

Collection and Taxidermy: A Pallas's Fish Eagle (*Haliaeetus leucoryphus*) (Pallas, 1771) (Accipitriformes: Accipitridae)

Sumona Afroz¹, Mamata Rani Das², Ashraful Kabir^{3,*}, Suman Mandal⁴

^{1,2}Department of Natural History, Bangladesh National Museum, Shahbag, Dhaka, Bangladesh

³Department of Biology, Cantonment Public College, Saidpur Cantonment—5311, Nilphamari, Bangladesh

⁴Padma Bridge Museum, Sreenagar, Munshiganj, Bangladesh

ABSTRACT

Taxidermy is very important for the study of evolution especially natural history. Taxidermy is the most important, powerful, and directs visual communication in the Bangladesh National Museum. This process is a skill that can be valuable to scientists and artists alike (Plate 1). Various species of birds are commonly exhibited in the galleries of the Bangladesh National Museum. This institution receives whole vertebrate specimens. Make sure that its skin will not be damaged while transportation, wrapping with the newspaper is necessary. Borax powder is used to protect the skin from insects and fungi. Later, it was made into a mannequin with the help of wooden wool, cotton, polyethylene foam, polyurethane foam, styrofoam, dried grass wool or other materials. Finally, mounting birds were placed with artificial rocks, plants, and grasses blended slightly into painted panoramic backdrops, giving an impression of actual nature (Plate 1).

Keywords: Pallas's Fish Eagle, Taxidermy, Diorama, Wildlife, Conservation, Bangladesh National Museum.

INTRODUCTION

Belon [1] describe the earliest scientific clarification and instructions for taxidermy procedures. His principal achievement was a history of birds, after that Aitinger [2] gave a narrative description of taxidermy or probable methods of their century and explain the procedures of taxidermy. In the same year, Olina [3] wrote the book 'Uccelliera overo discorso della natura e proprieta di diversi uccelli' in Rome and described the method of taxidermy. After many years, Reaumur and Eerchault [4] published the 'Preserving Dead Birds as Taxidermy' in London. Kuckhan [5] also described the process of bird taxidermy. The first French definition of the word appeared in an article written by Louis Dufresne published in the Nouveau dictionnaire d'histoire naturelle [6]. Taxidermy first appeared in 1848 in France then Germany, Denmark, England, and several other countries. At the beginning of the nineteenth century, the leather trade began in almost all cities in different countries of Europe. At that time, hunters used to bring their hunted animals to the furniture shops. The use of taxidermied models in houses was completely banned

Vol No: 08, Issue: 04

Received Date: October 03, 2024

Published Date: December 10, 2024

*Corresponding Author

Ashraful Kabir

Department of Biology, Cantonment Public College, Saidpur Cantonment—5311, Nilphamari, Bangladesh,
Phone: +88-01712563750;
E-mail: ashraful.mission@gmail.com

Citation: Afroz S, et al. (2024). Collection and Taxidermy: A Pallas's Fish Eagle (*Haliaeetus leucoryphus*) (Pallas, 1771) (Accipitriformes: Accipitridae). Mathews J Vet Sci. 8(5):53.

Copyright: Afroz S, et al. © (2024). This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

and used only for research purposes. English ornithologist John Hancock is said to be the father of modern taxidermy. He hunted birds and shaped them with the help of clay and plaster. Minnesota Association of Rogue Taxidermists is a well-known group dedicated to aesthetic display of mounted animals [7].

Bangladesh is a land of beautiful birds. It has got a moderate climate-neither too hot nor too cold. Bangladesh is a ground of forests and trees, hills and valleys, rivers, marshes and canals, wide open meadows. About 566 species of birds are present in our country [8]. Approximately 246 species of our birds are resident and the rest are migratory [9]. According to the International Union for Conservation of Nature (IUCN), the planet has lost half of its wildlife in the last 40 years [10,11]. The checklist of the birds of Bangladesh made by the biologists over the past 40 years have cited the species numbers from 578 to 718 [12]. IUCN Bangladesh [10] has declared 10 critically endangered, 12 endangered and 17 vulnerable birds add up to 39 species that can collectively be called threatened.

