Mold and Pests in the Library

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Outline:

- Introduction
- Mold
- Pests
- If You Find Moldy or Infested Materials
- Discussion and Questions
Mold and Microbial Growth
Mold and Microbial Growth

- Molds are fungi that occur naturally in the environment
- Help break down dead materials and convert it back into organic matter that can be used as fuel by other living organisms
- Thousands of types of fungi; < 100 types are known to be associated with human or animal disease
- We are all exposed to mold in the air we breathe, indoors and outdoors
Mold and Microbial Growth

- How mold grows:
  - Digest and destroy material they grow on
  - Can be found almost anywhere, grows best when oxygen and moisture are present
  - Reproduce by making spores
  - Spores are airborne
  - Land on materials
    - If conditions are favorable, mold will grow

Spores may remain able to grow for years after they are produced.

Whether or not the spores are alive, the allergens in and on them may remain allergenic for years.
Mold and Microbial Growth

• Appearance of mold depends upon species present

• May be circular or grow and spread across an area

• Health Concerns

• Pre-existing health conditions
  • Allergies
  • Asthma
  • Emphysema

• Infants

• The elderly

Institute of Medicine (2004)

◆ Cough, wheeze and asthma symptoms in those with asthma

◆ Irritation to nose, throat and respiratory tract

◆ Hypersensitivity pneumonitis
Mold and Microbial Growth

Other health concerns associated with mold:

- microbiological volatile organic compounds (MVOC)
  - strong/unpleasant odor (musty smell)
  - chemical compounds emitted by molds
  - can act as irritants,
  - linked to:
    - headaches
    - nausea
    - dizziness
    - fatigue
University’s Approach to Mold Growth in Buildings on Campus

• Visual survey

• Address causes
  • Water intrusion
  • Relative humidity
  • Cleanliness

• Remediate
  • Most remediation conducted by external firms
What about Sampling?

• There are no standards for acceptable limits of mold in the indoor environment

• Sampling will show the presence of mold in most indoor environments

• Addressing and remediating the root cause of mold growth is best approach
What is mold?

- Many species of fungi
- Spores are everywhere; indoors and outdoors
- Spread via air currents and mechanical transfer
- Require moisture to become active
- Higher temperature leads to faster growth
How does mold develop?

- When water or high relative humidity provides the necessary moisture, dormant (inactive) spores will germinate, grow fine web-like structures, and eventually produce fruiting bodies that release more spores.
- Most molds will germinate at 65% relative humidity.
- Increases in temperature can speed the growth rate of active mold.
How does mold develop?

- Food sources for mold include many library materials: paper, adhesives, cloth, leather

- Photographic materials, including film-based media, are vulnerable
Risks of mold to the collections
Risks of mold to the collections

• Weakens materials
• Causes stains
• Spreads easily under favorable conditions
Identifying mold
Identifying mold

• Inactive mold is dry and powdery, easy to brush off
• Early growth looks like fine webs
• Blooms in clumps, which can merge into “carpets”
• Active mold can be fuzzy, sticky, damp, or slimy
• Can be any color
• Multiple colors/species can grow on a single object
• Musty smell (active and inactive)
Early Mold Growth

• Similar appearance to dust or cobwebs
Mature Mold Growth

- Fuzzy appearance
- Multiple colors on a single object
Identifying mold

- Mold can be confused with dust, dirt, foxing, or cobwebs.
- Staining from water damage can appear similar to staining from mold.
- If in doubt, contact Preservation!
Chapter Six

SOME FUNCTIONS OF STIMULI

A Discriminative Stimulus as 'Inhibitory'

The discrimination of a stimulus involves another case in which the notion of 'inhibition' is frequently extended. If a discrimination is established between two complex stimuli, S+ and S-, with respect to their membership, such that the response S+ is always reinforced while S- is not, S+ acquires an inhibitory power to suppress the action of S-. The effect of S- is called by Pavlov conditioned or opisthous inhibition. The case resembles true inhibition more closely than simple extinction because it involves a second stimulus; but according to the present interpretation, discrimination is only a modified form of extinction and the concept of inhibition is needed to account for it. It does not act to inhibit the reflex in its entirety, for instance, to say, the inhibition of eating or of salivation by a loud sound. It is the difference in intensity of the complex stimuli.

