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DISASTER SALVAGE TEAM

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UNIVERSITY OF CANTERBURY

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INSECTS PART II

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Museum And Library Pests And Their Control

Anthony Savill - Canterbury Museum

Pests are a problem that plagues museums worldwide. They range in size from minute booklice smaller than a pin head that consume paper and natural history collections, to rats and mice whose damage to wood, paper and textiles can often be severe. In between are an array of wood-eating beetles, moths which confine their attentions to furs, skins, feathers and textiles, and the ubiquitous silverfish which turns up wherever there is a supply of paper.

Know Your Environment

The museum environment provides an ideal habitat because it is likely to contain large quantities of animal and plant material, and its architecture and storage practices provide ideal refuges and breeding grounds, and the still, dark environment in which many pests thrive.

Knowledge of your museum environment and the habits and requirements of pest species is the first step towards their effective control.

Good Housekeeping

The first line of attack against unwanted pests should always be "good housekeeping".

The most effective weapon in this case is the vacuum cleaner and duster.

Pests are also vulnerable to disturbance and desiccation brought about by changes in temperature, humidity and light intensity. Effective air circulation through storage areas and avoidance of damp, humid conditions are essential components to pest eradication.

The need for a regular programme of spring cleaning and cleanliness cannot be over emphasized.

Control Using Chemicals

Recent medical research has seen many of the more toxic insecticides outlawed in the museum environment. A chemical control programme that could present a risk to human health should not be embarked upon. The following control measures are those found to be both effective and "safe" in the museum environment if used correctly.

Pyrethrins

These contact insecticides are among the safest and most useful insecticides. They only kill insects which come into contact with their residue. They are available under a variety of tradenames as aerosol cans or as concentrates.

Apply their spray along skirting boards, on bookshelves, windowsills and the inside lids of storage boxes. Do not apply them directly onto museum objects. Pyrethrins have a short effective life so reapply every six months or less.

Dichlorvos

Dichlorvos is a very effective fumigant that will kill both flying and crawling insects. It is most conveniently used as pest strips (e.g. "Shell Pest Strips"). It can be used in airtight display cabinets or storage areas. However it should never be used where people are working. The strip should not come in contact with display objects and possible dripping should be prevented by placing aluminium foil underneath.

Pyrogenic Silicas

This is an inert substance, harmless to man, that kills insects by dehydration when they come into contact with it. A very light, white, fluffy powder (e.g. "Dridie"), it is best used in undisturbed areas such as under cabinet plinths, in display cases etc.

Deterrants

These do not have insecticidal properties. They can be placed in small, closed, storage

containers such as boxes and drawers. One of the most effective of these is camphor. Control of pests through chemicals should always be used in conjunction with good housekeeping practices and never as a substitute.

Observe Safety Precautions

When handling any chemical insecticides always:

1. Read instructions thoroughly.
2. Use gloves when handling toxic materials.
3. Use a face mask when spraying.
4. Avoid inhalation of vapours and wash hands thoroughly afterwards.

Identify The Pest

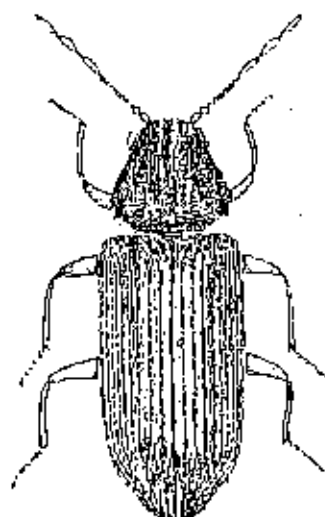
Rats and Mice

Identification: Their presence is usually revealed by their droppings. They have a wide range of diet and they rip up paper and other textiles for their bedding.

Control: Anticoagulant poison baits are best and painless for the animal. Traps baited with walnuts or cheese and bacon are effective although mice are easier to trap than rats. The latter often become trap shy and cunning. Check building to make sure rats or mice cannot gain access, nor have access to food or nesting materials.

