Realization of an osteological montage of domestic animals at the Museum of Anatomy of the Inter-State School of Veterinary Sciences and Medicine of Dakar

Comment [MS1]: The title should specify the method adopted for creating the montage and should not reveal the name and place of the institute.

Abstract

The present study aims to perform osteological mounting of major domestic animals. To realize the different osteological mounts, we used a non-ligamentary mounting method. This technique consists in gluing the bones next to each other on a wooden or metallic structure. The bones are drilled and reinforced with aluminum wire. This method was preceded by a preparation step that included fleshing, degreasing, and rinsing. At the end of our study, 29 skeletons of sheep, goats, cattle, horses, poultry, suidae, carnivores, camelids, leporids and wild animals were reconstructed.

Key words: Assembly, Osteological, Museum, Animals, Domestic, EISMV, Dakar

Comment [MS2]: Suggested to change the keywords as osteological mounting or osteological assembly

Comment [MS3]: Both wild and domestic animals were used in the study. So, it can be modified as domestic animals and wild animals

Comment [MS4]: Name of the Institute and Place should not be used as keywords.

I. Introduction

Veterinary anatomy is the science that studies the structure and morphology of animals, especially domestic animals. It seeks knowledge of the structures that make up living organisms by specifying their situations, their forms, their relationships, their functions, their particularities. Descriptive in nature, it is one of the important pillars of biomedical knowledge, especially since the search for abnormalities in organs presupposes that the organs of the healthy animal are perfectly described and known **(DYCE, 1996).**

Veterinary osteology is the first component and the first with which students become familiar during their apprenticeship in veterinary medicine. Indeed, bones are the passive organs of locomotion. Hard, rigid, yellowish-white in colour, they give attachment to the muscles, which act on them like levers. They also serve to protect certain fragile organs (central nervous system, heart, lungs). Finally, they have an important role as reservoirs of mineral substances and their marrow is involved in the production of the figurative elements of the blood. A skeleton is the framework made up of all the bones of an animal, a framework that

gives the individual its general shape and dimensions. The possession of a bony skeleton is the main characteristic of vertebrates **(BARONE, 1999).**

Unfortunately, osteology can only be learned from the remains of dead animals. The teaching or even the transmission of veterinary osteology requires the realization of osteological assembly which, through a fine and reliable reconstruction, reproduces almost perfectly the particularities of the species. It is a very effective tool for understanding osteology and a reliable technical support to students and veterinary practitioners. It is only rightly accepted that the osteological montage, in addition to enriching the museum's osteotheque (bones classified by type that can be used for comparative study), serves as an educational support for students and veterinary practitioners.

It is therefore to do this that we proposed to carry out osteological montages in the museum of osteology of the Inter-State School of Veterinary Sciences and Medicine in Dakar. The general objective of this study is to contribute to the learning of osteology students in order to perfect their knowledge.

II. Materials and Methods

II.1. Period and Study Area

Our study took place at the EISMV Museum in Dakar from January 01, 2022 to December 31, 2023

II.2. Equipment

II.2.1. Animal Material

We used bones from the anatomy collection of the EISMV in Dakar. It should be remembered that these bones are the result of successive dissections carried out on domestic animals from the creation of the School to the present day.

Comment [MS5]: In result section, it is mentioned wild animals was also mounted. It should be included here.

II.2.2. Technical laboratory equipment

The material used is a classic osteological assembly kit. It consists of a drill, a gluing gun, glue, screws of different sizes, aluminum wires, a screwdriver, black paint, metal and wooden brackets.

II.3. Methods

II.3.1. Preparation methods

To carry out the various osteological assemblies, we used a non-ligament assembly method. This technique consists of gluing the bones next to each other on a wooden or metal structure. The bones are pierced and reinforced with aluminum wire.

The assembly began with a morphological study of the remains of the animal from the dissections. He continued with a complete fleshing, a step that consists of removing as much flesh, muscles and tendons as possible from the skeleton.

Comment [MS6]: The passage needs to be rephrased. Is it fleshing or defleshing ?

The bones are then immersed in a series of hot baths to degrade the last remains of flesh. Once clean, they were dried and then degreased with soda and bleached into seed.

Comment [MS7]: The intended meaning is not clear.

Thus, 500 g of soda and 500 g of seed bleach were needed to degrease and bleach a complete skeleton of large animals (equines and cattle). These bones were soaked for 48 hours in bleach and soda solutions.

II.3.2. Assembly method for osteological assembly

Depending on the type of bone to be assembled, the duration and the use of the assembly, different types of glue can be used.

- Thermal glue is used for temporary bonding. The setting time is a few seconds and the glue can be detached on its own or mechanically.
- Cyanoacrylate or epoxy glue is used for permanent bonding (e.g. when a bone is broken).
- Wood glue (acrylic) is used for long-surface bones (teeth, nasal bones, flat bones). Indeed, this type of glue takes a long time to dry, so you have time to adjust it. It is reversible with hot water.