The Bangladesh National Museum is an institution in which material specimens of human and natural history are preserved. Natural History Department has been working to increase the general public perception and awareness about the animal kingdom and its environment. Knowledge about wildlife and their habitats with artistic ways could ensure life-like postures [13,14]. For protection of nature and rapid extinction of animals, this taxidermy is the only method to

keep the knowledge in such museums [15,16]. There is a dearth of the sufficient books on taxidermy [17]. Taxidermy can be an academic course in order to focus its impact for the conservation of nature and natural resources [18]. Carter and Walker [19] described all about gallery management of museums. At the time of taxidermy of birds, field-guides help a lot [20]. Livingness of stuffed animals play a significant role in human-animal relationships in museum galleries [21]. The main objective of this paper is to introduce with the term 'bird mounting' for long lasting preservation and how to be done this practically.

MATERIALS AND METHODS

Carcass collection: The existence of a single population of the migratory Pallas's Fish-eagle *Haliaeetus leucoryphus* was identified by the very first satellite tracking study in 2013-2014 [22]. Bangladesh Raptor Research and Conservation Initiative project started to research on detailed conservation, their immediate threats and breeding system of Pallas's Fish Eagle in Sunamganj area. In 2017, the species was re-categorized from vulnerable to endangered on the IUCN Red List. The sick Pallas's Fish Eagle was rescued by local people from Tanguar Haor in Sunamganj district and handed over to the authority of IUCN Bangladesh for better treatment but the bird failed to survive and died. IUCN Bangladesh preserved the carcass in deep fridge after post-mortem and gave it to the Bangladesh National Museum authority as a gift.

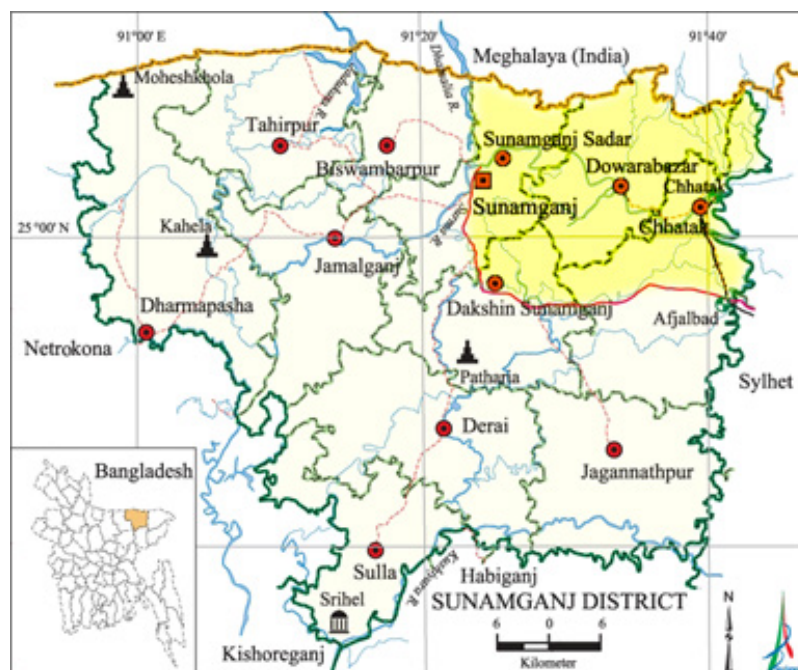


Figure 1. Location of the collection area in the Sunamganj of a Pallas's Fish Eagle [23].

Registration and preservation: Museum specimens are collected through purchase, gift, collection, loan, and exchange. The first step is to do taxidermy, mounted the bird and finally a little label may be tagged in the specimen. The object identification system was completed in both Bangla and English to establish a documentation system at an international standard. Finally, the specimen is then ready for the storage of the Department of Natural History or display in the gallery. The specimens are stored in unsealed polythene bags. Large, flat bird skins may be folded and stored in polythene bags. Small packets of paradichlorobenzene, silica gel, and naphthalene should be left in the wood compartment, glass container, etc.

