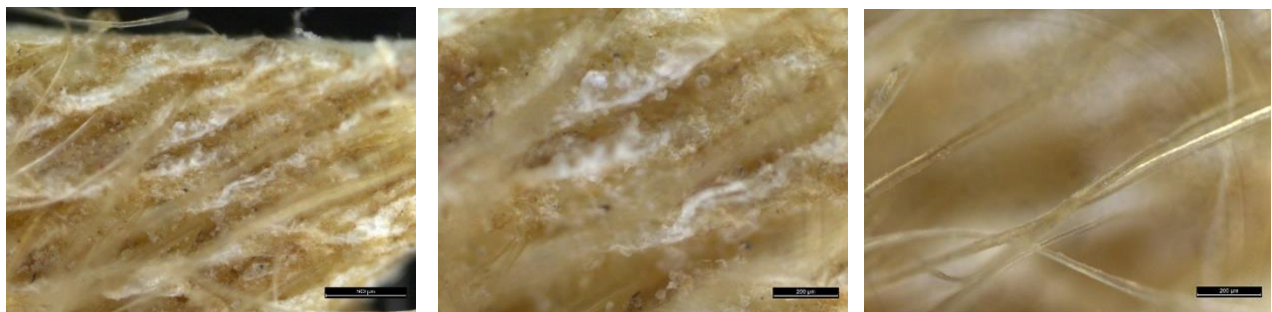


Figure 4: Coati skin (A), (B) and (C) - 10kGy

Optical microscopes can provide variable magnifications, typically up to about 1000x, allowing visualization of microscopic details across a wide range of sample sizes. Optical microscopy is a non-destructive technique,

which means that the sample is not damaged during observation. In many cases, optical microscopy allows samples to be viewed in natural colors, which facilitates the identification of different components or structures present in the material. Optical microscopy figure 4, confirms what was observed in the SEM that gamma irradiation did not cause changes in the morphology of the sample.

4. Conclusions

The conclusion that the insect decontamination process in taxidermied animal skins using ionizing radiation from a cobalt-60 source, with doses of up to 10 kGy, does not affect the morphology and color of the skin is a significant result. This suggests that this decontamination method is effective in removing unwanted insects without compromising the visual characteristics of the skin.

However, it is important to highlight that new studies will be carried out to complement this research. These studies may aim to investigate other possible consequences of the decontamination process, such as possible changes in the physical or chemical properties of the skin, or evaluate the long-term effectiveness of the method.

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