



Conserve O Gram

September 2006

Number 11/9

Handling And Care Of Dry Bird And Mammal Specimens

Introduction

Natural history specimens represent the biological legacy of our predecessors. They are the tools used by researchers to assess how species are distributed in geographical and ecological time and space. How we care for these collections today will directly affect their significance and usefulness in the future. Some bird and mammal specimens in North American collections are over two hundred years old. All specimens, new or old, share common preservation and maintenance needs. The handling and care of dry bird and mammal skins, skeletons, and parts is highlighted in this *Conserve O Gram*.

Storage

A well-sealed cabinet is the best protection for bird and mammal specimens. The cabinet shields specimens from UV light, dust, pollutants, insect pests and rodents, and moderates ambient temperature and relative humidity. Always return specimens to the cabinet after use and close the doors after removing or installing specimens. Never leave the specimens outside the cabinet overnight. Doing so can expose them to damage by rodents or insect pests such as clothes moths and dermestid beetles. Returning an infested specimen to a cabinet will expose the entire contents to a potential insect infestation. For suitable sources of vertebrate cabinets see *Conserve O Gram* 4/10.

Organization

Taxonomic arrangement

There are a variety of schemes to organize bird and mammal specimens. They can range from following a fully phylogenetic arrangement that organizes taxa to the subspecific level based on a recognized taxonomic authority to a simple alphabetical arrangement by family or genus. The system followed should be logical, intuitive, and efficient, and should allow researchers to easily find specimens of interest. Not all users of natural history collections are knowledgeable systematists, so base the scheme on how the collection will be used and by whom. Always document the arrangement of the collection and post a copy handy for researchers and staff.

Physical arrangement

Study skins of birds and mammals are generally placed directly in drawers or compartmentalized in trays within drawers. Specimen trays provide a convenient way to sort specimens by sex, locality, species or subspecies. They make it easier to remove a series of specimens at a single time for examination. All materials should be “archival or museum quality”, a term connoting permanence and durability but for which there is no universally agreed-upon meaning (Cato et al. 2003). Ideally, drawers (if no trays are used) and trays should be lined

with unbuffered cotton blotter paper. This serves a variety of functions including reducing movement of specimens when opening and closing drawers, absorbing grease and oil still remaining on the skin and thus preventing the staining of trays, and improving the museum staff's ability to see specimen damage or insect frass resulting from an insect infestation. Small birds such as hummingbirds are often stored in round plastic tubes due to their fragile nature. Flat skins and tanned hides of large mammals such as mountain lions and foxes should be stored flat in drawers. A less preferable but more common practice is to hang skins over padded support bars with the weight supported evenly. This can cause skins to stretch no matter how much care is taken with the skins.

Mounted birds and mammals are usually stored separate from the dry skin collections. They typically require more storage space due to their irregular shape. If they are placed on drawers in cabinets they will need additional support to keep them from toppling over when the drawer is opened. Frequently, they are stored on stationary shelves or specially designed racks that accommodate different sized objects. If stored on open shelves they should be protected with dust covers made from materials such as cotton or polyethylene sheeting. The dust covers protecting open shelving mount storage should be opaque to add protection from light. Antlers and mounted heads of deer and elk can be suspended from heavy gauge hardware cloth using padded supports. Do not drill holes in the specimen to anchor it to support brackets because of the irreparable damage it causes. If space and materials are available, however, it is preferable to store these specimens on open shelving or in closed cabinets. See additional suggestions listed under "taxidermy mounts"

and "Covers" in Rose and Torres (1992).

Bird eggs and nests: Eggs need protection from breakage and to ensure they do not roll. Use polyester batting to wrap each egg and then place in a box lined with polyester or cotton batting for additional protection. Nests can be stored in boxes made of clear polystyrene or archival board. See-through boxes or those with Mylar® windows are practical for viewing the contents without opening the container. For additional protection use a layer of polyethylene foam to line the bottoms of the nest boxes and secure each nest with a "ring" of unbuffered blotter paper. Other suggestions are found in Cato (1986). Eggs and nests are usually stored separate from the skin collection.

