



BISHOP MUSEUM
Art Conservation Handout

'BUGS' ARE EATING MY FAMILY TREASURES!

Insects ("Bugs" is actually a specific term for plant-eating insects, not a generic term for all insects) in Hawai'i eat a wide variety of foods: there are those which plague our living plants and animals, and those which are attracted to non-living organic materials: wood of all kinds, paper, paste and glue, tapa, gourds, lauhala and other dried plant material, feathers, horn, fur, leather, cotton, wool and linen. Insects can work quickly to damage the things we care about. Insect activity is not something that will "go away" of its own accord. In Hawai'i, because of our climate, we have to monitor, prevent and react to insect activity continually. This handout will help you to identify insects and the problems caused by them, and give you some ideas about what to do to prevent or stop them. In many cases, the adult insect locates a food source which will nourish its offspring, and lays its eggs on that material. The young larvae ("grubs, maggots, caterpillars") do the damage, consuming the food as they mature. As adults, some of these insects (e.g., wood-boring beetles, clothesmoths) do not eat at all, but merely mate, reproduce and die. With termites, cockroaches and silverfish, however, the adults also subsist on our possessions. It is important to understand the life cycle of these insects, so that you are aware of what to watch for.

The Evidence

How do we recognize that our things are under attack from insects? Here in Hawai'i, vigilance is needed. Be alert to the following signs:

Live insects, either adults or larvae. Be sure to examine objects closely, as silverfish, booklice and other insects can be difficult to spot because of their size, color and reclusive habits.

Insect remains: dead insects; termite wings; casings or skins shed by larvae as they mature and molt; empty egg cases of cockroaches (a hard dark pod attached to walls, etc.), and webbing of clothes moths (a small cocoon or threads) are irrefutable signs.

Frass: this is the product of the insect's digestion, a fine powdery sawdust or a hard sand-like material which collects in the holes and tunnels excavated by the insects. The color of the frass usually will be similar to that of the food the insects are digesting. If a small pile of frass is found under an object each time the floor around it is swept, that object probably has an active insect population. It's important to note evidence like this before you sweep or vacuum it away!

Visible damage: thin areas and small holes in textiles, ragged edges and 'skinned' areas on paper, small holes with clean edges in objects where the larvae have emerged as adults. Once again, close inspection is sometimes needed to detect these signs. Clothes moths may concentrate on seams and other hidden spots. Subtle skinning of paper occurs as silverfish graze across the surface. Exit holes in wood are a sign that adults have emerged and some damage already has been done; since the activity occurs inside the wood, it is unlikely you'll see any larvae at work.

Smell, sound: specially trained dogs can detect insects via these senses; some people are able to hear insects in wood, and to smell cockroaches. You can use your fingers to lightly tap across wood surfaces and listen for differences in sound to reveal hollow areas below, indicating tunneling.

Spiders sometimes take up a position near insect activity to capture strays. Spiders, centipedes and geckos do not harm objects, and are predators of insects which do.

The Insects

You can identify insects by checking references listed in the bibliography, or having them identified by an entomologist (see below). Try not to squash insects you want identified; try to place the specimen, dead or alive but intact, in a vial such as a film container. Knowing precisely what insect you are dealing with is critical; for example, the time needed to fumigate for termites is shorter than is needed to kill wood-borers, so if you have the latter, some standard fumigations will not be successful. Termites create tunnels through wood as it is consumed by the adults, resulting in serious structural damage. There are no flight holes, as with woodborers, but there is a sand-like frass. Termites can move from structures into furniture, picture frames, etc., and eat other cellulosic materials besides wood; they also tunnel through other materials on their way to a food source.

Woodboring Beetles including Powderpost and Death Watch Beetles, lay their eggs on wood which is then tunneled through by the larvae, sometimes for years before eventually emerging as adults through small holes. The powderpost beetle generates a very fine talcum powder-like frass.

Silverfish prefer high humidity and dark conditions. They move quickly and will eat anything containing starch, including adhesives and the coatings on papers, and also digest cellulose (paper).

Carpet beetles go by a variety of names. Adults feed on pollen, and may be brought indoors on fresh flowers. The larvae prefer dark, dirty areas, and eat fabrics, plant materials, fur, and feathers, usually grazing across the surface, resulting in obvious damage, or a general shabby look.

Dermestids include Larder and Hide Beetles and are voracious. The larvae consume animal skins and dried plant materials, then cause damage to wood as they burrow in to undergo pupation (metamorphose to adult form).

Clothesmoths: as they feed, the larvae of the Casemaking Clothes Moth enclose themselves in a case spun out of the material they are feeding on, whereas the Webbing Clothes Moth larvae leave a trail of silk as they go. Both eat fur, feathers, woolens and dried plant materials, gradually thinning the food source down by grazing on the surface.

Booklice are tiny and a pale color. They feed on mold and other dead insects, but will also graze on paper and paste.

