Crista Pack and Elena Torok

Winterthur/University of Delaware Program in Art Conservation

Stuffed with Challenges:

Two Case Studies Involving the Treatment of Taxidermy Birds

Abstract

The conservation of taxidermy specimens presents unique challenges related to treatment, display, and long-term care. Two case studies involving taxidermy birds are presented in this discussion. These birds, prepared in different time periods using different techniques, require similar treatment considerations regarding feather cleaning and reshaping. Crista Pack presents the examination and treatment of two small taxidermy birds from the collection of the Winterthur Museum. These birds, a barn swallow and a chimney swift, are displayed inside of an early 19th century birdcage in one of the Museum's period rooms. Elena Torok presents the examination and treatment of a large taxidermy blue hen rooster from the collection of the Department of Animal and Food Science at the University of Delaware. This specimen was prepared in the 1980s for the Delaware Museum of Natural History's "State Bird and Flower" exhibition. The presentation of both case studies includes a comparison of materials and methods considered for treatment, as well as a discussion of some of the challenging factors that influence conservation and exhibition decisions.

Introduction

Taxidermy is perhaps one of the most unique and controversial members of the natural history family and one that spans commercial, educational, and artistic fields alike. Taxidermy – by definition – is "the *art* of preparing, stuffing, and mounting the skins of animals with lifelike effect (Oxford Dictionaries 2012, emphasis added)." For centuries, taxidermists have struggled in their attempts to achieve this lifelike effect. Sometimes these challenges arise from ineffective preservation and mounting materials. But when done properly, taxidermy can be an effective method for preserving diverse species for a very long time.

The research presented in this paper is divided into three parts. The first section focuses on preparation techniques that have been used throughout the history of taxidermy. The second section addresses the unique challenges that conservators face when treating taxidermy specimens, particularly taxidermy birds. Finally, the third and most extensive section focuses on two case studies involving recent treatments on taxidermy birds: one from the Winterthur Museum and the other from the University of Delaware (UD) collections. Each case study contains a particular focus on the materials and methods considered for treatment.

History and Preparation Techniques

Interest in natural history became widespread in the second half of the nineteenth century. This increased interest was due in part to theories and fashions of the era. The "pursuit of natural history" was seen as an opportunity to "provide nerve-shaken city dwellers with a way to reconnect with nature (Barrow Jr. 2000, 495)" in an increasingly industrial world. Coinciding with this was the Victorian fashion for creating interiors that showcased a wide range of items, often including natural objects, much like the curiosity cabinets of the 17th and 18th centuries.

Most large urban areas had at least one taxidermy shop that employed multiple taxidermists. For example, a taxidermy workshop in Philadelphia is recorded as having kept as many as half a dozen taxidermists on staff during the busy bird migration seasons (Barrow Jr. 2000).

Ward's Natural Sciences Establishment, founded in 1862, became an important supplier to numerous museums, including the American Museum of Natural History in New York (Barrow Jr. 2000). In 1880, a number of Ward's employees founded the Society of American Taxidermists. Their goal was to raise the standards of taxidermic practice in order that it would no longer be viewed as an undignified trade (Lucas 1933).

Early methods for preservation were published in an 18th century pamphlet by the French scientist René-Antoine Ferchault de Réaumur (Farber 1977). However, the main methods outlined by Réaumur were far from perfect. His use of alcohol damaged and distorted bird skins and feathers, heat to dry the skins made the flesh brittle, and salts and alum used in embalming methods could cause a specimen to disintegrate (Farber 1977).

Insect infestations were another major preservation obstacle within the field of taxidermy. The artist Charles Willson Peale addressed this problem later in the 18th century. Peale was a naturalist and collector of natural history specimens. This is illustrated in his well-known 1822 self-portrait titled "The Artist in His Museum," which depicts him standing before the numerous specimens in his collection. During the second half of the 18th century, Peale is reported to have concocted a large batch of arsenic solution in his backyard to dip specimens into, and made himself rather sick in the process (Prince et al. 2003). While not the healthiest of practices, it succeeded in reducing problems related to pest infestations.

