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A review on wildlife taxidermy: preservation for conservation

by Ashraful Kabir* & Trevor J. Hawkeswood **

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Abstract: Taxidermy is very important for the study of evolution especially natural history. All museums of the world display many preserved animals within dioramas. Taxidermy focuses on the exhibition of dry, preserved animals. Birds and mammals are commonly exhibited. In wet preservation, in the present context, alcohol is used instead of formalin in various ratios depending on the cellular and muscular structure of such organisms. Chemicals and utensils used in taxidermy are tabulated and briefly reviewed.

Key words: Wildlife, taxidermy, preservation, economic value, Bangladesh.

Introduction

Taxidermy is an advanced form of art in the preservation and restoration of dead specimens for long term storage and display. A taxidermist needs to be both an artist as well as having excellent knowledge about the morphology and anatomy of the various species. It is an integral part in assisting and training new bird enthusiasts, ornithologists, researchers, students, ecologists, field inspectors, foresters, ornithologists, and general public alike in knowing about morphology and anatomy with distinguishable identification features and characteristics of closely related species. It is not always possible for bird enthusiasts to attend live bird displays, particularly if they are located well out of towns and cities. Natural bird models produced through taxidermy can fill this vacuum in better reaching and educating people (Basu & Zandi, 2015).

Mummies were created in a religious context unlike taxidermies which developed from a curiosity about nature. The great comedian Sir Charlie Chaplin (1889-1977) made a movie called "One A. M." in the year 1916 where he showed preserved animals like fish, rhea, bear, lynx, leopard, tiger, fox, mongoose, deer, sheep, baboon, pronghorn, buffalo's horn, elephant's leg, etc., often as head mounts. So it is very obvious that taxidermy is an ancient method. The protection of nature and the rapid extinction of species have given increased value to museum collections for researchers and for society in general (Payne & Sorenson, 2003; Suarez & Tsutsui, 2004). Taxidermy continues to represent the assertion of human dominance over the natural world (see internet at https://www.academia.edu/41606491/Taxidermy_displays_and_the_construction_of_nature_From_the_Akeley_Hall_of_Mammals_to_Guy_the_gorilla). The objectives of this study are as follows- a. Museum collections of dead, preserved animals. b. According to their body size and structure whether specimens require wet or dry preservation. c. Diorama or basic displays for the study of evolution and classification.

National Museum and Zoo: National Museums of any country usually have many sections where the animal section is well developed. They usually have a Museum Curator, Deputy Curator, Assistant Curator and Taxidermist (s). Moreover, staff produce taxidermied animals in their well-equipped laboratories. The National Museum may provide a course on taxidermy for the zoologist and student. This institution plays a significant role in taxidermy by producing dioramas and employing assistants to aid the taxidermist in this exceptional type of artistic work. For the public demand, a museum may exhibit as a result of various successful taxidermy processes, such items as

shoulder mounts, head mounts, free standing animals, common/traditional mounts (simple base, habitat base), soft mounts, possible soft mount, head-dress mounts, etc. All zoos have a museum because their dead animals can be taxidermied by their own in house or hired taxidermists. Live animals after killing do not allow for taxidermy, only naturally dead animals are suitable.

Zoology Museum in Universities: All public universities of Bangladesh possess a museum/natural history museum in the Zoology Department and an herbarium in the Botany Department which are possess numerous dry and wet preserved animals and plants respectively. There are also many osteological collections in zoology museums. All specimens are categorized in a sequential order because it is important to know the grade of classification. If the removed skins of dead animals are not processed properly, they can be infested by parasitic insects. If taxidermied animals are preserved in glass chambers, they will be permanently preserved but if they are prepared open, they should be sprayed with non-harmful, non-toxic pesticides for protection. The larvae of the beetle, *Anthrenus scrophulariae* (L.) (Dermestidae) devours the feathers, hair and skins of stuffed animals such that the animals became featherless or hairless and are ultimately destroyed (Hasan *et al.*, 2007).

Biology Department of the Colleges: Biology laboratories of any colleges of Bangladesh have a moderate number of animals according to their syllabus. Common animals especially insects, fishes, frogs, toads, snakes, birds, small mammals, and other invertebrates are commonly kept by the laboratory attendant and associated students. By taking a course in taxidermy, a biology teacher can prepare taxidermied animals especially birds and mammals for the study of evolution and classification. Students take part in the process of those taxidermies and they can display/present these at any science fair. Body parts of many animals can be stored in alcohol or formalin for a long time. When chemicals discolour them, the chemicals require changing. Body parts of animals can be obtained from slaughtering houses or veterinary hospitals. Taxidermist posts can be implemented in these colleges which can help to alleviate unemployment amongst graduates in the society.

Scientific stores: In Bangladesh, most divisional scientific stores provide all sorts of chemical, appliances, as well as wet and dry preserved animals.