Used chemicals and instruments: Before starting the taxidermy, some materials have been collected for the Pallas's Fish Eagle's taxidermy. The scalpel is the necessary instrument for skinning large birds, and there is an advantage in having several with various sized blades. Taxidermists use several chemicals to draw out the moisture, insect pests, and fungi. Skin tanning chemicals depends on the taxidermist's choice. Formaldehyde is used to treat areas where it is difficult to remove all the flesh such as the feet and wings. The following tools and chemicals were used for the taxidermy of birds in Bangladesh National Museum.

Table 1. Materials for a Pallas's Fish Eagle's taxidermy

Taxidermy steps	Tools, materials, and chemicals
Measurement	Slide calipers, flexible measuring tape, weight scale
Skinning and de-fleshing	Scalpel, scraper, forceps, scissors (small pointed, large, curved), wire brush, normal knife, pliers (diagonal, lineman's, slip joint, flat-nose, needle-nose), small hammer, needle and syringe
Tanning	Normal salt (NaCl ₂), borax powder, boric acid powder, ethanol, formaldehyde solution, detergent, shampoo, litmus strips, etc.
Tissue preservation	Deep fridge, airtight plastic vial
Mannequin making	PE foam, paper knife, sand papers, hand saw, cotton, threads, measuring tape, markers, etc.
Mounting	GI (galvanized iron) wires of three different sizes, copper wires, cotton, mud (mixture of silt, soil, clay), glue-gun, different threads, diagonal plier, pins, artificial realistic eyes, acrylic colors, clear white varnish, glue, paint brushes (different sizes), airbrush, branches of plants, wood board, polyethylene foam, screws, nails, etc.

Collection and taking photographs: For this study, a digital camera (Nikon D750) and a smart phone (Samsung Galaxy A05) were used. A photograph shows the right posture, color, size, shape of the specimen, etc.

Defrosting, measurements, and safety measures: Measurement of the carcass is very essential for taxidermy. Total length, tail length, length between two eyes, length between tip of the nose to midpoint of eye, wing length, distance between the tips of outstretched wings, foot length, beak length, weight, eye size, color of eyes, feet, beak, etc. Improper measurement can cause difficulties to complete the task of taxidermy. There are important health and safety issues relating to the handling of dead specimens. In most cases, the best habit to promote would be to always wear surgical latex gloves while skinning and handling. Wearing apron, spectacles, gloves, and managing first aid kits for unwanted accidents.

Skinning and fleshing: This can be accomplished without opening the body cavity. There are plenty of ways to make an incision on a bird specimen as like as vertical incision (from

the chest cavity to downwards), horizontal incision (from side to side of the stomach), and side incision (laterally, either left or right of the specimen's body). Skin from both side of incision has been loosening carefully by scalpel, forceps, and fingers. Some taxidermists prefer to keep the last piece bone of coccyx to be attached with the tail, but in this project the tail bone completely removed from the base of tail feathers. Cloaca had to be separated from rectum. Then, turn around the body skinned towards the forelimbs/wings. Humerus of both wings has been detached from pectoral girdle. Flesh from all parts like legs and wings have been removed manually. After removing most of the muscles and tendons, the inner surface of skin has been enclosed by plenty of non-iodinated salt. The skinning towards the head is done very carefully. Cut off left side of neck that is hanging, and then insert tweezers carefully into the head and pull out the brains bit by bit. Make sure the eyes are out as well; fake eyes can be easily bought or be made. Skin around the eyes then separated with special concern. After reaching to the base of beak, skinning will end. During skinning, always keep skin wet with water. It also helps to prevent drying the skin

which is also a cause of skin damage during cleaning.

Sketching and tissue preservation: Take few photographs of the detached body is mandatory after completing the skinning. Then the eye ball is measured using slide calipers. Before this, normal water should be injected inside the eye to give the precise shape. This helps to collect exact size of artificial eye pairs then measure the distance between two eyes. Tissue samples, usually liver, tongue, and muscle are taken and stored at -80°C for genetic studies in a refrigerator. After that a small amount of muscle has to cut from the body and preserved in 70% alcohol (Table 1) for knowing the gene-data of the specimen.

