



CHAPTER 6

herbarium pests



*If we can't see the object,
we look for its effect.*

—Peacock

A specimen damaged by insects.

One of the most serious problems faced by herbarium staff, especially in tropical regions, is damage to specimens caused by insects. Pests that are often encountered in herbaria include cigarette beetles, cockroaches, rats, and fish moths, of which the cigarette beetle, *Lasioderma serricorne*, is the most destructive in this dry habitat. However, at some herbaria, located in a more humid and tropical climate, the most problematic pest is the psocid booklouse *Liposcelis bostrychophilus*.

Preventing insect damage

Freezing

The simplest method of ensuring that no contaminated material is brought into the herbarium is to freeze all new accessions *after drying*. Some insects can survive short periods of freezing, so the specimens should be frozen at -18°C for at least 48 hours.

Microwaving



A specimen damaged by the cigarette beetle.

Specimens may also be microwaved, but this method may adversely affect the chemistry, DNA, and pollen, rendering them inadequate for research purposes. On the other hand, microwaving is quick, cheap, and safe, although only a few specimens can be microwaved at a time. Keep the following guidelines in mind:

- Microwave ovens cannot be used for fresh specimens—they may explode.
- Plants containing volatile oils (such as Rutaceae) will burn if microwaved.
- Be very careful to remove any metal objects, for example, staples or cigarette foil, which will cause sparks.
- Hall (1981) recommends 75 seconds of exposure was needed

to kill insects in parcels up to 50 mm thick, and two minutes for parcels 150 mm thick; this will, however, depend on the power output of the microwave oven.

- Do not microwave the specimens for too long or they may ignite.

Living plants

Fresh specimens do not pose a threat to dry collections: the insects that are found on living plants usually do not eat dead plants. It is better, however, not to bring a living potted plant into the herbarium, as psocids and other pests may inhabit bark litter.

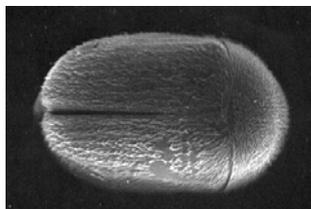
Monitoring

Lasioderma traps are commercially available and are useful for monitoring cigarette beetle densities. The triangular trap has a sticky inner surface and a small vial of pheromones in the centre. Beetles are attracted by the pheromones and trapped by the sticky surface. The traps act as an infestation-warning device so that increased numbers of the beetle can be noticed before too

TIP Always keep a lookout for insect damage. If you detect such damage, treat the specimen immediately. Clean by lightly brushing away powdered parts. Make a note on the specimen that it has been treated; stipulate the name of the poison used, and the date on which it was treated.



Adult; side view

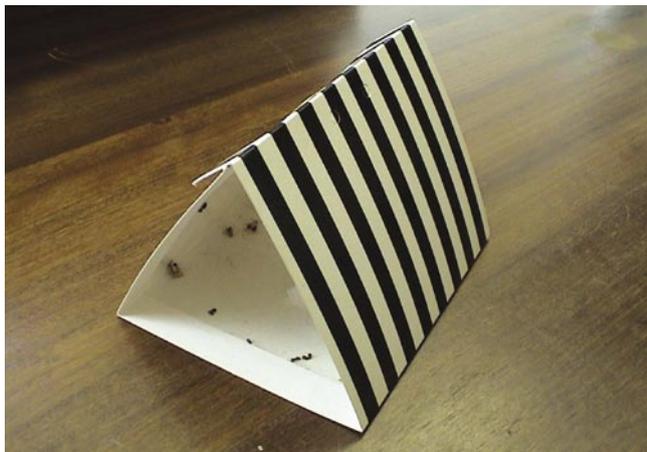


Lasioderma serricorne viewed from top



Lasioderma serricorne from below

TIP For the most effective freezing, specimens should be loosely packed in an open cage, or tied in a loose bundle to ensure that the cold penetrates to the centre of the stack.



Lasioderma trap.

much damage is done. It must be noted though that it is *not a means of prevention*.

Humidity control

High humidity can encourage proliferation of pests, especially cockroaches, fish moths, and booklice. If the humidity of the building can be maintained below 50% by installing air-conditioning, infestations should not occur. An alternative is to put a desiccant, such as silica gel, inside the herbarium cupboards. The gel, however, would have to be replaced or dried every

How to prevent insect infestations

Step 1: Start Clean

- Organise thorough fumigation of all areas where specimens are handled and stored.

