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Integrated Pest management in Manuscript Museums

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Abstract:
Preventing specimens from being attacked and damaged by pests is a major challenge of collection management. In collections facilities, the two most common types of pests are insects and fungi. In the past, pest management usually involved regular applications of toxic chemicals (pesticides or fungicides) to specimens and collection areas. In recent years, however, health and safety concerns have led institutions to move away from this approach in favor of preventative and protective measures that are not based on chemicals. These include upgrades and repairs to building structure; installing better cabinetry; better control of temperature and humidity in collections areas; removing food and other organic materials from collection areas; more effective monitoring; and treatment of outbreaks through freezing or anoxic environments. Using these different measures in combination is known as "integrated pest management."

Keywords: Pest management, IPM, Specimen, Health

Introduction:

Museum integrated pest management is the practice of monitoring and managing pest and environmental information with pest control methods to prevent pest damage to collections and cultural heritage. Preserving and cultural heritage is the ultimate goal for most museum collection personnel. Museum pests come in many different forms: insects, mites, rodents, bats, birds, and fungi and the two most common types are insects and fungi. It is widely recommended that every museum have some form of pest control in place and monitoring system to protect their collection and that museums review their storage and museum facilities to determine how to best control and prevent pest infestations while utilizing an Integrated Pest Management plan. In today's society, an increasing emphasis is being placed on environmental sensitivity and the reduction in use of traditional pesticides.

Basic Integrated Pest Management components:

Different components may be selected depending upon the problems encountered, the use of a room, pests involved or administrative constraints. Different parts of the museum collection or institution may initially require different approaches depending upon the priorities. Other components can be added or deleted later as necessary. Included within the discussion of each component will be recommendations to correct the problems. These recommendations are meant as guidelines or as a

starting point to think of new remedial measures. The main objective is to correct current problems in order to prevent worse situations later. The key stages in an IPM programme are as follows:

- Recognizing and identifying priorities for action.
- Identifying responsible staff.
- Taking action on the high priorities.
- Establishing procedures for forward planning, financing and review.
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Common Museum Pests:

There are much different type of pests that can affect a museum and its collection. It will be important for the museum staff to identify the pests, as well as understand how they will act and what they will feed on. Insects will cause damage not only through their feeding habits but their tracks, tunnel and nesting habits may also cause damage. Most damage will occur when the insect is in it larva stage – when most of the feeding takes place – though some insists like booklice will continue to damage objects past the larva stage. Rodents can cause further damage through the increase risk of fire when they gnaw on wires.

Insects:

Fabric pests: There are two groups of Fabric pests that are common in museums: carpet beetles and clothes moths. These pests eat proteins like wool, fur, feathers, dead animals and horns. These pests are known to burrow into materials such as storage bins or little used drawers. Wood pests: The most common wood pests are the wood boring beetle and the dry wood termites. These pests are known to attack and damage objects made of wood and often go undetected on the surface as they burrow into the wood. Stored product pests: The most common stored product pests or pantry pests are the cigarette beetle and the drugstore beetle. These pests are known to infest “seeds, nuts, grains, spices, dried fruits, and vegetables" of which many museums include these items.

Moisture pests: Moisture can be damaging not only to the building but also to the objects in the collection that “may attract a number of moisture-loving pests that can do additional damage”. Mold is damaging on its own but it attracts pests like Psocoptera to feed on the objects that are affected by mold. It is important for museums to keep their facilities and collection areas free from any dampness and immediately deal with leaks or possible water damage.

General pests: General pest are any household pests that enter into a building through windows, doors, cracks, and any other entrance to the museum. These pests include cockroaches, rodents, silverfish, ants, and will cause damage to the museum and their objects. The most common

damage occurs from the nesting and feeding behaviors.

Rodents:

It is will become apparent if your museum has a rodent infestation as the pests leave behind droppings and gnaw marks. Rodents will breed rapidly and begin shredding and nest in objects they come into contact with. It is important to note that rodents "will not discriminate between valuable objects, packing or rubbish". It is important to never use rodent bait, because "poisoned rodents often crawl away and die in unreachable areas such as between walls and under furniture, and their carcasses provide food for other pests". Traps should be used to remove rodents from the museum in a more humane manner that will prevent the rodents from attracting more pests or causing larger problems.

Birds:

Bird can cause damage to the exterior of the museum when they roost or nest on "windowsills, ledger, and other architectural features". Bird droppings can cause staining and damage to the build and any fabric attached to the building. Museum staff will also need to be careful when they are around birds and items infested by birds as they can "pose a health hazard to humans … as (they) carry parasites and disease" Bird droppings can also be tracked into the museum and collection space, and by working to remove the birds from entrances, the tracking of the droppings can be controlled.