Tanning of the skin: Tanning is an important step as it prevents the skin from decaying. After removing all flesh and fat from the skin, next step is to tanning. Washing the skin carefully and scientifically increased the longevity of the Pallas's Fish Eagle and protects the skin from bacterial/fungal attack. Washing have been done step-wise and it is a day long process. In general, the cheapest chemicals can be used in museum for animal stuffing [24]. At first, wash with cold water and NaCl_2 . It mostly washes the blood and prevent feather falling. Non-iodized NaCl_2 acts better in this case. Here amount of NaCl_2 is 10g/l of water. Skin should be washed from the outside and take care about reaching the salt solution each of the inner corners of it. Washing time is approximately 10 minutes. Nevertheless, the skin always keeps moving during washing and this should be maintained. Skin and feathers have been washed manually with the help of tooth brushes to make the feathers bright and clean.

Artificial body parts: After the skin preparation, construction of an artificial body is the next step. Taxidermy work on bird, using cotton, wooden wool, and jute fiber will be found most satisfactory for making of neck, wings, and legs wrapping. A good grade of long-fiber cotton has been used for wrapping skulls, wings and leg bones of Pallas's Fish Eagle. Various sizes of strong threads are needed for wrapping and stitching. The cotton fibers wrapped on the twisted U-shaped GI wire and tightened with thread to make the shape of neck. Open end of twisted wires remains at least 10 inches longer than the neck to connect the neck with dummy body. Closed end of GI wire will connect the skull with the neck.

Skin repairing, head preparation, and eye setting: After washing the skin, it needs to check appropriately. The anus and genital pore also need to close by stitching thread. It is best to use the original skull for Pallas's Fish Eagle taxidermy. The U-shaped end of GI wire from the artificial neck has been probed through the skull's neural opening and fixed by hot melted glue within the brain box. Artificial realistic eye setting is the most important part of taxidermy.

A pair of perfect eyes can make the stuffed specimens look alive. Eye color is the unique feature of any animal species. Taxidermists may add glass eyes and other artistic touches to create an accurate. Glass eyes are expensive and not available in Bangladesh. For this reason, epoxy resin eyes have been prepared for this specimen. Acetone based paint have been used to draw the details of eye. Mud clay has been used to fill the eye socket and remake the facial muscles. At first the glue-mud mixture poured into the eye ball.

Wiring wings, legs, and tail: GI (12 number) wire has been selected for legs and inserted the wire through the center of the palm. GI wire then tightened with leg bones by strong thread and wrapped the bone with cotton to make the approximate size and shape of real leg muscle. In case of wing, 16 no. of GI wire has been used and one end inserted up to the base of basal phalanx. GI wire then tightened with wing bones by strong thread and wrapped the bone with cotton. A 12-inch U-shaped GI wire has been inserted through the base of tail feathers which will probe through the mannequin tail.

Fixing artificial body, stitching, and drying: Legs and wings have been attached to the mannequin at the right points with extended GI wires of limbs. Tail's wire also has been inserted at the posterior end of dummy body and tightened the wires by bending at ends. Mondol and Khan [25] started 'paper mache' for making artificial body for animal stuffing. The last step is to sewing the bird around the body mold using dental floss or carpet thread. Pins have been used to set the skin primarily which were then removed during stitching. The skin and feathers have been dried with a clean towel and hair dryer. Feathers have been dried by using cool air blow. Then warm air blow has been applied to make the feathers fluffy.

Mounting and display: Mounting of bird depends on the posture and the surrounding habitat. The position of wings, tail feathers, legs, and claws have to place according to the desired action of the bird. If the bird mounts as flight mode the wings will spread, otherwise the wings will remain folded. A selected branch of tree has been fixed on a table vice before mounting, which will be attached to the tree later with the help of screws and glue. The extended wires through the legs have been inserted the tree branch with the help of electric driller. At the end of mounting, little formaldehyde solution injected into the shanks and toes. Finally, need to finish the color of bill and feet. A taxidermist needs to have a very good idea about color matching. When a bird dies and is subsequently tanned, no longer has the original color pigmentation of those areas. In this case, only the clear varnish can be used because the color of beak and legs is not changed. The display of a Pallas's Fish Eagle should be

attractive and informative. Dioramas placed mounting birds in exactly created environments to mimic in every way

possible the ecological habitat of the Pallas's Fish Eagle.



Accession no. 01.04.402.2024.00046

Plate 1. A mounted Pallas's Fish Eagle in Bangladesh National Museum.