Skulls and skeletons (osseous material) are generally stored in vials or boxes. Vials can be made of glass or polyethylene plastic (there are pros and cons to both), and can be round or square (the latter shape prevents rolling). After prolonged exposure to some chemical fumigants i.e., paradichlorobenzene (PDB), vials made of polystyrene have been known to show signs of "crazing", a type of deterioration that forms very fine cracks in the surface of the vial. Polyethylene caps or archival foam rod plugs are preferred covers for vials over corks because they reduce the amount of acidic wood products in natural history collections. Containers should be large enough that specimens can be removed and replaced without damage. Bird skulls traditionally remain inside the skin; whole bird skeletons usually are stored separately from the skins to conserve space. The skins and skeletal components of mammals are usually stored together but in separate trays. A series of vials can be stored in trays that either fit within the skin tray (but not on top of specimens) or just outside the

tray. To keep vials from rolling in a tray, use stable non-acidic products such as polyethylene foam, not wood blocks or cork. The skulls and skeletal elements of large mammals should be stored in boxes or trays or on padded shelves. The cranium and mandible of the skull should not be stored with the teeth in direct contact because this can cause breakage of the teeth. It is preferable to store the skull and mandibles with the teeth facing up; if stored so that the teeth occlude, separate them with a padded layer of polyethylene foam.

Handling

Wearing gloves reduces the transfer of oils and dirt from individuals to specimens and vice versa. Cotton gloves are suitable when handling recent collections but when handling older specimens, those collected before the 1970s, latex or nitrile gloves are recommended. The insides of skins of many older specimens, particularly taxidermy mounts, were treated with arsenic and other insecticides, or pesticides and fungicides i.e., mercuric chloride, that can leach through the cotton fibers, making latex and nitrile a better choice. Researchers are required to wear gloves when working in NPS collections, but for many non-NPS natural history collections there are no restrictions. If gloves are not worn, wash your hands before and after handling any specimen.

Skins: Handle bird and mammal skins one at a time by placing your hand around the main part of the body. Do not grasp the extremities or other fragile parts of the body. Use both hands for larger or heavy specimens or for large birds with spread wings or long legs or necks. Some rabbits and other long-legged mammals are made into study skins with a wooden dowel between the legs to help support the legs. Grasp the dowel to pick up the

specimen and support the rest of the specimen with the other hand. The skins of small birds or those with long or very fragile legs are also sometimes prepared with a support stick in the middle of the body to provide extra support. Handle these birds by the support stick but because the stick is anchored into the skull. Take care not to twist or twirl the specimen by the stick as this can loosen the anchorage point of the stick. Handle wings carefully taking care not to slide a wing along a surface against the grain which might damage the feathers. Never handle specimens by the tags or labels.

After returning specimens to a cabinet, be sure there is enough space between the top of the specimen and the bottom of the drawer above before sliding in the drawer. Tips of ears of some rodents are prone to sticking up and ears of lagomorphs (rabbits and hares) are especially high and can be easily broken when sliding in a drawer with inadequate clearance.

Mounted specimens of birds and mammals are awkward and can be heavy to handle alone. Ask for help when moving a large mount and use carts with support straps when possible. Wear gloves when handling older (collected before the 1970s) specimens because of the past practice to treat the insides of skins with arsenic or other chemicals to repel insect pests.

Bird eggs and nests: Due to the fragility of eggs, some museums allow them to be handled only in the presence of a curator or collection manager.

Skulls and skeletons: These materials are fragile but hold up well if handled at the thickest part of the bone. Use fine-pointed forceps to pick up individual bones or bones from small specimens. Small bones and frag-

ments are easy to lose so take care to return everything you removed to its original, correct container. Check to see if bones are numbered and, if not, do not remove contents from more than one container at a time. By placing bony elements on a sheet of paper or box lid you can gently slide them back into the container. The bony processes of small mammal skulls, e.g., the zygomatic arches and pterygoid processes, are especially fragile and can break easily if held too tightly between the fingers. Hold small skulls of bats, shrews, and mice by grasping lightly between the top and bottom of the skull or cradle them in a hand for examination. The skulls of certain families of birds, such as flycatchers, are fragile as part of the skull never fully ossifies. Handle these skulls with great care.

Maintenance

Collection staff can easily reduce the amount of “maintenance” needed for specimens if “common sense” practices prevail from the time the specimens arrive in the collection to each and every time they are accessed. Ensure that specimens are not brought directly into the collection unless they are determined to be 100% pest-free, and that specimens are returned to the cabinet after use, and are never left outside a cabinet overnight.

Apply good housekeeping rules to the collection space: regularly vacuum or damp mop the floor and wipe the tops of cabinets and all work surfaces with a damp cloth to remove dust. Do not sweep as this only shifts dirt and dust. Inspect cabinets periodically to ensure the door fits tightly and closes properly. Inspect gaskets for wear and replace when necessary (see guidelines in Raphael and Cumberland 1992). As tray liners or blotter paper become greasy or stained, replace with new

blotter paper.

