SL all yours

Info guide

Caring for your collections: **Dealing with mould**

HEALTH WARNING
Mould can be dangerous to people as well as to collections. Some species such as *Aspergillus fumigatus* are toxic. In addition, moulds are powerful sensitisers to people prone to allergies and asthma. Ensure proper safety precautions are followed when handling mould affected material. Wear your Personal Protective Equipment (PPE) including P2 respirator masks (follow manufacturer's instructions), nitrile or latex gloves, eye protection and clothing protection such as Tyvek overalls. If unsure, seek advice from a mycologist. If toxic moulds are present, **DO NOT** attempt to salvage materials yourself.

About mould

- The majority of mould (a form of fungi) affecting collections are *conidial fungi*. This type of fungi is a threat especially in damp parts of buildings and in geographic areas with seasonal periods of high humidity.
- Moulds excrete enzymes that allow them to digest organic material, altering and weakening materials.
- Many fungi contain coloured substances, such as melanin, which can stain paper, cloth or leather.
- Spores (correctly called *conidia*) active or dormant are always present. Germinating *conidia* develop into *hyphae*. *Hyphae* are thread-like multi-cellular structures growing out of the spore. At their tip, they secrete enzymes into the material and absorb the soluble products as food and thus grow. These enzymes eat into organic material, altering and weakening material.
- Although good housekeeping and proper ventilation help, it is not possible to create an atmosphere free of these organisms.

How to prevent mould

Mould is always present, but certain conditions are more conducive to growth than others. The most effective preventive measure is to ensure conditions within your collection area are hostile to mould activity. This can be a great challenge in most Queensland homes and small collections during our hot, humid summers.

- The threat of mould growth increases significantly when humidity and temperature are high. Most mould will grow when relative humidity is over 60%.
- Outbreaks can occur surprisingly quickly and if not attended to, can cause widespread damage in a short space of time. During and after prolonged or heavy rainfall, monitor your collections closely to ensure small outbreaks are noticed before wide scale damage has occurred. The most dangerous time of year for most parts of Queensland is during the wet, humid summer.

- Mould can also form on objects if they have become wet and have not been dried out properly.
- If material becomes wet, dry it as quickly as possible using fans. Never use heaters, as heat encourages mould growth. For more information on treating water damaged collections please see our guide Salvaging water damaged collections.
- Avoid storing collections near sources of moisture or heat such as bathrooms and kitchens.
- Build-up of dust and dirt in collection areas will encourage mould growth as it provides a food source. It is important to prevent this by maintaining a regular cleaning programme.
- Poor air circulation is another contributing factor to mould growth. Ensure collections are well ventilated. Simple steps such as leaving space between books and the back of the bookshelf to allow airflow will help.

How to treat mould affected material

This section provides a step-by-step approach to the salvage of small to moderate mould outbreaks. For more severe outbreaks please refer to the section on 'Dealing with a major outbreak'.

1. Quarantine

If a mould outbreak is found, quarantine affected material:

- Small outbreak
  - If only a small number of objects are affected, wearing your Personal Protective Equipment, place objects into a labelled plastic container or bag and seal thoroughly with tape.
  - Transfer to an area where no other material is housed. Outside on a shaded verandah may be suitable or ideally a fume cupboard if available.
  - Assess the objects. If mould activity is minor, treat as outlined below. If objects have heavy mould growth, discard them, but keep them in a sealed enclosure. The risk of mould becoming active again will be very high.
  - If an object is heavily affected but of great importance, seek help from a qualified conservator.
- Large outbreak
  - If the outbreak is widespread, do not disturb the material, cordon off the area and contact a mycologist to carry out the appropriate tests to identify the mould species and carry out spore counts. Refer to the section further below on 'Dealing with a major mould outbreak'.

2. Stabilise environment

Mould will only become dormant if the environmental conditions that activated the outbreak are altered by lowering the temperature and relative humidity.

- Reduce temperature and relative humidity in the area to below 60%. Contact a conservator or air conditioning engineer to get advice on dehumidification techniques appropriate to your situation.
- If you are unable to improve environmental conditions you may have to remove collections to a more stable environment.

3. Move collections if necessary

If collections must be moved, extreme care must be taken to ensure mould spores are not spread:

- Wear full Personal Protective Equipment.
- Minimise handling.
- Thoroughly seal objects in plastic bags.

