



FISH TAXIDERMY AS A SCIENTIFIC TOOL: SUPPORTING RESEARCH AND SPECIES RESTORATION

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Abstract

Fish taxidermy is a scientific and artistic practice that supports biodiversity conservation, research, and education. Once linked to trophy hunting, it has evolved into an ethical tool for documenting species morphology and raising conservation awareness. With increasing threats to aquatic biodiversity, taxidermy aids in species restoration and ecological studies. Modern taxidermy in India, guided by the Wildlife (Transactions and Taxidermy) Rules, 2024, focuses on preserving naturally deceased specimens. Pioneers like Dr. Santosh Gaikwad have advanced ethical taxidermy methods for research and education. Fish taxidermy employs two main techniques: skin mount taxidermy, which preserves real fish skins, and replica mount taxidermy, which creates fiberglass replicas for conservation-friendly preservation. These methods are widely used in museums and research institutions to document endangered species, study environmental changes, and educate the public. By blending scientific preservation with artistic craftsmanship, fish taxidermy remains a valuable tool in conservation, ensuring the documentation and appreciation of aquatic species for future generations.

Introduction

Taxidermy, derived from the Greek words taxis (arrangement) and derma (skin), is a specialized discipline that integrates art with scientific methodology to create lifelike representations of animal specimens (Péquignot, 2006). It involves the preparation, stuffing, and mounting of animal remains to preserve their

physical structure for long-term display and study (Kabir et al., 2020). The primary objective of taxidermy is to achieve anatomical accuracy and realism in the representation of animal forms, distinguishing it from simple preservation techniques. Fish taxidermy, in particular, is a highly intricate practice requiring not only technical proficiency in anatomy and conservation but also artistic precision in recreating natural postures and color patterns. Historically, taxidermy has served as a vital tool in scientific research and education, aiding in the documentation of biodiversity and species morphology. Over time, the practice evolved beyond scientific study into an art form utilized by museums, aquariums, and educational institutions to facilitate learning about aquatic life, ecological systems, and species conservation.

Prominent taxidermists, such as Divya Anantharaman, emphasize the philosophical aspect of taxidermy, viewing it as a means to extend an animal's existence beyond its biological lifespan. The term "taxidermy" was formally introduced by Louis Dufresne in 1803, and the technique has historically played a role in species conservation by preserving specimens of endangered or extinct animals (Athar, 2022). However, the enactment of the Wildlife Protection Act in 1972 led to the prohibition of taxidermy in India, aimed at curbing illegal hunting and trophy collection. Despite this restriction, contemporary taxidermy is experiencing renewed interest in conservation, research, and educational contexts, necessitating the development of ethical and scientifically sound methodologies for preserving biodiversity.

Historical Development of Taxidermy

The origins of taxidermy can be traced to prehistoric civilizations, where early humans practiced rudimentary forms of preservation. Ancient Egyptians were among the first to embalm animals, primarily for religious and funerary purposes, rather than for anatomical display. The earliest recorded attempt at taxidermy as a structured practice is attributed to a Dutch nobleman in the 16th century, who collaborated with chemists to preserve bird specimens using aromatic spices and structural wiring (Hendriksen, 2019). Modern taxidermy began to take shape in the 19th century, particularly through the contributions of John Hancock, an English ornithologist recognized for his pioneering realistic bird mounts showcased at the Great Exhibition of 1851 (Niittynen, 2018). The Victorian era (1837–1901) marked significant advancements in fish taxidermy, driven by a growing public fascination with natural history. During this period, improvements in artificial eye technology and anatomical modeling techniques led to increasingly lifelike representations of fish specimens. In the 20th century, taxidermy techniques evolved with the introduction of synthetic materials such as polyurethane foam, which provided enhanced durability and realism in specimen mounting (Reddy et al., 2024). This era also saw a transition in taxidermy applications, shifting from trophy collection to scientific study and museum curation.

India's taxidermy history is closely linked to colonial hunting traditions, where trophy mounts were widely popular. However, post-independence wildlife conservation policies led to strict legal restrictions on the practice. The Wildlife Protection Act of 1972 was a pivotal measure in curbing hunting and its associated taxidermy trade, resulting in a decline in traditional taxidermy businesses, including the closure of the renowned Van Ingen company, once a leading taxidermy enterprise (Asian news, 2022). Despite historical associations with hunting, taxidermy continues to play a crucial role in scientific research and conservation. In contemporary India, practitioners such as Dr.