Shops: The shopping malls of megacities often market some taxidermied animals. Since those are expensive but very attractive with their gesture and posture. Some shop keepers put inside and/or outside of their shop for their aristocracy and for attracting customers. Moreover, dioramas provide a natural appearance in shops. In large Bangladesh pet shops, some animals normally die and if shopkeepers know how to remove the skins they are able to do this and supply them to the taxidermists. If they have basic training on taxidermy, shop keepers can process animals for taxidermy.

Useful instruments for taxidermy

Taxidermists have access to commercial suppliers who trade in mass quantities of all kinds of strange products such as artificial eyes, noses, tongues, mouths, and ears (www.wildnh.com/pubs/wj-magazine.html).

Table 1. Summary of instruments and their uses in taxidermy.

Instruments	Uses
Fridge	Preservation, refrigeration
Compressor	Pressure washing
Grinding machine	Grinding
Charger drill machine	Pores, holes
Hair dryer	Drying feathers and fur
Pliers	Cutting wires
Weight machine	Measuring weights
Table vice	Cutting
Hammers	Striking, flattening etc
Knife	Cutting
Thread	Ligation
Forceps	Catching, holding
Scissor	Cutting
Slide calipers	Measurements
Beaker	Store liquids
Measurements tape/Large scale	Measurements
Cloth thread	Coiling
Cotton	Inside specimens
Plastic wool	Soaking skin
Plastic mug	Pouring
Plastic bucket	Storing
Wood file	Finishing
Water sprayer	Spraying
Glue gun	Ligation
Wood saw/Wood wool/Foam/Straw/Dry grass	Shaping internal body
Syringe and Needle (small, medium, large)	Pushing chemicals within the body
Screw	Staging, securing mounts etc
Scalpel	Cutting skin
Water colours	Colouring
Wood/Plywood/Branches of plants/Artificial plant	Body shape, natural habitat
Dropper	Chemical transferring
Artificial eyes/Marbles	Eye replacement

Source: Hossain (2016). *Modern Technologies in Taxidermy*

Table 2. Summary of chemicals and their uses in taxidermy.

Name of chemicals	Uses
Alcohol/Ethyl Alcohol/Ethanol/Isopropyl Alcohol	Preservatives
Formalin	Preservatives
Glycerine	Shining
Acetic acid	Preservatives
Formic acid	Antibacterial
Arsenic powder	Pesticide
Mortanol	Antifungal
Preventol	Antifungal
Supranol	Antiallergic
Novalton	Paralyze parasites
Finis	Pesticide
Rencast FC52/53	Casting, resin, copying models
Eulan spa	Insecticide
Soda	Deodorant/Weedicide
Borax	Insecticide, Antifungal
Alginate/Sodium alginate	Casting
Plaster of Paris (mixture of sand and cement and sometimes lime with water)	Make smooth hard surface during drying of the skin
Galon/Liquid soap/Floor cleaner/Shampoo	Wash
Resin/Peroxide/Fiber glass resin	Model
Silicon (Finsol A and B)/Sandpaper	Finishing
Ammonia solution (25%)	Pesticides
Litmus paper	Detect acidity and alkalinity
Fiberglass wool	Model

Source: Hossain (2016). *Modern Technologies in Taxidermy*

Keeping records of dead animals

Once the animal has been collected and for taxidermic treatment, scientific data is required- Serial number, the registration number, the English and scientific name of the animal, the sex of animal, date of death, collection date, collection place, cause of death, name of collector and contact number, taxidermy type (stuff, print, skeleton), weight of the animal, total length, length of forelimb-hindlimb-neck-tail-beak, distance between two eyes-corner of lip and eye - eyes to the tip of beak, shape of eye, eye size, stuffing date, and name of the taxidermist (Hossain, 2016).

Easiest methods for taxidermy

Cheapest chemicals normally used in taxidermy are sodium chloride, thymol, and 5% formal saline. Large amounts of skill and artistic ability are required to produce life-like appearances of dead animals. Simple injection of formalin to the animal followed by drying is not suitable for the educational specimens. Separated skin can be placed in solution with 5 parts of sodium chloride and 1 part thymol and left overnight; this acts as an anti-fungal preservative. The following day specimens are immersed in 5% formal saline for 1 month. Cotton placed carefully inside the skin with wiring can be utilized for the required posture of the specimen. For snake skins, soaking in 10% formal saline for 6 months is used and the snake abdominal cavity is stuffed with absorbent wet cotton with sodium chloride and thymol crystals (viz. Ramkrishna & Leelavathy, 2017). Browne (1896) was the first taxidermist to describe different methods of skinning and mounting birds. Hormann (1931) described various steps in the collection of birds, killing live birds, care of specimen tools, preservation paste, skinning and especially fat removal. For that purpose taxidermists utilize skinning, tanning, stuffing, and mounting techniques that are completely different from mummification (Pequignot, 2002). Some taxidermists completely remove all bones in order to obtain both a lightweight mounted specimen and a full skeleton for their osteological collections. Some methods may have been lost over time because taxidermists often failed to preserve records or did not publish their methods. In addition, each taxidermist has had his/her own methodology and also could change their practices during his/her life-time (see Pequignot, 2006). For fish, the taxidermic process is much trickier and requires more artistic talent. Warm-water fishes are easier to preserve as skin mounts because they have tough skins, large scales, and are not especially greasy (www.wildnh.com/pubs/wj-magazine.html).