The effectiveness of Peale's preservation techniques is evident in a pair of golden pheasants. In life, they were owned by George Washington. In death, they were given to Peale, who prepared and mounted them in 1787. The fact that they are still preserved in the Museum of Comparative Zoology at Harvard University attests to the effectiveness of arsenic as a preservative (Prince et al. 2003). Though Peale was among the first to use arsenic in taxidermy preparation, it quickly became widespread and continued to be used well into the 20th century.

Challenges in Taxidermy Conservation

The long-term preservation of taxidermy can be challenging for a number of reasons. First, the specimens themselves are composed entirely of organic materials. For birds, the most vulnerable materials present are collagen-based (including skins, wattles, and combs) and keratin-based (including feathers, beaks, and feet). These materials are susceptible to deterioration through a number of pathways, which are exacerbated by conditions of high or fluctuating relative humidity and temperature, exposure to visible and ultraviolet light, and pests. Inadequate environmental conditions can cause a wide range of problems, including the breakdown of organic materials, hair slippage, feather loss, and color changes.

Secondly, mounting materials and preparation techniques utilized to both make the specimen appear more life-like and prevent decomposition range widely. Mounting methods depend on the time period during which the specimen was prepared, the type of specimen being preserved, and the preference or skill level of the taxidermist. The preservative or desiccant used can also vary greatly. Though harmful heavy-metal containing compounds were largely phased out in the latter half of the twentieth century and replaced with less toxic alternatives, this is not the case for every specimen (Carter and Walker 1999). When planning for handling or treatment, the presence of harmful materials often need to be confirmed with the help of microchemical spot tests or instrumental techniques.

Thirdly, treatment decisions will always have to reflect an object's use, purpose, or context. For taxidermy, this varies greatly. Taxidermy can serve as a research or educational tool: intended for study, display, or both. Multiple natural history museums have taxidermy collections that are used solely by researchers. However, alternatively, some specimens may also be prepared entirely for display, such as the ones in the historic dioramas at the American Museum of Natural History in New York, NY.

Taxidermy can also be found in works of art, such as in Maurizio Cattelan's *All,* a retrospective of his work that was suspended from the ceiling of the Guggenheim Museum in early 2012. This installation included a number of taxidermy animals, including birds, dogs, and horses (Spector and Brinson 2011). And aside from natural history and art-related contexts, taxidermy has also been used for just about every other use or purpose in between. A 2011 issue of Martha Stewart Living featured an article on how taxidermy could be used to decorate a home. Photographs included Stewart posing with mounted birds in her stairway, a mounted bear wearing a night cap in her guest bed, and mounted birds used as decorative centerpieces on her kitchen table (Stewart 2011).

Case Studies

All of the aforementioned challenges were encountered during two different treatment projects involving avian taxidermy at the Winterthur/University of Delaware Program in Art Conservation (WUDPAC). Both are presented in this section as case studies. Case Study I involves the examination and treatment of a chimney swift and barn swallow that are associated with a decorative nineteenth-century birdcage owned by H.F. du Pont and are part of the collection of the Winterthur Museum. Case Study II involves the examination and treatment of a Delaware Blue Hen chicken from the University of Delaware collections that was mounted in 1985.

Each case study enabled the in-depth study of materials and techniques used in preparation and mounting. In both, these findings were used to understand condition issues present and develop and implement treatment plans.

Case Study I

The Winterthur Museum has in its collection a nineteenth-century birdcage shaped to look like a covered wagon which houses two taxidermy birds; a barn swallow and chimney swift (Fig. 1).

Fig. 1: Winterthur Museum, Bequest of Henry Francis du Pont 1959.1711

Many years on exhibit in a heavily trafficked area of the museum resulted in thick accumulations of dust and grime on the horizontal surfaces of the cage and birds. Treatment goals included improving stability, safe handling, and the overall aesthetic in preparation for these objects to return to display in the Winterthur period rooms.

While currently associated with a nineteenth century cage, barn swallows and chimney swifts were not birds that typically would have been kept as pets at that time (Arista 2009). However, as their names suggest, both tend to nest in man-made structures and commonly breed in the eastern United States.