4. Collection treatment

If you cannot treat material affected by mould immediately, freezing may be a suitable strategy to buy you time. (Please note: Not all material can be frozen. If unsure, check with a conservator.) Further information can be found in our guide Freezing water damaged and insect infested collections.

- If the mould is identified as non-toxic and is dormant, it is possible to surface clean affected objects. Otherwise seek advice from a qualified conservator.
- An indication of active mould includes a fluffy or slimy appearance while dormant mould is usually dry and powdery.
- All involved in the clean-up should wear appropriate protective gear including P2 respirator masks and disposal gloves. Protective suits may also be necessary.
- Work in a well-ventilated area away from other collection material. Ideally use a fume cupboard. Otherwise, work in a sheltered area outside.
- Carefully brush off spores with a soft brush into a vacuum cleaner. Ideally this should be a HEPA filtered vacuum cleaner capable of retaining 99.97% of all particles down to 0.3 microns. Otherwise a vacuum cleaner with a disposable bag can be used. Ensure the bag is carefully removed, wrapped in a plastic bag and sealed after use to prevent mould spores spreading.
- Be careful with fragile material. Place a ‘Chux’ or other porous cloth over the nozzle of the vacuum cleaner.
- If an object is heavily affected with mould, it is best to carefully dispose of it. Or seek advice from a qualified conservator

Cleaning the storage area

It is important to ensure that the conditions that caused the mould outbreak are rectified before returning material. If they are not, the mould will quickly regrow. The area where the affected material was stored should be cleaned thoroughly before collections are returned.

- Vacuum thoroughly with a HEPA filter vacuum cleaner.
- Wipe shelves with microfibre cloths and a 70% methylated spirits/30% water solution. Use a two bucket system – one bucket with the methylated spirits solution and the other with clean water. Do not put the dirty cloth back in the methylated spirits solution – wash in the clean water bucket first. This avoids cross contamination. Change cloths regularly.
- Ensure shelves are completely dry before replacing material.
- Avoid commercially available mould killers and cleaning products such as ‘Exit Mould’ as they emit harmful gasses and leave residual chemicals on materials and storage furniture.

- If the affected area is air conditioned, have the air-conditioning system's components including ductwork cleaned and disinfected. This is particularly important if the system was the cause of the mould activity.

5. Check environmental conditions

- Ensure that the conditions that caused the mould outbreak are rectified before returning material. If they are not, the mould will quickly regrow.
- If necessary investigate methods for improving conditions.

6. Returning collections

- Once you have thoroughly cleaned and dried the affected area and the environment is stable, return collections to the area.

7. Remain vigilant

It is important to remember that it is extremely difficult to kill mould. Once conditions are conducive, growth may resume. This risk is increased for objects with porous surfaces such as paper, cloth, photographic emulsion, wood and leather as mould spores become embedded and are difficult to remove.

Inspect collections regularly, monitor conditions in the area and act quickly if new growth is detected.

- Keep area clean. Dust build up will encourage mould and insect activity.
- Before bringing new objects into the area, quarantine first to check for mould activity.
- If the area is air conditioned, ensure the system is well maintained and air filters are changed regularly.

Dealing with a major outbreak

- Some mould outbreaks will require specialist assistance. This will be necessary if the outbreak is widespread and severe, if toxic species of mould are identified or if the problem has affected the building including the air-conditioning systems.
- There are companies who specialise in disaster recovery who can assist in the clean-up of the collections and the building. Research the company thoroughly and ask for a comprehensive outline of their treatment approach including any solutions being applied to collections. Some techniques can adversely affect objects.
- Badly affected or valuable collections should be treated by a qualified conservator. They will ensure methods used are not harmful and can provide advice on the best way to prevent future infestations. A list of private conservators working in Australia can be found in the 'Useful Websites' section below.

Useful Websites

- *AICCM Australian Institute for Conservation of Cultural Material* www.aiccm.org.au
- *AIC American Institute for Conservation* https://www.culturalheritage.org/
- Find a conservator in private practice through the Australian Institute for Conservation of Cultural Material (AICCM) https://www.aiccm.org.au/need-a-conservator

The procedures described here have been used by State Library of Queensland in the care of its collections and are considered suitable by State Library as described; however, State Library will not be responsible for damage to your collections should damage result from the use of these procedures.

Need further information?

(07) 3840 7810 | http://www.slq.qld.gov.au/preservation

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