All of these glues are transparent, making it easy to take photos without glue-related artifacts.

The reassembly was done on a metal support structure that was as discreet and as non-intrusive as possible. It is used to keep the skeleton in its position. The bones are threaded and fixed with rods, wires and screws. The assembly must remain reversible to make it possible in the future to consult the whole or only part of the skeleton.

After reassembly, the various supports were painted black to bring out the shine of the bones.

III. Results

At the end of our study, we obtained different osteological skeletons. In all, 28 carcasses of sheep, cattle, goats, horses (horse and donkey), poultry, suidae, carnivores, dromedary camels and rabbits were mounted.

Comment [MS8]: The list of animals mounted should be given in the animal material section.

Table 1: Skeletons mounted at the Museum of Anatomy of the EISMV in Dakar

Cash	Number
Sheep	4
Cattle	2
Goats	2
Equines (Horse)	2
Equidae (Donkey)	2
Poultry (chicken, duck, etc.)	10
Suidae	2
Carnivores	2
Dromedary	1
Rabbit	1
Wild animals (Derby Elk)	1
Total	**29**

For the skeletons of small ruminants, different skeletons of sheep and goats in different postures were mounted **(Figures 1A, B, and C).**

(A)

(B) **(C)**

Figure 1: Skeleton of small ruminants assembled at the EISMV Anatomy Museum

As far as the cattle skeletons are concerned, skeletons simulating zebu on pasture were set up **(Figures 2 A and B).**

(A)

(B)

Figure 2: Skeleton of cattle assembled at the EISMV Anatomy Museum in Dakar

As far as equines are concerned, skeletons simulating gallon horses have been mounted **(Figure 3).**

Figure 3: Skeleton of equines mounted at the Anatomy Museum of the EISMV in Dakar

As far as camelids are concerned, a camel skeleton has been mounted **(Figure 4).**

Figure 4: Skeleton of camelids mounted at the anatomy museum of the EISMV in Dakar

As far as carnivores are concerned, cat and dog skeletons have been assembled **(Figure 5).**

Figure 5: Skeleton of carnivores assembled at the Anatomy Museum of the EISMV in Dakar

s far as poultry is concerned, different species of poultry have been mounted, including pigeons, chickens and ducks **(Figure 6).**

(A) **(B)**

(C) **(D)**

Figure 6: Skeleton of poultry mounted at the Anatomy Museum of the EISMV in Dakar

As far as leporidae are concerned, a rabbit skeleton has been assembled (Figure 7)

Figure 7: Skeleton of rabbits mounted at the EISMV Anatomy Museum in Dakar

As far as the suidae are concerned, a pig skeleton has been mounted **(Figure 8).**

Figure 8: Pig skeleton mounted at the EISMV Anatomy Museum in Dakar

As far as wild animals are concerned, a derby elk skeleton has been mounted **(Figure 9).**

Figure 9: Skeleton of the derby moose mounted at the anatomy museum of the EISMV in Dakar

IV. Discussion

Veterinary anatomy is the science that studies the structure and morphology of animals, especially domestic animals. Osteology forms the basis for learning anatomy for students. The montage, beyond its role of enriching the Museum's osteotheque, contributes to serving as an educational learning medium for students, clinical veterinarians and for anyone wishing to deepen their knowledge of Anatomy.

We used a so-called non-ligament mounting method such as **BARRAQUAND, in 2010** in marten and marten and by **DURBEC in 2012** in night monkeys and by **MORLAR in 2010** in roe deer.

Our assembly technique, the non-ligament method of the skeleton with a hot glue gun, has the advantage of being non-destructive by keeping the bones, especially the articular surfaces, intact and restoring the thickness of the cartilages and intervertebral discs. In addition, it is less difficult to implement than drilling and wire techniques. The combination of these two processes, which are inexpensive and easy to set up, has made it possible to limit the creation of chemical and organic waste, as **Lacoste-Garanger, 2013,** who carried out an osteological assembly in the emperor penguin, has so well remarked.

It should be noted, however, that **LACOSTE-GARANGER in 2013,** used a variant of our method involving predators, in particular the giant predel and especially amphipods. In addition, unlike our technique, **LACOSTE-GARANGER** immersed the carcass in seawater, to take advantage of the salinity of the sea and amphipods instead of soda and bleach as in

our technique. This technique has the advantage of being less polluting and using natural components.

V. Conclusion

Our study consisted of making osteological montages according to the facilities present at the museum of the anatomy-histology-embryology department of the Inter-State School of Sciences and Veterinary Medicine of Dakar. This technique will make it possible to make osteological montages of wild animals in order to enrich the museum;

VI. References

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