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THE EFICIENCY OF WHITHENING AND DEGREASING SUBSTANCES IN THE PROCESSING OF LEPORIDAE BONES

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Abstract

Conservation of animal skeletons is necessary for various reasons - often to determine the species or as decorative items, but we are interested in terms of their use as teaching materials. Students can achieve artistic projects using bones; they can learn species identification and deducing elements of the animal's life by measuring bones. Applying the techniques of obtaining a skeleton can be an enriching experience in the educational process of any student. The aim of this study was to obtain two complete rabbit skeletons and to asses the efficiency of the whitening and the degreasing substances. The materials used were: two rabbit cadavers, dissection instruments, insect colony, hydrogen peroxide, sodium bicarbonate, acetic acid, acetone, gasoline, wooden bases, support wires and silicone gun. To obtain the skeletons we have used the technique of maceration with the help of insects, with a previous dissection of the carcasses. In both cases, the maceration process took 7 day to complete for the body and, 5 day for the cranium, respectively. The osseous pieces thus obtained were frozen at -18^{0}C to eliminates the remaining insects. The skeletons have then undergone a 24 hours whitening process using hydrogen peroxide and sodium bicarbonate, respectively, followed by 24 hours of drying at room temperature, and by 24 hours degreasing using acetone and gasoline. The processing was completed by a final drying period and the assembly on the mounts. In conclusion we can mention the fact that the process of skeleton preservation is scrupulous, time-consuming, but it yields satisfying results in terms of anatomic characteristics maintenance and didactic usability.

Key words: *bones, preservation, rabbits.*

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INTRODUCTION

Conservation of animal skeletons is necessary for various reasons - often to determine the species or as decorative items, but we are interested in terms of their use as teaching materials. Students can achieve artistic projects using bones; they can learn species identification and deducing elements of the animal's life by measuring bones. Applying the techniques of obtaining a skeleton can be an enriching experience in the educational process of any student.

Anatomical study methods remain some of the most important ways to obtain body knowledge, because diagnosis and applying treatment starts from the knowledge of normal structures. Therefore, experimental research on animal models is based on a thorough knowledge of the morphology with direct impact on functionality. Rabbits are the most used animals for experimental models (*Stan, 2014*).

Through their peculiarities, they also present different levels of soft tissue preservation. Selecting the technique for a certain piece depends on several factors, such as the desired type of piece, the efficiency of soft tissue preservation, the degree of resemblance to the fresh piece, but also the laboratory equipment available.

Maceration is defined as a controlled form of putrefaction, a stage of decomposing in which the proteins are consumed by bacteria in anaerobic conditions (*Sommer, Anderson,1974*).

This technique necessitates the use of an incubator to ensure optimal conditions. Taking into consideration the fact that this technique involves a putrefaction process that generates a strong repulsive smell, it is indicated to use it in specially arranged rooms, with a proper ventilation system (*Sommer, et al., 1974*).

MATERIALS AND METHODS

The experiment was performed in the Comparative Anatomy Laboratory of the Faculty of Veterinary Medicine of Cluj-Napoca.
The materials used were: two rabbit cadavers, dissection instruments, insect colony, hydrogen peroxide, sodium bicarbonate, acetic acid, acetone, gasoline, wooden bases, support wires and silicone gun.
The skeletons were obtained by applying a maceration technique using insects that required a prior dissection of the cadavers (Fig.1).

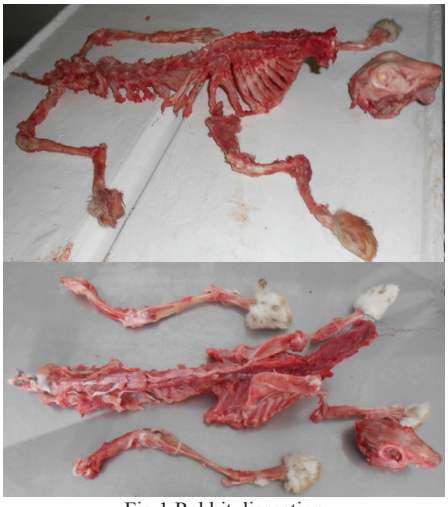

Fig.1 Rabbit dissection

In both cases, the maceration process lasted for 7 days for the body and for 5 days for the cranium (Fig.2 and 3).

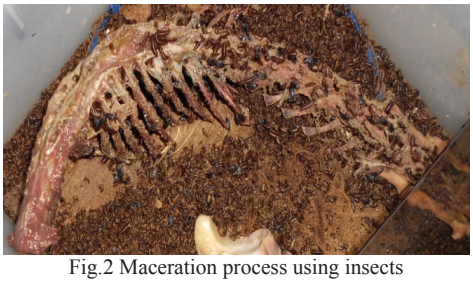

Fig.2 Maceration process using insects

Fig. 3 Maceration process

At the end of the maceration process, the pieces that we have obtained were introduced in a freezer at -18^{0}C to eliminate the insects left on them.
The skeletons thus obtained underwent a process of degreasing using acetone and gasoline, for 24 hours, followed by drying at room temperature, for 24 hours and whitened with hydrogen peroxide, and sodium bicarbonate, respectively, also for 24 hours, followed by their drying, the mounting on a base and comparing the results.

RESULTS AND DISCUSSIONS

The experiment was carried out in view of improving the technique of osseous pieces processing.
The Acetone was efficient in the process of bone degreasing, although, from a cost value point of view, this product is very expensive. It also must be carefully handled, because it is a substance that may endanger the health of those that come in contact with it. Another risk factor constitutes its high flammability potential, a fact that is common knowledge, as demonstrated by sources such as: http://www.collectioncare.org/MSDS/Acetonemsds.pdf.
We have also obtained remarkable results in the case of using gasoline for the osseous pieces degreasing process, but we have encountered the same inconvenient: the substance is expensive and has a very high flammability degree. The latter was also reported by Green et al.,1993.
The gasoline, of course, has the advantage that it is easier to purchase.
The whitening process using hydrogen peroxide has produced a satisfying result,

corresponding to our expectations, although in the case of the small sized pieces we had to take into consideration the concentration of the substance and its action time (Fig.4). This was also reported by Hussain et al., 2007.

Fig.4 Result of acetone degreasing and hydrogen peroxide whitening

In the case of using sodium bicarbonate and acetic acid, we haven't obtained a relevant result (Fig. 5).

Fig. 5 Result of gasoline degreasing and sodium bicarbonate whitening

At the end of the experiment, the obtained pieces were assembled according to their anatomic position and mounted on wooden bases.

The results of this experiment can help us to obtain osseous pieces that are durable in time and qualitatively superior to other methods of degreasing and whitening (Fig.6 and 7).

Fig.6 Cranium degreased with acetone and whitened with hydrogen peroxide

Fig. 7 Cranium degreased with gasoline and whitened with sodium bicarbonate

CONCLUSIONS

Following the comparison of the results yielded by this experiment, we can present several conclusions:

The applied maceration technique yielded ?remarkable results in both cases of osseous pieces obtaining process.

Both the acetone and the gasoline that we have used for the degreasing of the pieces lead to appropriately degreased items.

It must be mentioned that both substances have a high degree risk of inflammability, which entails handling them in an attentive manner.

Both products are expensive, but gasoline has the advantage that it is easier to obtain.

The hydrogen peroxide was more efficient for the process of bone whitening, by comparison to the sodium bicarbonate (NaHCO3), mixed with acetic acid.

Nevertheless, we can affirm that both skeletons are usable as didactic material, for the study of osteology in Leporidae.

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