The North American barn swallow is easily recognized by its dark metallic blue back and wings, buffy white underparts, and cinnamon colored forehead and throat. As adults, the males are typically much more brightly colored than the females (The Cornell Lab of Ornithology 2011).

The Winterthur taxidermy specimen had an overall grayish-brown appearance to its back and wings, which was partially due to the accumulation of dust and grime (Fig. 2). It is not brightly colored, but this may be attributable to a variety of factors including the bird's gender, age, seasonal changes caused by molting, fading, or interaction with preservation materials (Pouliot 2011).

Fig. 3: Detail image of taxidermy barn swallow, before treatment. Winterthur Museum, Bequest of Henry Francis du Pont 1959.1711.

Fig. 3: Detail image of taxidermy chimney swift, before treatment. Winterthur Museum, Bequest of Henry Francis du Pont 1959.1711.

Additional condition issues included losses to the bird's beak and the misalignment of the proper right wing, which appeared to be bent up and away from the body. Many of the feathers at the tips of the wings were disheveled and some of the barbs were abraded and broken.

The second specimen associated with the Winterthur cage is a chimney swift. In nature, it is a small, uniformly dark-colored bird with a cylindrical body and long, pointed wings that are swept back. Chimney swifts use their long claws to cling to the sides of vertical surfaces and do not alight on perches like other birds (The Cornell Lab of Ornithology 2011).

The Winterthur swift appears to be the rare exception, as it is posed gracefully atop of a branch (Fig. 3). Accumulations of dust over the years had dulled the appearance of the normally dark feathers and had given them a gray, faded look. Feathers on the wings were particularly disheveled and the tips abraded with some loss of barbs. This may have been the result of the long wings of the specimen coming into contact and abrading against the wire mesh of the cage.

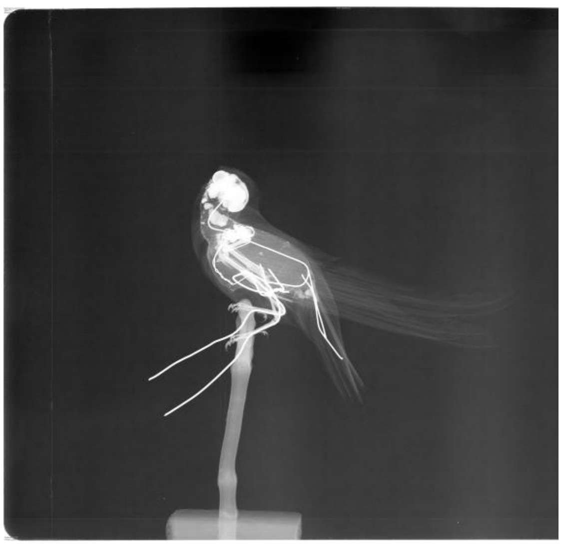

Fig. 4: Radiograph showing interior armature. Winterthur Museum, Bequest of Henry Francis du Pont 1959.1711. Radiograph captured by Lauren Fair.

Each bird sits on a small perch made from a tree branch and is secured with wires that extend out through their feet. This interior armature is easily visible in x-ray radiography, which shows how the wires were wrapped around the remaining skeletal components and where they are located (Fig. 4).[1] In each, a single wire that supports the length of the body, running from the skull to the base of the tail, and two separate wires that are used to support the tail. Wire is wrapped around each shoulder joint and down the front bend of each wing.

[1] X-ray tube: Pantek Seifert Eresco 65 MF2 with digital control, 3 mm focal spot. Exposure: 30 sec, 10 kV, 3 mA. Resolution: barn swallow - 100µ, low grain; swift - 50µ, low grain. Image capture on phosphor imaging plates (IPS) read with GE CR50P Phosphor Scanner. Scans collected with GE Rhythm Acquire software and processed with GE Rhythm Review software.

Additional wire is wrapped around the leg bones, comes out through the bottom of the feet and then pierces through the wooden perch.

The size, age, and condition of the birds all contribute to their feathers being particularly delicate and easily susceptible to damage. A treatment plan needed to be designed that would remove the heavy accumulation of dust but minimize disruption to the barbs and barbules. Additionally, analysis with x-ray fluorescence in 1989 confirmed the presence of arsenic in both specimens (Rasch 1989). Therefore, it was imperative that health and safety precautions be followed throughout each procedure.