Step 2: Prevent Insect Entry

- Seal any openings where insects may enter.
- Install insect screens on all windows.
- Keep windows and cabinet doors closed when not in use.

Step 3: Stay Clean

- Keep herbarium cupboard doors closed.
- Never bring potentially contaminated material into the herbarium.
- Avoid contamination: no eating, smoking, wet or muddy gumboots, or umbrellas in the herbarium.
- Monitor continuously.
- React immediately when you spot an infestation.

three months. This procedure is therefore labour-intensive and costly.

Treating infestations

In spite of preventative measures, there may still be infestations. We urge you to consider using toxic methods of control and eradication **only** if no other method is successful in preventing infestations. Many chemicals that have been used in the past and are still advocated in the literature, have been taken off the market, or are no longer regarded as safe methods. **Specialist advice must be sought before any chemical methods are used.** Never even use a commonly available spray insecticide without taking precautions. Also, remember that it is possible that chemical treatment may adversely affect specimens, and the specimens' use for research purposes, for example, DNA studies.

Fumigation

Fumigation by a registered pest control company is the most effective method of dealing with herbarium pests. Yet, even in the case of fumigation, the herbarium is guaranteed to be insect-free only during and directly after treatment. For effective control, fumigation should take place regularly at intervals of six to twelve months.

At present, only methyl bromide is effective against both adult beetles and eggs. The poison is applied in a single treatment and is therefore least disruptive to herbarium staff. Other chemicals are effective against adult beetles only and the treatment generally has to be repeated after two weeks. For more information on the use of these chemicals, specialist advice should be sought.

Localised treatment

Commercially available insect sprays contain dichlorvos, which is effective against live insects. It must be applied regularly as a space or surface spray, or "room fogger". Staff should wear adequate protective masks when administering the treatment, and no one should be allowed into the fumigated rooms for a 48-hour period after treatment. Individual specimens that are infested may be sprayed directly with a dry insecticide spray.

W A R N I N G

Caution! Fumigation is potentially harmful to herbarium staff. No one should be allowed into the herbarium for a 48-hour period after treatment. Specialist advice **MUST** be sought before any chemical methods are used.

W A R N I N G

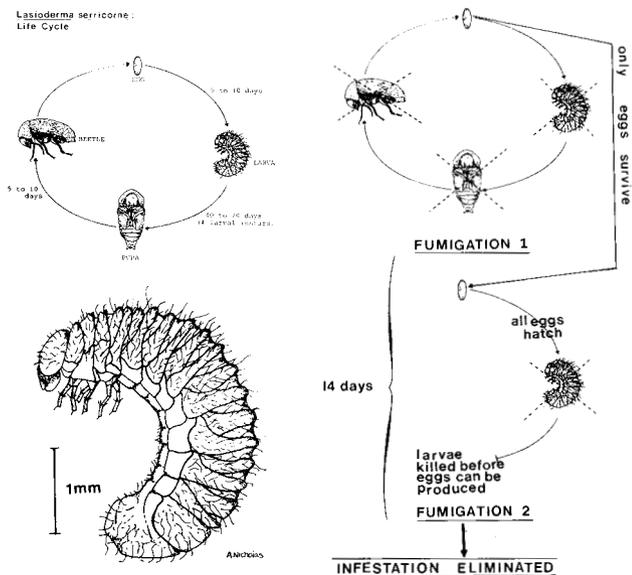
If there are poisoned specimens in your herbarium, place each specimen in a sealed clear plastic bag to prevent accidental contamination and poisoning.

Non-volatile insecticides, such as a barium fluorosilicate, starch and glue mixture, can control fish moth infestations when painted beneath the shelves, or on the back of compartments of wooden herbarium cupboards. Silica aero gel mixed with pyrethrin has been used successfully in inaccessible places, such as behind panelling or under cupboards.

Not recommended

In the past, fumigants such as naphthalene (mothballs) were placed in specimen cupboards. These are ineffective, however, and people working closely with specimens are exposed to the harmful effects of the chemicals. If these fumigants were used, staff would need to work in well-ventilated conditions, and unless the windows are covered with insect screens, it would be counter-productive to do so, as insects would be free to enter the building.

Other unsatisfactory techniques include coating specimens with mercuric chloride or a weak solution of lauryl pentachlorophenate (LPCP) in turpentine. However, LPCP is not dependably effective and mercuric chloride releases mercury vapour, which is very harmful to people and to the environment. ▲



Dusting off poisonous powder from a specimen in a fume cabinet.



Specimen covered with DDT.