Santosh Gaikwad have redefined taxidermy within ethical parameters, focusing on preserving specimens that have died due to natural causes rather than hunting. This modern approach aligns with global conservation efforts aimed at protecting endangered species through specimen-based studies and educational initiatives.

Scientific and Conservation Significance of Taxidermy

Taxidermy contributes to various scientific disciplines, including zoology, ecology, and wildlife management. Specimen preservation allows researchers to study morphological variations, genetic traits, and environmental adaptations in different species. The technique has been particularly useful in documenting rare and endangered species, ensuring that physical references remain available for future study even if a species becomes extinct. Fisheries resources are subject to environmental fluctuations, and many aquatic species face significant threats due to pollution, habitat degradation, and climate change. According to the IUCN (2009), 42 fish species in India are classified as threatened, with further assessments by the National Bureau of Fish Genetic Resources (NBFGRR) identifying 120 species as endangered or vulnerable. Additionally, the Indian Wildlife Act (1972) provides strict protection for 12 fish species listed under Schedule I, Part (2).

A notable example of species loss is the extinction of Steller's sea cow (*Hydrodamalis gigas*), which was last observed in 1786. The species' skeletal remains, now preserved in museums, highlight the critical role of taxidermy in maintaining records of lost biodiversity. Similarly, the Gangetic dolphin (*Platanista gangetica*), India's national aquatic mammal, has experienced severe population declines due to habitat fragmentation and anthropogenic pressures. Classified as Endangered by the IUCN and protected under Schedule I of the Indian Wildlife Act, this species is also listed in CITES Appendix I and CMS Appendix II, underscoring the necessity for international

conservation efforts. The preservation of such specimens through ethical taxidermy practices aids in ecological research, public education, and policy-making for species protection.

Taxidermy and Ethical Considerations

Historically, taxidermy was associated with sport hunting, where mounted trophies symbolized status and power. However, modern taxidermy has shifted towards scientific and educational applications, emphasizing ethical practices and conservation awareness. Early taxidermy techniques, which involved stuffing animal skins with sawdust and rags, often resulted in distorted representations. Advances in anatomical modeling and synthetic materials have since enabled taxidermists to achieve greater accuracy in specimen restoration.

The Wildlife Protection Act (1972) defines taxidermy as the preparation, preservation, and mounting of animal remains. Under this legislation, the taxidermy of scheduled species is strictly prohibited, limiting the practice to scientific and educational contexts. Ethical taxidermy now focuses on preserving naturally deceased specimens, providing a means to study species that are otherwise difficult to observe in the wild, such as the elusive red panda (*Ailurus fulgens*).

Resurgence of Taxidermy in India

Recent trends indicate a resurgence in taxidermy, driven by advancements in preservation techniques and increased recognition of its value in biodiversity conservation (Patchett, 2010). The introduction of the Wildlife (Transactions and Taxidermy) Rules, 2024 has provided a regulatory framework to promote ethical taxidermy. These regulations mandate licensure for taxidermists and ensure that specimens are sourced through legal and ethical means, focusing on animals that have perished due to natural causes or accidental deaths (Rai, 2024).

Dr. Santosh Gaikwad, India's foremost taxidermist, exemplifies this modern approach by

working closely with museums and conservation organizations to preserve specimens for educational purposes. His contributions to fish, bird, and mammal taxidermy highlight the importance of preserving biodiversity through responsible taxidermy practices (Puri, 2017). Today, taxidermy extends beyond mere exhibition; it is an essential tool in the study of animal physiology, behavioral ecology, and conservation education. Museums and research institutions utilize taxidermy to develop informative displays that enhance public understanding of ecological systems and the necessity of conservation efforts. This shift reflects an evolving perspective on taxidermy as a scientific discipline, reinforcing its role in promoting sustainable wildlife management and biodiversity preservation.

The Art and Science of Fish Taxidermy

Fish taxidermy is a specialized field that combines artistic precision with scientific preservation techniques to maintain the anatomical accuracy and aesthetic appeal of fish specimens. Unlike mammalian taxidermy, fish preservation requires unique methodologies due to the delicate nature of fish skin and the challenges associated with color retention. The two primary approaches to fish taxidermy are:

1. Skin Mount Taxidermy
2. Replica Mount Taxidermy

Skin mounting is a traditional method that utilizes the actual fish skin, while replica mounting is a modern alternative that creates fiberglass reproductions without using the original specimen.