Once egg and nest collections are properly prepared there is only minimal care that needs to go into these collections. The main care for eggs is to make certain they are well protected from rolling. Egg and nest collections do have to be protected from excesses of light and humidity; too humid an environment can cause mold growth or Byne’s Disease on eggs.

Insect activity should be monitored regularly by placing sticky traps throughout the collection room. The data provide a useful record of pest trends, i.e., seasonality, abundance and diversity, etc. If rodent droppings are found in collection areas, it is preferable, and more humane, to use live traps to capture and remove the rodents.

The single most important step in maintaining specimens is to inspect skins for the presence of insect pests if a problem is suspected. Inspection is done by systematically lifting each bird or mammal skin in a tray or drawer and looking for obvious signs of an infestation: clipped fur or feathers, insect frass, or a live insect (adult or larval form). The insect frass of different species is diagnostic and can sometimes be readily identified, for example, clothes moth frass resembles coarse ground black pepper. All signs of an active infestation are easier to see if tray or drawer bottoms are light-colored or lined with white blotter paper. Specimens should always be inspected whenever they are moved by museum staff.

Despite our best intentions, specimens can get attacked by insect pests and at this point immediate action is required. Method of treatment depends on money, space, and resources available to the museum staff. Effective options are freezing, anoxic (low oxygen) treatment,

and isolation and monitoring. Here are a few suggested sources of information: freezing procedures: Florian 1990; Strang 1997; Conserve O Gram 3/6; Anoxic treatment: Burke 1996; Daniel 1995; Conserve O Gram 3/9; General treatments: Conserve O Gram 3/8.

Sources of Supplies and Equipment (can include for the following products if this is warranted: plastic specimen tubes, cotton blotter paper, Mylar-windowed boxes, polystyrene boxes)

References

Burke, J. 1996. "Anoxic microenvironments: a simple guide." *SPNHC Leaflet* 1 (1):1-4. Society for the Preservation of Natural History Collections, Washington, D.C.

Cato, P.S. 1986. "Guidelines for managing bird collections." *Museology* No. 7. Texas Tech University, Lubbock, TX. 78 pp.

Cato, P.S., J. Golden, and S.B. McLaren (compilers and eds.). 2003. "MuseumWise: workplace words defined." *Society for the Preservation of Natural History Collections*, Washington, D.C.

Daniel, V. 1995. Storage in low-oxygen environments. Pp. 147-155 in *Storage of natural history collections: a preventative conservation approach* (C. Rose, C.Hawks, and H. Genoways, eds.). Society for Preservation of Natural History Collections. 448 pp.

Florian, M-L. 1990. "Freezing for museum insect pest eradication." *Collection Forum* 6 (1): 1-7.

Raphael, T. and D.R. Cumberland, Jr. 1992. Retrofitting steel storage cases: installing new, improved gasketry. placing gaskets. Pp 233-

234 in *Storage of natural history collections: ideas and practical solutions* (Rose, C.L., A.R. de Torres, eds). Society for the Preservation of Natural History Collections. 346 pp.

Rose, C.L., A.R. de Torres (eds). 1992. *Storage of natural history collections: ideas and practical solutions*. Society for the Preservation of Natural History Collections. 346 pp.

Strang, Thomas J.K. 1997. "Controlling insect pests with low temperature." *CCI Notes* 3/3. Canadian Conservation Institute, Ottawa.

Cindy A. Ramotnik
Museum Specialist
U.S. Geological Survey, Biological Resources
Discipline
Fort Collins Science Center
[Arid Lands Field Station, Museum of Southwestern Biology]
University of New Mexico
Albuquerque, NM 8713

The *Conserve O Gram* series is published as a reference on collections management and curatorial issues. Mention of a product, a manufacturer, or a supplier by name in this publication does not constitute an endorsement of that product or supplier by the National Park Service. Sources named are not all inclusive. It is suggested that readers also seek alternative product and vendor information in order to assess the full range of available supplies and equipment.

The series is distributed to all NPS units and is available to non-NPS institutions and interested individuals on line at <http://www.cr.nps.gov/museum/publications/consveogram/cons_toc.html>. For further information and guidance concerning any of the topics or procedures addressed in the series, contact NPS Park Museum Management Program, 1849 C Street NW (2265), Washington, DC 20240; (202) 354-2000.