Fig. 1. Examples of preserved pigeons (<https://www.artcurial.com/en/lot-pigeon-ramier-pigeon-colombin-columba-palumbus-columba-oenas-deux-specimens-3105-112>).

Variable percentages of alcohol-formalin

Table 3. Summary of uses of alcohol and formalin for micro-organisms to mammals.

Organisms	Alcohol (%)	Formalin (%)	Comments
Micro-organisms	-	-	For their microscopic features only mounting is possible under the microscope
Plants	-	-	Herbarium oil and drying methods are suitable
Protozoans	-	-	Only mounting
Poriferans (Sponges)	95	-	-
Coelenterates, Platyhelminths	70	5	-
Nemathelminths	70	-	-
Annelids	70-80	-	Wet preservation
Arthropods	70-80	10	Inject 10% formalin then in alcohol
Molluscans	75	10	Wet preservation; 10% formalin for buffering for 2-3 days then storing in alcohol
Echinoderms	70	5	Wet preservation
Fishes	70	10/25	Wet preservation
Amphibia	75	7-10/8/25	Wet preservation
Reptilia	75	7-10	Wet preservation; large animals especially the crocodile and python are recommended for dry preservation
Aves	90	37	Drying is required to retain feather colours
Mammalia	90	6	Drying is required

Source: Internet

Tanning procedure

Tanning is a key part of taxidermy. If undertaken correctly, the mounted animals' skin will remain shiny and realistic for many decades. If undertaken incorrectly, a poorly preserved skin can also quickly lose its hair or become eaten by moth larvae and other pests and the specimen therefore takes on a ghastly appearance (www.wildnh.com/pubs/wj-magazine.html). The tanning of the skins of large and furred animals ensures the longevity of the taxidermied animals. This tanning has entails some processes such as washing of the skin, salting (24 hours), drying (25%), folding inside

the skin, punching, storing, rehydration (3-4 days), shaving/stretching, using tanning solution/alum, employing tanning oil (coconut oil can neutralize some pathogens, green tea for neutralizing uv radiations, using walnut oil for healthy skin), and finishing/drying/brushing (see internet at <https://www.youtube.com/watch?v=PYCvBADKSu4>).

Table 4. Related useful articles which enriched this review.

Features	Examples	References
History	Carl Ethan Akeley (1864-1926) was the pioneer of modern taxidermy	Basu & Zandi, 2015; Payne & Sorensens, 2003; Suarez & Tsutsui, 2004; https://www.academia.edu/41606491/Taxidermy_displays_and_the_construction_of_nature_From_the_Akeley_Hall_of_Mammals_to_Guy_the_gorilla
	Sometimes museum specimens	Hasan <i>et al.</i> , 2007
Infestation	can be infested by pests	
Instruments	For preparing life-long taxidermied animals reliable instruments are needed	Hossain, 2016; www.wildnh.com/pubs/wj-magazine.html
	For quality skin, appropriate chemicals are essential	Hossain, 2016
Chemicals	Before removing the skin, needs	Hossain, 2016
	Record keeping	to maintain an information ledger
Methods	Easiest method	The cheapest chemicals can be used in taxidermy
	Tanning	Without proper tanning, the hairs will fall from the skin
		Ramkrishna & Leelavathy, 2017; Browne, 1869; Hormann, 1931; Pequignot, 2002; Pequignot, 2006; www.wildnh.com/pubs/wj-magazine.html
		www.wildnh.com/pubs/wj-magazine.html https://www.youtube.com/watch?v=PYCvBADKSu4

Concluding remarks

Zoo, pet or domestic animals can die occasionally because of various factors. Each zoo has a museum where all dead animals can be stored as dry or wet models for the future. According to natural habitat, those animals could be displayed within a glass jar for safety. Soft animals can be preserved in alcohol or formalin whereas large or furred adult animals are best for dry preservations. In any house, restaurant, hotel, park, garden, or a shopping mall could flourish with stuffed animals especially feathered or furred creatures. Specimens of endangered and near-extinct animals can be preserved as wet or dry preservation techniques. Micro-organisms, plants,

invertebrates, fishes, tetrapods (amphibia, reptilia, aves, mammalia) are considered wildlife. For the preservation of plants, after scientific drying of various parts of plants (stem, leaf, bud, flower, root) or herbarium oil can be used. Within various preservation techniques, taxidermy is the best because through this, whole animal is possible to study well and is not wasted after death. This is an excellent rewarding hobby or pastime for animal lovers and can be transformed into a business as well, which leads to the exportation of quality taxidermied animals and at the same time maintaining wildlife rules.

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