Borer

Identification: This insect is the commonest threat to wooden objects. Its presence is evidenced by small circular exit holes of the adult and the frass or "borer dust" produced by the larvae. It is the larval stage that does the damage, tunnelling through the wood and concealed beneath the surface for 2-5 years. The adult beetle emerges between October and January and lays about 20 eggs on the wood surface, preventing further infestations but they will not kill the larvae beneath the surface of the wood.



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Control: "Borer bombs" will only kill the flying borer beetle thereby preventing further infestations but they will not kill the larvae beneath the surface of the wood. This can be achieved by either painting on an anti-borer preparation or having the object professionally fumigated. Treated timber should be used for all structural work in a museum.

Booklice

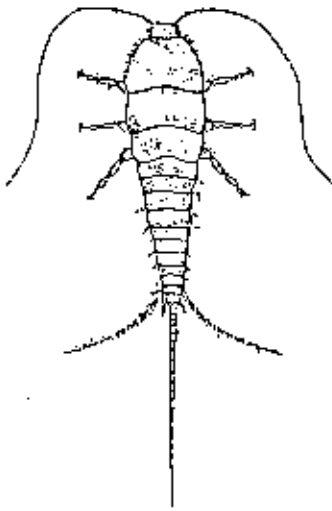
Identification: Minute, white, wingless insects seen crawling on the surface of books or shelves. They feed on paper, museum plant and insect collections, as well as the microscopic moulds that grow on objects under damp conditions.

Control: Booklice are dependent on high humidity and still air. They are absent from well ventilated buildings. Dry moving air and good housekeeping are the most effective methods of control. They will also succumb to the chemical control measures already outlined.

Silverfish

Identification: One of a museum's commonest and most destructive pests. They are

smooth tapering insects covered in silver-grey, glistening scales. They prefer dark, warm, undisturbed areas. Active only at night, they are particularly destructive to anything containing starch such as paper, book bindings, glues and starch in clothing. Their damage is evident in paper as a mosaic of holes or a grazed surface.



Control: Since silverfish are long lived, can breed before they are fully grown, and can live for several months without food, they are difficult insects to keep under control. Their preference for dark, undisturbed habitats means the first line of attack is good house-keeping. This should be followed up with pyrethrin sprays to floors and skirting boards and pyrogenic silicas.

Dermestids or Carpet Beetles

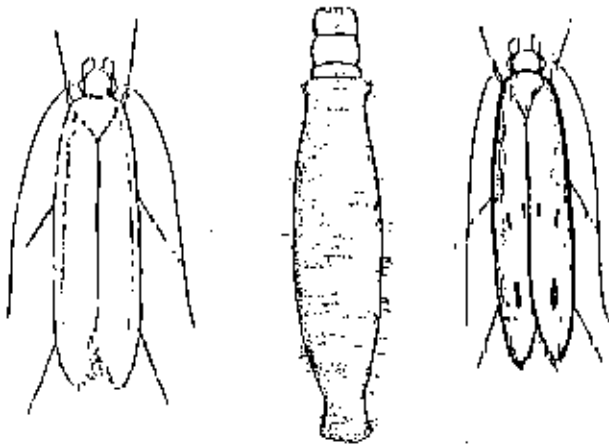
Identification: There are several different species of this insect that occur in museums. The beetle itself does not feed, it is the larval stage that does damage to woollen fabrics, furs, carpets and furnishings. The larvae are hairy, brown on top, with a white undersurface.

Control: These insects are often difficult to control because they breed in difficult to reach or enclosed areas such as boxes, cupboards or drawers.

Infected items should be removed, cleaned and aired, then stored in airtight plastic bags containing an insect deterrent such as camphor. Spray pyrethrin on the inside of the drawer, box or cupboard.