RESULTS AND DISCUSSION

Browne [26] described various methods of skinning birds. In the process of taxidermy, skinning, tanning, stuffing, and mounting are completely different than the mummification [27]. Metcalf [28] described fixing, preserving skin, and anatomy of birds and mammals. Birds are known for their delicate feathers, fragile extremities, as well as the neck and beak. This step-by-step initiative will focus on the anatomy, preparation, and mounting of a Pallas's Fish Eagle from frozen to display using different techniques. Mounting Pallas's Fish Eagle's made in the process of taxidermy. Dioramas are inspired to become a taxidermist and continue to stoke the fire of desired passion. Naturally, it requires a thorough knowledge and concept of Pallas's Fish Eagle's life process. Heat and moisture promote bacterial growth, so avoid those conditions because they cause feather slippage. This is true applicable in all kind of bird specimens. As a result, the skin is likely to deteriorate quickly. Part of the taxidermy process is taking measurements to be able to accurately recreate each specimen. Unlike mammal taxidermy, birds can have their skull, beak, leg, and wing bones remain intact. It requires removing all meat and fat and cleaning the feather tracts of all soft tissue. The entire inside will be a sculptural representation of the bird. The skin will be cleaned to remove all muscle, tissue and fat before putting it on the sculpture. In short, a taxidermist must know the following things in order to complete a large bird's taxidermy. Such as the identification of bird, the habitat and its environment, the behavior, the scientific method of skinning and tanning, etc. Finally, the strategy to protect against insects. Flea and tick killing insecticides are used in taxidermy laboratory of the Bangladesh National Museum. Sometimes, coleopteran

insects may destroy the specimens in museum [29]. Moreover, bacteria would more likely be damage inside or outside of the skin and feathers of birds. As long as treat the hide by drying properly for avoiding bacterial infection.

CONCLUSIONS

Bangladesh National Museum display a remarkable number of mounting birds with dioramas in their respective galleries. This renowned institution plays a significant role in taxidermy by displaying dioramas and employing assistants to aid the taxidermist. Taxidermy is an important technique for curation, education, and environmental awareness in the world. The art of taxidermy has contributed to broader conservation goals. This is usually done for research or teaching purposes. Collected bird specimens (mounted or skins) have always been a valuable resource for zoological research. The reason behind taxidermy's work is the desire to keep birds indestructible with their evolution. Taxidermists are always trying to apply methods in a modern way to represent birds to the next generation that could be unseen from the earth. In this regard, there is no shortcut of this taxidermy to resolve those hidden clues about the extinction of animals. At present, the popularity of taxidermy is increasing day by day. Youngsters from different countries are choosing taxidermy as their profession. This is impeccable in the field of preservation of nature and natural resources. Taxidermy has achieved an industrial value in western countries where experts mold artificial bodies, ears, eyes, tongues, teeth, and other parts of various animals. In this taxidermy work, many people will enjoy about this endangered bird species and will endure as a living bird in the Museum for years. This work could make future bird researchers in Bangladesh.

ACKNOWLEDGEMENTS

The authors would like to express their deep gratitude and thanks to Bangladesh National Museum for all kinds of support during this work. We are also thankful to Mr. ABM Sarwar Alam, IUCN Bangladesh, for taking necessary steps to receive the dead Pallas's Fish Eagle as a gift in the Bangladesh National Museum.