Pest Prevention:

There are a number of steps that a museum can put in place to help to prevent pests within their buildings. It is important to inspect any item that is coming in the storage area such as a new accessions or loans. Museums should maintain good housekeeping and restrict food in the museum to help prevent pests in the first place. It is important for the museum to keep the environments in exhibition galleries and the collection storage areas stable with low, controlled humidity and temperature. A museum may also install sweeps and gaskets on exterior doors, screens on all drains and windows, while also caulking all cracks in the building. Museums can make their facilities less attractive to pest by removing any plants growing near the building, cleaning the gutters, using sodium vapor lighting, minimizing dust, vacuuming the floors, and eliminating clutter

A. Storage condition:

Collection storage areas are especially at risk from pests as they can be darker, tight spaces that often go undisturbed for long periods of time. If these tight spaces are left undisturbed and unmonitored for months or years at a time, they will provide an atmosphere for pests to nest in high quantities. All collection areas should be fully cleaned at least twice a year with regular inspections once a month.

Pest removal:

- **Heat**

Treating an object with heat is a method used to disinfect objects by either an oven or a commercial kiln. When the internal temperature reaches "130°F for three hours it will kill any insect"; however, this kind of heat can cause damage to veneer, finish of specimens, warped lumber, or melt glues.

- **Freezing**

Freezing objects is one of the best ways that it can be used to disinfected and destroy pests. This process should be done in a controlled freezer that can reach temperatures below 0 °F. "Books, mammal, ethnographic materials and bird collections, have been successfully frozen for insect control" though freezing is not always the best options for certain objects such as certain woods, bone, lacquers, some painted surfaces, and leather.[11] Before an object is frozen for one to two weeks, it should be wrapped tightly in plastic or in a plastic bag.

- **Vacuuming**

Vacuuming an infested object can remove pests. It is important to ensure that the "materials are not fragile or deteriorated can be vacuumed". Vacuuming should remove the entire hatched pest, but some eggs may remain as they can be microscopic. After the object has been vacuumed, it should be placed in a plastic bag isolating the object. During the isolation, the objects should be monitored to make sure that no pests remain on the object, and after the pests life cycle is completed the cleaning process may needed to be repeated.

- **Microwave**

Microwaving an infested object is still an experimental technique but has been known to "kill cockroach, silverfish, and solids inside books ... the average infested book is microwave on high for 20 -30 seconds

Attacks of Pests:

Identification of the species of pest causing the problems is the cornerstone and the initial part of an IPM programme. Incorrect identification may result in large amounts of time and resources being wasted in controlling the wrong pest. Some pests are general feeders whereas others will attack only a limited range of materials (Table 1.1) below. There are also major differences in pest importance and status.

- **Record keeping**

Record keeping is crucial to the success of IPM programmes. Accurate and complete records of pest presence and activity will allow the programme co-coordinator to modify the programme as needed, identify seasonal occurrences and devote attention to problem areas. The most important information to record is the correct identification of the pests found.

The number of individuals caught per trap and life stages of those individuals should be recorded. This information should be kept in a log hook or spreadsheet. Plans should also be used to record the distribution and presence of pests; these will be useful as references in future surveys.

Treatment strategies for pest removal:

Choosing the pest control method best suited for a particular problem can be a difficult decision. Prevention is better than cure and all the points made in the section on preventing pests should be the first priority. However, when pests are found in objects or in the building then some remedial action may be necessary. Remedial action when pests are found is as follows:

- Isolate any objects suspected of being infested to prevent spread of infestation to other objects
- Clean infested areas and destroy insect
- Bodies and debris. Decide on the most appropriate treatment for the object and environment.

Repellents:

A number of chemicals such as camphor, naphthalene and para-dichlorobenzene have been used for many years as repellents and passive fumigants. They are crystalline solids which slowly vaporize and, to be effective in killing insects, the vapour must be contained at a high concentration in a storage case, drawer or bag. At lower concentrations there is some repellent effect on booklice, moths and beetles. Due to the rate of volatilization, vapours tend to move out of the enclosed airspace to contaminate the surrounding areas. The health hazards to humans from these chemicals are high enough that it is advisable to investigate alternative methods. PDB will kill insects at high concentrations but is known to adversely affect articles containing such materials as zinc white, lithopone, scarlet pigments and some dyes used on cellulose acetate. It will severely shrink polystyrene foams and plastics and will structurally weaken resins. PDB will also discolor the ultramarine pigment and contribute to the yellowing of paper and fading of ink.

Conclusion:

Pest management in museums and other collection holding institutions often involved regular applications of toxic chemicals to collection areas and actual collections

IPM plans for your institution – whatever your collection type. Each element is explained with detailed information, samples of documents and forms, and links that you can follow to access even more resources through integrated management of Pest control in Museums.

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