The procedure described above is based essentially in reminding the magnitude of R to its opposite S-. It really inhibits and not merely a passive disappearance of the positive conditioned reflex owing to the compound stimulus presented beforehand. The inhibition of S- is based primarily upon an interchange from one stimulus to another simple, which...
Staining from Mold

Staining from Bleeding Dye

Staining from Three Sources
Mold on Page Edges
Dust Stains on Page Edges
Insect Stains on Page Edges
Ink Stains on Page Edges
Prevention & Remediation
Managing the Environment

• Controlled relative humidity
• Cool temperatures
• Air circulation
• Monitoring
• Environmental Management Team
Mold Remediation

- Deactivation
- Irradiation
- Cleaning
Deactivation

- Desiccants
- Freezing
- Causes the mold to go dormant, but does not kill the mold
- In-house or sent to a vendor
- Best used in concert with cleaning
Irradiation

- Materials are exposed to gamma radiation
- Kills mold
- May be damaging to fragile materials
- Requires materials to be sent out to a vendor
- Best used in concert with cleaning
Cleaning

• Brushes
• Soot Sponges
• HEPA Vacuum
• In-house or sent to a vendor
Cleaning
What you can do

• Avoid eating in work areas
• Keep beverages in lidded containers
• Keep collection material off the floor
• Inspect packing material of new acquisitions for evidence of water damage
• Promptly report wet items to Preservation
Common Species

- Silverfish
- Biscuit Beetle
- Carpet Beetle
- Hide Beetle
- Cigarette Beetle
- Clothes Moth
- Book louse
- Termite
- Rodent
- House Centipede
Conditions Favorable to Pests

• Warm temperatures and high humidity (>65% RH)

• Available food and water sources

• Dark cracks and crevices to hide in

• Poor housekeeping – dust, dirt, and trash provide additional food sources that attracts insects
Risks to Collections

Some insects eat through paper, leaving oddly-shaped holes in the pages of books.

Carpet beetles and their larvae feed on textiles

Wood-boring insects weaken wood by chewing or boring holes through it.
Integrated Pest Management

- IPM uses a holistic approach that prioritizes prevention first and relies less on chemical treatments.

- Minimizes the need for chemical treatment by using a combination of strategies to prevent, detect, and appropriately treat infestations.
IPM Program Components

• Building Maintenance (Interior and Exterior)
  – Make sure windows and door seals are in good condition
  – Ensure that dumpsters and trash bins are not kept too close to the building and are emptied regularly
  – Do not allow plants to grow too close to the building

• Environmental Controls
  – Humidity above 65% and warm temperatures attract pests

• Housekeeping
  – Dirt and dust accumulation attracts insects
  – If you notice that your trash isn’t being picked up regularly, notify custodial staff

• Food and Plants
  – Only eat and dispose of food in designated areas of the library such as the staff lounge
  – Do not keep insect-attracting plants in work areas.
When to be Concerned

1. If you see several live bugs in an area...
2. Or several dead ones
3. Insect frass or rodent droppings near collections
4. Inspect new acquisitions containers inside and out for evidence of pests
5. Alert Building Services of any building envelope issues
Monitoring and Treatment Options

- Sticky Traps and regular building inspections are used to monitor pest activity in collection areas – data is collected and assessed 4 times/year.
- Visual inspection of all incoming materials are important, quarantining of items if pest activity is suspected

- Treatment Options – treatment varies depending on pest type and scale of infestation:
  - Freezing
  - Heat Treatment
  - Anoxic Treatment (removing oxygen)
  - Nitrogen or CO₂ Treatment
  - Chemical Treatment in rare cases
What you can do

• Only eat, store, and dispose of food in designated areas such as the staff lounge.

• Notify custodial staff of any issues (unpicked up trash, spills, unmopped floors, etc.)

• Do not store boxes or collection materials on the floor, which makes them more susceptible to pests and damage from water leaks.

• Notify Building Services or Peggy Keher of any building maintenance issues
If You Find Moldy or Infested Materials

- Isolate infested material
- Clean work area
- Contact Preservation
Questions or comments?

Contact Preservation!