REFERENCES

1. Belon P. (1555). L'histoire de la nature des oyseaux. Paris: Chez Guillaume Cauellat.
2. Aitinger JC. (1626-1631). Kurtzer und einfeltiger Bericht von dem Vogelstellen. Cassel.
3. Olina GP. (1622). Uccelliera overo discorso della natura e proprieta di diversi uccelli. Rome: Andrea Fei.
4. Reaumur RA, Eerchault D. (1748). Divers means for preserving from corruption dead birds, intended to be sent to remote countries, so that they may arrive there in a good condition. Philosophical transactions of the Royal Society of London 45:304-320.
5. Kuckhan TS. (1771). Four letters from Mr. T. S. Kuckhan, to the President and Members of the Royal Society on the preservation of dead birds. Philosophical Transactions 60:302-320.
6. Dufresne L. (1803). Taxidermie, Nouveau Dictionnaire d'Histoire Naturelle, appliqué aux Arts, à l'Agriculture, à l'Economie rurale et domestique, à la Médecine etc., par une société de naturalistes et d'agriculteurs. Paris: Deterville.
7. Topcik J. (2005). Head of Goat, Tail of Fish, More Than a Touch of Weirdness. The New York Times. January 3, Page 2.
8. IUCN. (2015b). Red List of Bangladesh. Volume 3: Birds. IUCN, International Union for Conservation of Nature, Bangladesh Country Office, Dhaka, Bangladesh. pp. xvi+676.
9. Dipu SA. (2012). Migratory Birds of Bangladesh. Abosar Press, Dhaka. 296 pp.
10. IUCN. (2015a). International Union for Conservation of Nature. Annual Report of the Species Survival Commission and the Global Species Programme. Available at: <https://portals.iucn.org/library/sites/library/files/documents/2015-024.pdf>
11. IUCN. (2017). *Haliaeetus leucoryphus*. The IUCN Red List of Threatened Species 2017: e.T22695130A119358956. Available at: <https://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T22695130A119358956.en>
12. Khan MMH, Aziz N. (2015). Birds of five protected areas of Bangladesh and temporal changes in the densities of indicator species. The Festschrift on the 50th Anniversary of the IUCN Red List of Threatened Species.
13. Kabir A, Hawkeswood TJ. (2020). A review on wildlife taxidermy: preservation for conservation. Calodema. 845:1-8.
14. Kabir A, Das MR, Hawkeswood TJ. (2021). A study on the theoretical concepts of quality mammalian taxidermy: clues for conservation. Calodema. 854:1-10.
15. Payne RB, Sorenson MD. (2003). Museum collections as sources of genetic data. Bonner Zoologische Beiträge. 51:97-104.
16. Suarez AV, Tsutsui ND. (2004). The value of museum collections for research and society. BioScience. 51(1):66-74.
17. Hossain MD. (2016). Modern Technologies in Taxidermy (in Bangla). Publisher: Md. Delwar Hossain. 133 pp.
18. Shafiq S. (2024). The man whose passion is to preserve dead animals (in Bangla). Available at: <https://www.tbsnews.net/bangla/%E0%A6%AB%E0%A6%BF%E0%A6%9A%E0%A6%BE%E0%A6%B0/news-details-268301?sfnsn=wa>
19. Carter D, Walker A. (eds.). (1999). Chapter 1: Care and Conservation of Natural History Collections. Oxford: Butterworth Heinemann. pp. 1-36.
20. Clement P, Hathway R. (2007). *Thrushes*. Christopher Helm, London.
21. Burt J. (2008). The aesthetics of livingness. Antennae. 5:4-11.
22. Chowdhury SU, Foyal M, Prince NU, Inam SS. (2020). Pallas's Fish-eagle *Haliaeetus leucoryphus* conservation project in Bangladesh. Birding ASIA. 34:23-26.
23. Banglapedia. (2024). Available at: https://en.banglapedia.org/index.php/Sunamganj_District (Accessed on 8 November 2024).
24. Hormann MJ. (1931). Taxidermy Lessons. The Blue Beaver Taxidermy School, Brooklyn.
25. Mondol N, Khan SI. (2007). Taxidermy and preservation of dead birds in the National Museum (in Bangla). Newsletter (July-September) 22-26.

26. Browne M. (1896). *Artistic and Scientific Taxidermy and Modelling*. Adams and Charles Black, London.
27. Pequignot A. (2002). Histoire de la Taxidermie en France de 1729-1928. Etude des facteurs des évolutions techniques et conceptuelles et ses relations à la mise en exposition du spécimen naturalisé. Ph.D dissertation, Paris: Museum National d'Histoire Naturelle.
28. Metcalf JC. (1981). *Taxidermy: A Complete Manual* (1st edn.), Gerald Duckworth and Co. Ltd., London.
29. Hasan MA, Hossai, MD, Hasan MM, Rahman MS. (2007). A pest of stuffed museum specimen *Anthrenus scrophulariae* (L.) (Coleoptera: Dermestidae). University Journal of Zoology, Rajshahi University. 26:99-102.