1. Skin Mounting

Skin mount taxidermy is a technique that preserves fish specimens in a lifelike state by utilizing the actual skin, head, and fins. This method aims to maintain the natural structure and coloration of the fish while preventing decomposition. The key steps involved in skin mount fish taxidermy are as follows:

1.1 Specimen Preparation

The process begins with precise measurements of the specimen, including total length, girth at the widest part of the body, and fin dimensions. These measurements are crucial for ensuring an anatomically accurate final mount. Repeating the measurement process minimizes errors and enhances precision.

1.2 Skinning

The fish is carefully skinned while preserving the head, tail, and fins. The internal organs, muscle tissue, and eyes are removed using specialized tools such as filleting knives or taxidermy scalpels. The remaining skin, along with the head and tail, undergoes chemical treatment to prevent decomposition. The specimen is then subjected to a controlled drying process that can last several weeks or months to ensure complete moisture removal.

1.3 Preservation Techniques

Various chemical treatments are employed to preserve the skin and retain its original coloration. Common preservation agents include:

- Borax (sodium borate): Used to dry and disinfect the skin.
- Formaldehyde and salt solutions: Employed to prevent bacterial and fungal deterioration.
- Denatured alcohol: A powerful preservative that strengthens the skin's structure and prevents insect infestation.

Additionally, insecticide powders may be applied to inhibit microbial growth.

1.4 Mounting and Finishing

A lightweight anatomical form, slightly smaller than the fish's actual body size, is used to support the mounted skin (Rinehart, 1983). The dried skin is carefully positioned over the mold to recreate the fish's natural posture. Various mold materials, including polyurethane foam, resin,

and clay, are used to achieve realistic structural integrity.

Since the drying process causes the fish's natural pigmentation to fade, the specimen is meticulously hand-painted using airbrush techniques to restore its authentic coloration. Suturing may be performed to secure the skin, ensuring durability and aesthetic accuracy.

2. Replica Mounting

Replica mounting is a modern taxidermy technique that does not require the use of an actual fish specimen. Instead, a fiberglass replica is created from a mold of the original fish, allowing for long-term preservation without sacrificing live specimens. This approach is widely used in conservation efforts and educational exhibits.

2.1 Specimen Selection and Molding

A well-preserved fish specimen is chosen based on its anatomical accuracy, size, and color patterns. A flexible mold is then created using materials such as:

- Silicone rubber: Ensures high-detail replication.
- Polyurethane or alginate: Captures intricate scale patterns and fin textures.

The mold is applied in multiple layers to achieve precision and is allowed to cure for several hours. Once hardened, the mold is carefully detached to preserve the structural integrity of the fish's features.

2.2 Fiberglass Replica Formation

The mold is used to produce a fiberglass cast, which forms the solid body of the replica. This is achieved by:

1. Mixing fiberglass resin with hardeners and strengthening additives.
2. Pouring the resin mixture into the silicone mold.
3. Allowing the cast to cure before carefully extracting it to prevent structural damage.

Additional anatomical details, such as gill plates, fins, and scale textures, are enhanced manually to ensure an accurate representation of the fish.

2.3 Painting and Finishing

A base coat is applied to establish the primary color of the species (Ceran, 2023). The painting process involves:

- Spray-painting techniques to ensure uniform coloration.
- Layering pigments to recreate natural hues and iridescence.
- Applying a protective coating to enhance durability and UV resistance.

Replica mounts offer an eco-friendly alternative to traditional taxidermy while maintaining the visual authenticity of real fish specimens.

Advantages of Fish Taxidermy

- Fish taxidermy is extensively used in museums and research institutions to document species diversity and educate the public on aquatic biodiversity.
- Replica taxidermy reduces the need to collect real specimens, thereby supporting conservation efforts while still allowing for realistic displays.
- Anglers can preserve significant catches using either skin mounts or replicas, maintaining a personal connection to their fishing experiences.
- Both taxidermy techniques allow for creative expression, as taxidermists can modify fish poses, colors, and display arrangements according to artistic preferences.

Conclusion

Fish taxidermy is a highly specialized discipline that integrates biological preservation with artistic representation. Traditional skin mounting maintains the authenticity of real specimens, while modern replica mounting

provides an environmentally sustainable alternative. Both methods contribute significantly to scientific research, conservation, and public education, ensuring that fish species are documented and appreciated for future generations.

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