The first method tested was mechanical cleaning using a HEPA-filtered vacuum and soft brush. This resulted in visible improvement to the feathers, but required direct handling of the delicate feather surfaces, thereby increasing the potential for damage. Furthermore, while the removal of surface dust improved the aesthetic, there were still visible particulates that remained trapped in the barbs and barbules.

Fig. 5: Winterthur Museum Objects Conservator Bruno Pouliot test cleaning the taxidermy barn swallow with Beseler® DustGun 100.

In order to reduce handling and direct contact with the feathers, an alternate method for removing the surface grime was sought. Pressurized air was looked at as a way to gently blow off as much grime as possible without physically manipulating the feathers. Critical CO_2 was initially tried on a taxidermy duck from the study collection, but proved ineffective on the soft feather surfaces.

Beseler® DustGun 100, which is comprised of 1,1,1,2-tetrafluoroethane under air pressure (Charles Beseler Company 1993), was tested as a combination solvent and mechanical cleaning. The force of the air coming out of the canister can be controlled with the trigger. When the can is held upside down and the trigger pulled, the nozzle disperses a mist of the tetrafluoroethane. The rapidly expanding gas freezes on contact with the feather surface and quickly volatilizes away, leaving no residues behind and breaking secondary forces between the dirt and feather. These could then be gently blown away with the pressurized air (Fig. 5).

The technique worked slightly better than mechanical cleaning with the vacuum and provided a way to remove dust and loosely-bound grime in a way that minimized the disruption to the feathers. While the visual improvement was very noticeable, there were still small, more tightly bound particulates remaining in the barbules and the feathers had not regained their sheen.

In an attempt to further reduce grime, the Chimney Swift's PR wing was then solvent cleaned with Leksol® AL, a registered trademark for an azeotropic blend of n-propyl bromide, an aliphatic alcohol, and a proprietary stabilizer (Leksol® AL 2011). It has low polarity, a fast evaporation rate, and leaves no residue behind. However, its main benefit in feather cleaning is that it does not remove the natural oils of the feather easily (Pouliot 2011).

Placing lens tissue under the feathers and brushing the solvent on with a small, soft brush worked very well at removing additional soil and restoring sheen to the feathers. Solvent cleaning had the additional benefit of improving the color as the grime layer gave an overall grayish cast to the feathers.

The combination of cleaning with pressurized air containing 1,1,1,2-tetrafluoroethane followed by Leksol® AL proved to be a method that allowed a thorough cleaning of the feathers of both birds with minimal disturbance to the barbs and barbules (Fig. 6). While application of Leksol® AL required direct handling of the feather surfaces, the risk of feather disruption and damage was minimized by the initial removal of the heaviest accumulations of dust and grime.

Fig. 6: Detail image of taxidermy chimney swift, after treatment. Winterthur Museum, Bequest of Henry Francis du Pont 1959.1711

Case Study II

The second case study involves the examination and treatment of a taxidermy specimen of a Blue Hen Chicken (Fig. 7). This specimen is much different than the barn swallow and the chimney swift: not just in size and appearance, but also in the way in which it was prepared. All of these factors led to different considerations regarding its treatment.

Fig. 7: ACP 1440, Taxidermy Blue Hen Chicken (before treatment).

The specimen, which was mounted in 1985 by a taxidermist at the Delaware Museum of Natural History (DMNH), belongs to the collection of the Department of Animal and Food Sciences at the University of Delaware (Gelb 2011).

