

Pest Management Notes: Establishing a Pest Monitoring Program for Museums

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Museum collections are vulnerable to deterioration caused by mold, insects and vertebrate pests. This damage can range from surface soiling and spotting to complete destruction of the object. While organic materials are most vulnerable, inorganic materials may also be damaged by biological agents.

Unfortunately, the conditions optimal for the care, storage, and exhibition of museum objects are also ideal for the survival of museum pests. Improper storage and exhibition conditions, such as high temperature, high relative humidity, dust, overcrowding and clutter improve the conditions for pest survival.

Conventional methods for controlling pests in museums have relied on the use of pesticides to protect against pest attack or to treat infestations once they have been found. Recent studies have found that these chemicals can damage or alter the materials of museum objects. This is contrary to one of the basic tenets of museum conservation — that any treatment must be reversible and not alter the materials of the object or specimen. Furthermore, any chemical that has been designed to kill a pest has the potential to cause health hazards to human beings — the museum's staff, volunteers and visitors.

While it is doubtful that all pesticide use can be eliminated from the museum environment, the implementation of a preventive program for the control of pests can serve to restrict pesticide use to an option of last resort without increasing the damage caused by pests to the collection.

In recent years, a number of museums have been developing Integrated Pest Management or IPM programs. These programs rely on preventive techniques to minimize the elements required for pest survival: food, moisture and habitat. In museums, IPM programs include: good building construction and maintenance; proper sanitation; restriction of food, smoking, plants and flowers; proper storage and exhibition techniques; and control over collections to ensure that infested materials are not integrated into non-infested collections. Museum IPM programs

develop a structure for making responsible decisions concerning minimizing and treating pest problems. While some direct treatment for collection pests may be necessary, the treatment selected in an IPM program is specific to the species and concentration of the pest as well as the media of the infested materials. This ensures that a minimum of damage is caused to the object or specimen and the environment while minimizing the potential for human health hazards.

Monitoring is the key to developing an effective IPM program. Monitoring provides information on the biological activity occurring in and around the museum collections and structures: where the pests are, how they came into the museum and why they are surviving. It can help to determine strategies to take to eliminate future access and survival of pests in the collections. Finally, monitoring can help evaluate the effectiveness of any treatment action taken.

Monitoring relies on a variety of techniques such as direct observation, population sampling, routine inspections and passive trapping. Depending upon the target pest, different techniques are used.

Since insect pests of collections are small, shun people and are most active at night, passive trapping is one of the easiest ways to document their activity. Traps will record the presence of insects when humans are not present and are especially useful because they can document the distribution of insect populations over time.

The most effective all-purpose insect trap currently available is a "sticky" trap. Produced by many manufacturers and generally configured in either rectangular box or pup-tent shape, they are made of cardboard with an adhesive layer tacky enough to catch the insect. Many of these traps contain a food bait attractant. For a wide variety of insects, the tent-shaped trap may be best because insects can crawl directly onto the adhesive layer without having to navigate over or around end flaps. Sticky traps can be purchased at hardware and grocery stores or ordered through local pest control or chemical supply houses.

Steps for Establishing an Insect Trapping Program:

1. Draw a floor plan of the area to be monitored. On the floor plan, indicate the location of all doors, windows, water and heat sources, floor drains and furniture. If the area to be monitored is a collection storage or exhibition area, cabinets should be marked on the floor plan with notations as to the type of collection material that is stored or exhibited therein.
2. Number and date the traps.
3. Place the traps throughout the area to be monitored: critical areas are around the perimeter walls; in corners; near doors; under furniture; near water and heat sources; inside and outside exhibit and storage cabinets (note: take precautions when placing traps inside of drawers to ensure that the motion of the drawer does not make the object come into contact with the trap — the adhesive is very sticky, is difficult to remove and can cause damage to objects and specimens).
4. Indicate the location of the traps on the floor plan.
5. Inspect the traps on a regular schedule and record the following in a logbook: the trap number; the location of the trap; the date set; the date inspected; the species of insects and the number of individuals and life stage of each species found in each trap. During the initial phase of the monitoring period — usually three to six months — the traps should be inspected weekly.
6. As the trapping routine becomes more regular, refinements in trap placement and inspection periods can be made depending upon the building structure and the evidence found in the traps. An understanding of the biology of the pest will assist in the placement and scheduling of maintenance for the traps. Do not leave the traps uninspected for too

long, however, because they can become food sources for rodents and other insects.

7. Traps should be replaced every two months, when they become full or when the adhesive loses its tackiness, whichever comes first.

Routine, thorough inspections for insect evidence in all interior spaces of the building is another important monitoring activity. At least once a week, all window sills, light diffusers and door jambs should be checked for insects. Adult carpet beetles are attracted to light and attempt to go outside in order to feed on pollen and breed. Spiders set their webs around door jambs if there are any gaps to catch insects that enter the building.

The museum collections should be inspected at least every six months. Particularly vulnerable materials such as organic ethnographic objects should be inspected more often. Look for cast larval skins of dermestid beetles, holes in textiles, piles of woodboring insect frass developing beneath wooden objects and cut hairs of animal skins that gather in the bottom of cabinets and drawers.

All evidence must be thoroughly documented. Document what was found, when it was found and where. If possible, identify the species of the insect. Without proper

documentation, monitoring is not effective.

The identification of the insect and its life stage are critical to determining what is happening in the areas being monitored. Although not all insects found in the museum will cause damage to museum collections, all insects must be identified to determine if the collections are in jeopardy. To determine species, keys are available in a number of the references listed in the bibliography. Additional assistance can be found by taking the insect specimen or evidence to County and State Agricultural Extension agents or entomologists, university biology departments or the local natural history museum if there is an entomologist on staff.

Monitoring for rodents uses a combination of techniques, including the use of traps. Sticky traps known as glue boards are available for rats and mice. These are usually shallow plastic trays filled with an adhesive onto which the rodent walks and gets stuck. One disadvantage of glue boards is that sometimes a rodent can get partially stuck and can drag the glue board around. If this happens in a collection area, the rodent may cause damage to objects. To avoid this problem, old-fashioned snap traps have been found to be effective in trapping rodents. These traps should be baited with cotton batting instead of a food bait which can attract insects. Cotton bat-

ting is attractive to rodents as a nesting material. Inspections using a variety of tools are also part of a rodent monitoring program.

All museum staff should be trained in pest awareness and should immediately report any evidence of biological activity to the staff person in charge of pest management. A logbook should be kept to document any and all evidence found.

Once monitoring programs have been established, regular analysis of the data collected can guide the museum staff in developing strategies for minimizing or eliminating pests found. These strategies can range from improving sanitation to making building modifications to exclude pests from entering the building.

If infestations are found through monitoring, the information gathered in the program can provide critical information concerning the extent and source of the infestation.

This short article has provided a brief overview to Integrated Pest Management for museums and has described techniques for establishing a monitoring program — an important component in any IPM program. Additional information on IPM and assistance in dealing with pest problems can be gained through contacting the Field Advisory Service, Oklahoma Historical Society, 2100 N. Lincoln Blvd., Oklahoma City, Ok 73105; 405-521-2491.

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