



Ethan Estabrook, BCE

IPM in Museums and Historic Homes

Up to 54% of museums and historic homes have reported damage from pests. Textiles, animal hides, taxidermy, wood works, natural fibers (like wool and feather), books, and paintings contain material that pests can exploit and do irreversible damage to. Having a good Integrated Pest Management (IPM) program is crucial to protect and ensure the continued longevity of important historical artifacts.

[Insects Limited](#) and the [MuseumPests Working Group](#) hosted the IPM in Museums and Historic Homes workshop March 11 – 12, 2019. This workshop was designed for museum, library, and archive professionals who need to establish, improve, or better understand their IPM program. Museum conservator, Rachael Arenstein of A. M. Art Conservation and Insects Limited President, Pat Kelley, taught multiple aspects of museum IPM including:

- Pest Identification and Biology
- Pest Monitoring and Prevention
- IPM Policies and Procedures
- Identifying Risk Zones and Vulnerable Collections
- Recognizing Pest Damage and Conservation Issues
- Remedial Treatment

Knowing the Pest is Half the Battle in Preventing It

Insect identification focused on pest species that are typically associated with museums. Dermestid beetles like the Varied Carpet Beetle (*Anthrenus verbasci*), Odd Beetle (*Thyodrias contractus*), and Hide Beetle (*Dermestes maculatus*) can be destructive to numerous natural fibers such as wool, silk, fur, and feathers. Dermestid beetle larvae produce a fine frass (excrement) and cast skins (shed skins) as they mature. The frass and

cast skins are great indicators of existing populations of the destructive beetles.



Insects Limited's environmental chamber for rearing museum and stored product insects.

Moths like the Webbing Clothes Moth (*Tineola bisselliella*) and Case-making Clothes Moth (*Tinea pellionella*) larvae feed on textiles and natural fibers.



*IPM in Museums and Historic Homes attendees looking at Webbing Clothes Moth (*Tineola bisselliella*) damage to a wool sweater.*



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*Webbing Clothes Moth (*Tineola bisselliella*) damage to a wool sweater after 6 months.*

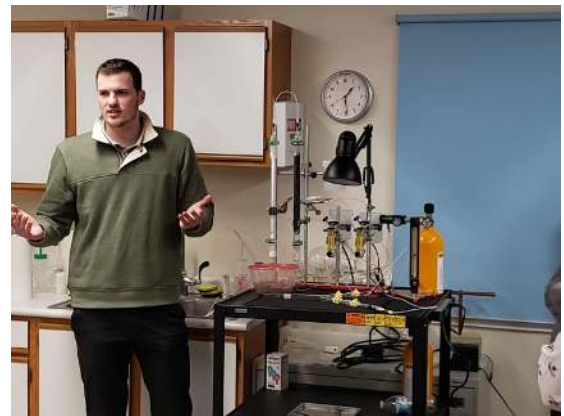
Wood boring insects like the Powderpost Beetle (*Lyctus spp*), Furniture Beetle (*Anobium punctatum*), and Old House Borer (*Hylotrupes bajulus*) can bore in wood objects and cause extensive damage including structural damage. The larvae can spend months or years inside wood while developing and feeding on the starch content. Wood boring insects emerge from wood as adults, leaving behind pinhole-sized openings called shot holes. Shot holes and powdery frass below these holes are indications of wood boring insect damage.



IPM in Museums and Historic Homes attendees identifying museum insects.

IPM – A Scientific Approach to Pest Prevention

A good IPM program consists of exclusion, sanitation, monitoring, remediation, and education. Exclusion and sanitation are the first lines of defense at preventing pest activity in a facility. Doors, windows, attics, and basements are areas that can have small openings to the outside environment. Rodents can enter through openings of 0.25 inches (6.35 mm) while insects can enter through small cracks and crevices less than 0.02 inches (0.5 mm). Removing food sources and clutter around the exterior building will discourage rodents coming towards a building and will make rodent control stations more effective.



Quinn Kelley demonstrating a Y-tube test which helps determine the attractiveness of different compounds to insects.

Monitoring for insects provides valuable information, such as the detection of insects, insect species, population trends, and locations of infestations. Blunder traps capture pests that are moving between areas while baited traps use food or pheromone attractants to lure specific species of pest to a trap. Different styles of traps and attractants are used to monitor different species. For example, hanging traps are designed to capture flying insects while floor traps are designed to capture crawling



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insects. Dermestid beetles can be best monitored by a food lure and pheromone lure in a floor trap. Moths like the [Webbing Clothes Moth](#) and [Case-Making Clothes Moth](#) can be monitored using hanging or floor traps containing a pheromone lure.



[All Beetle Trap with a dermestid lure and AA Carpet Beetle Pheromone](#)

There are several ways to treat an active pest infestation and the most appropriate method will depend on a variety of factors such as the type of collection, size of infestation, institutional capabilities, and budget. Some treatment options could include:

- **Isolation / Bagging** (Place item on white paper in polyethylene bag. Wait a few weeks then inspect for signs of insect activity such as live insects, cast skins, frass, webbing or casings)
- **Freezing** (Wrap objects in absorptive material such as muslin cloth and place in sealable plastic bag. Store items in freezer at -20° F (-29° C) for minimum of 72 hours)
- **Anoxic Treatment** (0.3 % oxygen for 21 days)
- **Carbon Dioxide** (60% for 28 days)
- **Heat Treatment** (Controlled RH treatments recommended)



Quinn Kelley demonstrating anoxic treatment.

Continuing education is important to see new industry trends and understand how other institutions manage pest issues. MuseumPests is an ad hoc group of collection managers, conservators, entomologists and other professionals across the world interested in issues surrounding the implementation of integrated pest management in museums, libraries, archives, and other collection-holding institutions. The MuseumPest website can be found at <https://museumpests.net/> and is a great resource for collection professionals.



IPM in Museums and Historic Homes attendees listening to museum conservator, Rachael Arenstein.