The Blue Hen, Delaware's state bird, has carried historical significance in the state since the time of the Revolutionary War (Sammelwitz n.d.). According to Paul Sammelwitz, Professor Emeritus at the University of Delaware and original owner of this specimen, multiple conflicting reports exist regarding exactly how the species became popularized. In his undated publication, "The Delaware Blue Hen: Fact and Fancy," he writes that one story credits Captain John Caldwell of Delaware's Second Regiment, who was a fan and owner of the bird, and allegedly always carried one with him into battle (Sammelwitz n.d.). He also describes another story that asserts that Caldwell's regiment passed the time by staging cock fights among these types of birds, and the association of this activity with the military gave the Blue Hen a reputation for ferocity and success (Sammelwitz n.d.). Sammelwitz notes that some historians discredit both of these accounts, and argue instead that the military association with the Blue Hen came from the fact that soldiers in the Revolutionary War simply resembled the breed in both dress and conduct. Military uniforms included a red leather hat with a high peak and red feather plumes, which very closely resembled the Blue Hen chicken's head (Sammelwitz, n.d.). But no matter how its popularity was obtained, the species remained an important part of Delaware folklore throughout the nineteenth and twentieth centuries, and is still significant today. The Blue Hen has been the official state bird since 1939, and is now the official mascot of the University of Delaware (Sammelwitz n.d.).

The University of Delaware's taxidermy Blue Hen is not actually blue, and few are, as blue plumage is a recessive trait. Most chickens of this breed are brown (like this one), solid black, or white with black splashes (Sammelwitz n.d.). The only parts of this specimen that are blue are a few feathers in the tail that contain blue-green iridescence, which is a structural color caused by interference effects inherent to the physical morphology of the feather itself (Hooke 1665, Chapter 36; Young 1804). Furthermore, this Blue Hen is not actually a hen. It is a rooster, or a male, as evidenced by the spurs on the backs of its legs and its large wattle and comb (Woods 2012).

Letters and correspondence at the DMNH indicate that this specimen, along with a second, was prepared by a DMNH taxidermist for a 1985 exhibition at the museum about the state bird and flower (Sammelwitz 1985). Both birds were given by the University of Delaware, and were descended from a line of Blue Hens donated from the estate of S. Hallock Dupont (Sammelwitz 1985).

According to Jean Woods, Curator of Birds at the DMNH, a few different mounting techniques were employed by museum taxidermists during the 1980s. The method chosen always depended upon on the type and size of the animal being mounted. Generally, for avian specimens, after death, a long, shallow vertical incision would have been made along the bird's ventral median. The skin would have been turned inside-out from this point and all internal organs, muscle, and flesh would have been removed. Preservative would have been applied to all interior surfaces, and then the specimen's body would have then been turned right-side in. Next, an internal mount would have been constructed and inserted inside (Woods 2012).

Figure 8: X-ray radiograph of the specimen from the left side.

The most common mount-making materials used by DMNH taxidermists in the 1980s were Excelsior® (a commercial brand of wood wool), and cotton batting, supported with additional wires and pins (Woods 2012). Glass eyes would have also been inserted, and some exterior features may have been painted (such as the comb and wattle of this rooster) in order to offset the color change that occurs in some of these types of materials after death (Woods 2012).

X-ray radiography of this specimen confirmed that the aforementioned type of mounting technique was used in the preparation of this specimen (Fig. 8[2]). Multiple bones have been left intact, including leg bones, wing bones, and skull. The main internal mount is not readily visible because it is composed of a low-density material. A large number of wires and pins are also present to secure the bird in its life-like pose and hold the mount in place.

Fig. 9: Dislodged white, granular preparation materials on the display mount.

The specimen was in overall good condition when it arrived at the Winterthur Museum in October 2011, but it was immediately noted that the base was covered in a white, granular material that appeared to be coming out of the bird's ventral incision (Fig. 9). Due to the long history of pesticide use with these types of objects, this material was characterized using analytical methods in the Winterthur Museum's Scientific Research and Analysis Laboratory with the help of scientists Catherine Matsen and Dr. Chris Petersen. Techniques employed included x-ray fluorescence spectroscopy (XRF), Fourier transform infrared spectroscopy (FTIR) and gas chromatography-mass spectrometry (GC-MS). Elemental data collected from multiple locations using XRF indicated that heavy metals such as arsenic, mercury, and lead were not present, which is consistent with a bird prepared at the DMNH in the 1980s (Matsen 2012; Woods 2012). Data collected with FTIR indicated the presence of a sodium borate compound, such as sodium tetraborate (or Borax®), which was used as a desiccant and a preservative in the late twentieth century and is still used in taxidermy preparation today (Matsen 2012; Carter and Walker 1999). Data collected with GC-MS did not indicate the presence of any common organic pesticides, such as dichlorodiphenyltrichloroethane (DDT) (Petersen 2012). All of this information was used to determine safe handling procedures for the specimen during treatment.