House Moths

Identification: The brown moth is recognised by its colour and black dots near the centre of its forewings. The whiteshouldered house moth is recognised by its smaller size, white head and thorax and mottled wings. The adult moth does not feed. The larvae or caterpillars are 15-20mm long, white, with a brown head. They feed on a wide range of materials including fabrics and any dried plant or animal material.



Control: As for Dermestids.

Clothes Moths

Identification: The common clothes moth has yellowish wings with a satin sheen. The case bearing clothes moth is slightly darker and duller with faint dark spots on its forewings. Again the adults do not feed but the larvae or caterpillars feed on fabrics, fur, wool, hair and feathers. The larvae of the case bearing clothes moth can be easily recognised by the silken case it constructs. That of the common clothes moth, spins a silken webbing incorporating some of the material on which they are feeding.

Control: As for Dermestids.

Other Pests

Several other pests may occur in museums from time to time such as cockroaches, ants, flies etc. They can be controlled using the same techniques outlined above.

REGULAR MONITORING OF PEST NUMBERS

Usually the numbers of pest species seen are only the pinnacle of an otherwise large and hidden population and the damage they do. Regular checks of your collections every few months are the only effective method of monitoring pest numbers and intercepting potential outbreaks.

KEEPING THE MUSEUM PEST FREE

All objects should be examined thoroughly before they are accessioned into museum collections. If there is any evidence of pests or pest damage they should be treated immediately. The nature of the object would determine the method used.

1. A deep freeze in minus 20 C. In 24 hours this temperature will effectively kill all life stages of a pest. It is best to place the object in an airtight plastic bag to prevent damage from condensation.
2. Seal the item in an airtight plastic bag or container together with a dichlorvos pest strip for at least 5 days.
3. For larger, bulkier objects commercial fumigation by Port Agricultural authorities or pest distribution firms should be considered.

USEFUL LITERATURE

New Zealand Insect Pests by D.N.Ferro. Published by Lincoln University College of Agriculture, N.Z. 1976.

Pest Control in Museums by S.R. Edwards et al. Published by The Association of Systematics Collections, U.S.A., 1980.

A Current Status Report on Fumigation in Museums and Historical Agencies by Robert F. McGiffin. Published by the A.A.S.L.H. Technical Information Services, U.S.A., Technical Report no. 4.

Preventative Pest Control

Measures In Storage

Tony Clark Museum of New Zealand

We have developed a mentality that demands if even a suspicion that pests are present we will fumigate anyway. Rather like taking a pill just in case we may get a headache. It is much more efficient and environmentally sensitive to develop a programme of monitoring and intervention combined with effective eradication methods when required.

Integrated Pest Management

is "the control of pests using a variety of environmentally sound techniques, in a way that is safe for collections, museum staff and visitors".

Pest management requires a detailed knowledge of the habitats and preferred environment that supports the pest, then using this knowledge to prevent establishment and survival. It requires good housekeeping and sanitation, monitoring, inspection, and modification of habitat.

When pests are discovered it may be more effective to monitor activity for a brief period, identify living habits (a nest for example) then eradicate the pest at source rather than blanket fumigation which may still leave the problem unsolved.

Therefore the basic components of a pest management programme are

- 1) Good housekeeping
- 2) Monitoring
- 3) Inspection
- 4) Treatment action
- 5) Evaluation
- 6) Education

Monitoring

The first most important consideration is to prevent insects and other pests entering the building. Quarantine of objects coming into the building is required.

Secondly, staff using the collections, and cleaners should keep watch for infestation and report it immediately.

Thirdly, traps for rodents and pheromone or sticky traps (with or without bait) for insects are now considered essential in discovering the presence of insects.

It is then necessary to trace the source. This requires an understanding of the building envelope and structure, and awareness of areas where warmth, moisture, and even food may exist.

Check buildings and clean gutters regularly, prevent birds nesting and remove droppings. It may not appear obvious but these precautions will help to reduce pests.

