

Books, papers and photographs are made from a variety of organic materials, including cellulose, leather, cloth, glue, gelatin and starch. As a result, they can be an appetising source of food for a wide range of pests. Rats, mice, silverfish, carpet beetle larvae, moths, termites, crickets and cockroaches will all feed on the organic material in collections and, if left undisturbed, can cause considerable damage.

A pest infestation can be a serious problem. Immediate action is required at the earliest sign, as delay allows the infestation to worsen.

## Rodents

Rats and mice are attracted to environments that are dark, wet, dirty, cluttered and undisturbed, providing places for them to hide, scraps of food to eat and water to drink. Rats and mice rarely damage books inside the home, but they are attracted to untidy sheds and garages, so any material carelessly packed and stored in these areas is at risk. Rodents can be killed with traps and poisons, but it is safer to simply disturb their habitats by cleaning the infested area and sealing potential entry points. If conditions no longer suit them, rats and mice will simply leave.

## Insects

Insects are a common cause of damage to books and papers, and a number of species can create problems at both the larval and adult stages of their life-cycles. Like rodents, they are generally attracted to dark and damp environments with a ready food source, where they can reproduce undisturbed. Unlike rodents, however, insects can live within bookshelves or the books themselves, where their eggs settle in the gutters between pages.

Insects are generally most attracted to protein-based materials, such as wool and feathers. While this may initially seem like good news for books and papers, starch and similar materials also contain some degree of protein, as does any dirt and grime that has settled on the surface of materials. Parchment, animal glue and gelatin photographic emulsions may also be attractive to protein-seeking insects. Paper-based collections are generally at less risk of serious pest infestation than collections containing protein-rich materials such as fur, feathers, wool and silk.

Among the most common insect pests affecting paper-based collections are silverfish (*Lepisma*) and booklice (*Psocids*). Both insects graze selectively on the starch, sizes and coatings on paper, resulting in damage to edges, delamination and areas of loss. Their tiny eggs resemble poppy seeds (their colour varies from pale to black) and can hatch within two to eight weeks of laying.

Carpet beetles are another insect that may be found in the home, but are usually more attracted to woollens and silks. Carpet beetles damage books at the larval stage only and may be attracted to cloth covers or glued spine linings. The larvae are reddish-brown in colour and up to five millimetres long, with stiff bristles covering the body surface. They thrive in environments where fragments of hair, skin, pet fur and insect remains provide a ready source of food (e.g. dirty carpets).

## How to deal with an infestation

Signs of an infestation, apart from the insects themselves, include fresh damage, shed skins or body parts, frass (droppings) or piles of dust or powder. Sometimes these may be left over from a previous infestation; nevertheless a careful inspection should be made.

If evidence of infestation is discovered, the following action should be taken immediately:

- Isolate infested material from non-infested material. If in doubt, treat all material as if it is affected.
- Take books and papers from shelves and vacuum them using a HEPA-filtered vacuum cleaner with a micro-vacuum attachment. (HEPA – High Efficiency Particulate Air – filters are fine enough to catch insect eggs.)
- As an alternative to or as well as the above, brush out the affected items, preferably outside. Remove and brush book jackets and plastic covers, then book gutters, page by page, to remove hidden eggs. Sweep debris onto waste paper, then into a bag for discarding.
- Move or dismantle shelves and carefully dust and vacuum the site, including carpets and underneath rugs.
- Only re-shelve books after thorough checking and cleaning.
- Insecticides, flea bombs and mothballs are not recommended because they can be harmful to human health as well as to books and papers. Solvents used in insecticides can damage collection materials. Additionally, insecticides have little effect on insect eggs, which may hatch weeks after sprays have ceased to be effective. However, if the infestation persists, engage a professional pest control company.

## Prevention

The approaches to pest control favoured by conservators today are passive, preventive and non-toxic. If the preferred environment of a pest is understood, infestation can be avoided or eradicated by wholly non-toxic means. Infestation is less likely to occur if bookshelves and books are kept clean, floors and carpets vacuumed regularly, and food and drink are not allowed in the storage area. Good housekeeping and building maintenance is safer and far more effective than using poisons.

If an infestation occurs, try to identify its source to prevent further infestations. This can be difficult, as, for example, silverfish may be breeding in a damp area within a wall cavity or under the floor and then migrating into your storage area in search of food and water. Similarly, carpet beetles often thrive in bird and animal nests inside roof cavities, only roaming farther afield when the pest population outstrips the food supply.

One common source of pest infestations is from new items brought into a collection. To prevent contamination, books acquired second-hand should be checked for insects and eggs and cleaned thoroughly before being brought into the home.

## Further information

Gerozisis, J and Hadlington P, 2001, *Urban pest control in Australia*. 4th ed. Sydney: University of New South Wales Press.

Heritage Collections Council, 1998, *reCollections – Damage and decay*. Canberra, Collections Australia Network. See [collectionsaustralia.net/sector\\_info\\_item/24](http://collectionsaustralia.net/sector_info_item/24) (accessed June 2013).

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