[2] X-ray tube: Pantek Seifert Eresco 65 MF2 with digital control, 3 mm focal spot. Exposure: 30 sec, 10 kV, 3 mA. Resolution100µ, low grain. Image capture on phosphor imaging plates (IPS) read with GE CR50P Phosphor Scanner. Scans collected with GE Rhythm Acquire software and processed with GE Rhythm Review software.

Other condition issues were also present. Minor pest damage was observed in multiple locations. The specimen had been placed in a low oxygen chamber for three weeks in order to eradicate any pests present upon arrival, so there was no ongoing active infestation. However, previous insect damage made some areas of feathers a bit more fragile than others. All feathers on the main body and tail were covered with a layer of dirt and grime, and many barbules had become unzipped. Additionally, the red paint on the bird's comb and wattle was flaking severely, and approximately 10% was lost overall.

Fig. 10: Feathers on the left wing before reshaping (top) and after reshaping (bottom).

Major treatment steps included surface cleaning, feather reshaping, and paint consolidation. The specimen and tree bark base were cleaned overall using a vacuum and soft brush, followed by cosmetic sponges. After cleaning, some white areas at the ends of feathers on the wings still appeared yellow and dirty. Surfynol® 61, a non-ionic, volatile surfactant composed of an acetylinic diol, was found to work best to clean these areas of dirty feathers (Air Products Inc. 2012, Surfynol® 61 2012). A blotter was inserted underneath the feather, the surfactant was applied by brush, and allowed to completely volatilize in the fume hood. Use of the surfactant helped to slightly brighten these areas at the ends of the wings.

Some feathers were then reshaped using heat and moisture, which was administered with the use of a Preservation Pencil® attached to a humidifier. The presence of pest damage and minor losses prevented complete reshaping from occurring. However, overall, this technique was successful in smoothing feathers back into plane (Fig. 10).

Fig. 11: Proper right side of face before treatment (left) and after treatment (right).

Paint on the comb, which was very fragile and separating from the substrate in flakes, was first consolidated using a 1% (w/v) solution of gelatin in deionized water. This solution was applied to the comb using a mist consolidation technique. A small humidifier was retrofitted to allow adhesive to flow through the unit and into an attached piece of small tubing, which could direct the flow of adhesive mist to a small point and enable its direction to be manipulated so it could be locally and gradually applied to the entire surface area of the paint. After this, tented and loose paint flakes were re-adhered to the comb and wattle using Aquazol® 500 bulked with fumed silica to reduce sheen. The adhesive was applied from behind through areas of loss using a needle and syringe, and the paint was gently smoothed back into plane as the adhesive dried. All losses were then inpainted to match surrounding areas using Aquazol ® 500 mixed with fumed silica and dry pigments (Fig. 11).

Overall, a number of challenges that are commonly encountered in the conservation of taxidermy were addressed during the treatment of this specimen. In 2013, this bird will be put on display in the Department of Animal and Food Sciences at the University of Delaware. Both WUDPAC and UD's Department of Art Conservation will continue to work with its owners to help establish proper preventive conservation protocols for exhibition and display, which are paramount in ensuring this specimen's long-term preservation.

Conclusions

The treatment of all three birds this year demonstrated the wide range of materials and methods used in avian taxidermy, as well as multiple treatment approaches that can be used in their conservation. Though both case studies focused on interventive treatment approaches, both projects also demonstrated the importance for proper preventive care. Environmental control, particularly involving relative humidity, temperature, pollutants and light, is critical in the preservation of taxidermy and many other different types of natural history materials.

A taxidermy specimen's condition can vary greatly depending on the materials and methods used in its preparation. An understanding of the history of these methods, as well as the use of analytical techniques and x-ray radiography, is helpful in characterizing the way in which a specimen may have been prepared. This information is critical in the determination and implementation of conservation plans, both regarding treatment and long-term care.

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