"Bookworms"/Cigarette and Drugstore Beetle larvae burrow through books and bindings, creating a hole in each page as they pass. They also eat dried plant materials.

Cockroaches damage paper, cardboard, clothing and furniture by eating starch, mold, proteins and other residues on the surface. They also stain materials with their droppings, and adhere their egg cases to objects.

Prevention

There are a number of practical things which you can do to prevent an insect infestation in your home. Prevention is always better than having to respond to an outbreak.

Make sure your screens are secure to restrain insects from entering the house. Outdoor lights act to attract insects to the house. During termite swarms, turn off the lights in your house.

Many insects (and mold) prefer a warm, humid environment. Coolness and dryness inhibits their activity and growth. If possible, lower the temperature and humidity in your home by increasing air circulation, or installing an air conditioner and de-humidifier.

Keep your home clean. Many insects thrive in dusty, dirty, dark environments. Vacuuming, shaking out rugs, turning over cushions-- all disturb insects. Don't store things which are not clean-- food residues attract insects. Don't stockpile cardboard boxes, newspapers, etc.

Consider storing valuables in airtight containers, such as Ziploc bags and Tupperware; the larger Rubbermaid™ containers are not airtight and need to be sealed with tape around the lid. Do not seal an item in a container unless you are certain that the item is insect-free!

Store seed and feather leis and other susceptible items in a Tupperware-type container in your refrigerator to suppress insect activity.

At least semi-annually, check items which you have stored away in closets, etc. A dark, undisturbed environment is a perfect habitat for many insects.

Mothballs and "pest strips" are not recommended as a way to prevent insect infestations, as both of these chemicals are potentially hazardous to humans. Boric acid and other insecticidal dusts are generally safe, provided you follow the manufacturer's precautions.

Avoid bringing insects into your home in cardboard boxes and paper bags; check items like baskets and wooden objects for signs of insect activity before acquiring them.

Response

What if you do find that insects have gotten to something you value? What is safe to use and won't harm the object? What alternatives are there to chemical pesticides? Chemical pesticides can cause damage to the objects we treasure. They can also affect human health. Moreover, they are often not effective, as they may not destroy eggs, which then hatch out several weeks later, and the cycle begins again. To avoid these drawbacks, we have been seeking other effective, non-chemical methods to kill bugs.

First, place the object in a plastic bag and seal it. This will prevent the insects from spreading to other objects, while you decide how to proceed.

Clean the object. For example, if textiles are affected, wash them or have them dry cleaned. Even daily vacuuming of a rug over a period of a few weeks may suppress an infestation by picking up larva as they hatch, and by creating an unwelcoming environment.

Some objects can be frozen. This is a very effective way of killing adults, larvae and eggs. The freezing process goes as follows:

Wrap the object in a sheet, towel or some other type of absorbent material. This material will collect any condensation.

Place the wrapped object in a plastic bag, press the air out of the bag, and seal the bag tightly.

Place the bagged object directly into a freezer for at least two weeks. Self-defrosting freezers should be avoided because they are very dry, and don't maintain a steady temperature as they cycle.

When you remove the object from the freezer, leave it in the bag and wrap it in towels or blankets so that it will reach room temperature slowly over a period of several hours.

Do not freeze objects which are made up of layers of materials such as paintings, lacquerware, photographs, ivory. Freezing could cause disruption and damage to these

layers. Objects which are made up of one material, such as wood, or paper, or wool are the best candidates for freezing.

If you have to resort to chemicals, the safest chemical fumigant available is a product called Vikane®. It must be used by licensed personnel, in a chamber. It is known to affect metals, but appears to be safe for organic materials. If you have something which should not be frozen, this is currently your only recourse.

Never spray pesticides directly on your treasured objects. The array of chemicals in these products could stain or discolor your object irreparably.

Bibliography

What's Bugging Me? Identifying and controlling household insect pests in Hawaii
JoAnn M. Tenorio and Gordon M. Nishida, University of Hawaii Press,
October, 1995

Integrated Pest Management in Museum, Library and Archival Facilities
James D. Harmon, Harmon Preservation Pest Management, Indianapolis,
Indiana, 1993

Urban Entomology
Walter Ebeling, University of California, 1975

Safe Pest Control Procedures for Museum Collections
Perri Peltz and Monona Rossol, Center for Occupational Hazards, NY, NY

Insect Identification

Use the books listed in the bibliography to identify any specimens you collect. If you cannot make the identification, you may be able to get assistance at the following agencies: State Department of Agriculture, 1428 S. King Street, Honolulu, HI, 948- 0145
State Department of Health, Vector Control Branch, 2611 Kilihau, 831- 6767
University of Hawaii, Department of Entomology, 956-7076
Bishop Museum, Department of Entomology, 848 4192
Various units of the Army (Tripler) and Navy (Pearl Harbor)

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