Modify The External Environment Of The Building

Look at the area surrounding the building.

Security lighting attracts insects and moths at night. Sodium lamps rather than incandescent or mercury vapour lamps will avoid this, and try to place lighting away from buildings, NOT attached to the walls.

Birds nest within walls and gutters where their droppings attract insects.

Avoid having plants near the building. If possible have a 1 metre gravel path around the perimeter of the building.

Visitors leave food in the grounds and rubbish bins which attract rodents. Discourage birds and animals feeding. Control garbage.

Modify The Internal Environment

Is the internal environment checked regularly?

A moist environment will cause mould, and some insects like it.

Storage areas where rooms may not be climate controlled, may become damp and musty. Also, containers have their own microclimate which may be moist, remember to inspect containers regularly.

Is somebody responsible for checking for insects regularly?

Install sweepers on exterior doors to prevent entry of crawling insects. Use double exterior doors if possible. Block any access openings around holes in walls (eg plumbing entry holes). Regularly schedule inspection of these holes for evidence of attempted entry.

Fumigation Eradication And Control

It is no longer acceptable to simply fumigate collections on a regular basis using fumigants which are damaging to both humans and the environment. A number of alternatives for pest eradication are now being used which are considered safe and effective. These are freezing, anoxic treatment, carbon dioxide and conventional fumigants under strictly controlled conditions.

Freezing

This is effective if done properly. It requires the infected object to be sealed in a polythene bag and frozen as quickly as possible to reduce the formation of ice crystals which may damage fibre, and reduce the possibility of insects going into diapause before they are killed.

This temperature should be below -20C where the object is to remain at this temperature for a period of 3-7 days. It is then

thawed slowly before refreezing and leaving at the -20C temperature for a further 3-7 days. The objective being to prevent eggs hatching and to eradicate any insects which may have survived the original freezing. The item may then be left in the bag for storage.

Anoxic treatment involves a sealed environment form which the oxygen is removed to below 0.1% using a vacuum.

Residual sprays such as "Permigas" (permethrin in aerosol form) and Coopex (Permethrin powder which is dissolved in water for spraying) are used sparingly when required.

Permigas is also available as an automatic pest control system which is used for space control. Microdroplets of permigas are automatically sprayed into the atmosphere at predetermined intervals. This system is very useful for warehouses and closed storage areas.

Coopex is another residual spray in powder form which is mixed with water and sprayed using a garden spray.

Mould is very difficult to eradicate completely, the most effective way to avoid this problem is environmentally.

"Vikane" (Sulphuryl fluoride) is the fumigant most often used by MONZ. It is generally considered safe unless there is sulphur present in the object being treated.

Aromatic Pest Deterrents

Camphor is still widely used for deterring insect pests. It would appear to be very effective but the quantities required make it hazardous to humans working within storage areas.

Space Control Systems

A solid state timer is set to emit a measured amount of Permigas insecticide at regular intervals. It can remain in the air for up to 2 hours when it eventually settles on surfaces and may remain effective as a pesticide for 2

weeks. After this period the chemical breaks down to become harmless.

Conclusion

Pest control in the past has been a reactive approach followed by overkill, pest management requires

- * **An effective quarantine programme for incoming material, together with suitable treatment methods if required.**
- * **Keeping a close watch on other possible sources of infestation and entry of pest into the collection storage area.**
- * **Maintaining a stable environment and avoid potential for moisture within the building.**
- * **Avoiding the potential for providing a supporting environment for pests by keeping storage and work areas clean and free from food.**
- * **Trying to avoid external conditions which may attract insects towards the building.**
- * **An effective monitoring system to detect the presence of pests.**
- * **An effective eradication system based upon the species to be eradicated.**
- * **Deployment of non-chemical methods.**
- * **Evaluation of results.**
- * **If required chemicals to be deployed in a carefully specified manner.**
- * **Re-evaluation of results.**