

NOTES ON THE PRESERVATION OF PERSONAL HEALTH

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The use of old books and documents can be hazardous to your health! I do not mean to alarm anyone with this statement, yet you should be aware of possible hazards and how to avoid them.

This article begins with an overview of infection, allergy and disease sources. Then there are suggestions for the safe use of paper materials. Finally, there is a section on problems associated with paper which has been moldy, in a flood, stored in a basement or a barn, or treated with an insecticide or fungicide.

Please note that this article is about paper based artifacts. Other materials, such as textiles, could be the source of different health risks.

Sources of allergies, infections, and disease

The sources of health hazards when using papers are dust, mold, bacteria, by-products of mold and bacteria, and applied chemicals. (While not all molds and bacteria are disease causing, it is best to assume that a portion of those encountered on paper are pathogenic.)

The dust associated with books and manuscripts is described by McLellan and Baker in the article "Incidence of allergy in archival work":

House dust, which may be very similar to our records dust, is the end result of the breakdown and decomposition of the various animal and vegetable products found in the interior environment, including the results of bacterial actions on these materials.

Dust causes mild, moderate, and severe allergic reactions.

A second source of risk is mold, which has two aspects to consider:

1) The mold organism which you see on paper is most likely to be a hazard if it gets into an opening in your skin, causing an infection. When the mold is dead and the paper is dry, allergic reactions can result if the mold is scattered as dust in the air.

2) Mold releases reproductive cells called spores, which are easily inhaled into the lungs. Hundreds of types of molds can be associated with paper, and they are the source of numerous allergies. The spores of a few species of mold also cause disease such as histoplasmosis. "Old mold" can be a source of spores, even when the mold organism is dead.

A third source of risk is bacteria, another complicated micro-organism. Many different types of bacteria can cause ill-health in humans, and the mechanisms which cause disease or infection are varied:

1) Some bacteria cause allergies just by their presence, since the human body reacts to the bacteria as "foreign" cells.

2) The enzymes which bacteria produce can cause harm to human tissue.

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3) Bacteria have two groups of by-products which are classified as toxins. One group affects human hosts while the bacteria is alive; the second group becomes a hazard when the bacteria dies. So it is possible for there to be a health risk from both newly contaminated paper and paper which was exposed to living bacteria long ago.

Tolerance and sensitivity

Every individual has a different tolerance to each possible toxin and allergen. This makes it difficult to predict whether a potential health hazard will actually become someone's disease, infection, or allergy. Everyone should look at their own previous experience to evaluate the risks and set their personal limit of exposure. For instance, if there is a history of allergies, it would be best to avoid any exposure to dirty or moldy papers. Likewise, exposure to known risks should be avoided if a person has been ill recently, since the body's defense mechanisms are probably weak.

Prolonged exposure to dust and mold can increase a person's sensitivity until the body can no longer tolerate what was once no problem. This is a special concern for people who work in libraries and archives. Prolonged exposure (all day, for years) can mean that allergies develop with relatively low levels of airborne dust and mold. Therefore, a library staff member should be extra strict in following the healthy behavior guidelines given below, when working with papers that are heavily contaminated.

Incidentally, the "stale" air in many libraries and records repositories contributes to health risk. When ventilation is inadequate, and when air filters are not chosen well or maintained properly, the adverse effects of dust and mold are increased.

Basic healthy behavior

When dealing with the book related problems discussed below, there are three routes by which hazardous substances usually enter your body. These are by ingestion (through the mouth), respiration (through breathing), and through the infection of cuts or openings in the skin. In general, risks can be eliminated by being careful, and by recognizing your personal limits.

Following these guidelines would prevent the *ingestion* of potentially harmful materials:

- 1) After handling suspect books and manuscripts, wash hands with soap and water before eating, drinking, smoking, or applying cosmetics.
- 2) If reading or doing research in your home, especially at the kitchen table, keep food and food dishes away from the work area. Wash the table before preparing or serving food.
- 3) If you have not changed your clothes since handling the suspect paper, avoid eating crumbs of food which have fallen on your clothing.
- 4) Do not lick your fingers! Some people have the habit of wetting a finger to "thumb" through a book or a stack of papers. This is bad for the paper, as well as being risky behavior.
- 5) Keep suspect paper away from children. They will not be cautious with the materials, and they might even chew on a book!

Respiratory problems can result from breathing dust, mold spores, bacteria toxins, and other substances. The respiratory route of exposure can be controlled by providing the correct working environment and an adequate dust mask.

- 1) If you choose to clean books and manuscripts which are contaminated, it is best to work in a laboratory fume hood. This equipment circulates a lot of air past the work space, and hazardous

materials are pulled away from your body. (Remember that a spray booth is not an adequate substitute for a laboratory fume hood.)

Working outdoors is a second-best choice. At least there is a large volume of fresh air, and there might be a breeze. Be sure to work so that debris is blown away from your body.

2) Dust masks filter the air that you breathe, and eliminate larger particles. Do not trust the gauze masks which can be bought in retail stores. These do not filter smaller particles such as mold spores. For complete safety, you must purchase respiratory protection which is approved by NIOSH (the National Institute for Occupational Safety and Health) for use around the specific hazard that you are trying to avoid.

Cuts and skin breaks are the route of *infection*. Wearing plastic gloves can prevent this third route of exposure to hazardous substances. Acceptable gloves are made from thin polyethylene or latex, or you can use the thicker gloves sold for dish washing and house cleaning.

Be aware that these gloves act as physical barriers to protect the skin. They are not usually adequate as solvent barriers.

In addition to the three sets of guidelines just described, there are other healthy behaviors to be followed while handling paper materials:

- 1) Do not rub your eyes when your hands are contaminated by hazardous materials.
- 2) Wash hands before going to the bathroom, as well as after.

Mold/mildew

It doesn't require a flood to have a problem with mold and mildew! Mold develops on paper in conditions of high relative humidity and poor air circulation.

"Old mold" and fresh, living mold are both health hazards. When you are confronted with any paper that is moldy, decide whether you really need to keep the object. Consider throwing it away, replacing it, or photocopying it. Sometimes a book has mold only on the cover, and it might be possible to remove the cover and rebind the book.

If you have decided to keep the paper item, the mold should be removed. Seek advice from a conservator about the procedure to use. Cleaning methods are different, depending on the object (book, photo, manuscript) and the type and extent of mold damage.

While handling the moldy item, and while cleaning it, you should follow all three sets of healthy behavior guidelines listed above to avoid ingesting, breathing, or being infected by the mold.

Do not use a fungicide to kill mold on paper or to "prevent" mold. Instead, maintain paper in the proper environment (50% R.H. at 70° F). It also helps to have air circulation, so that humidity does not build up in semi-enclosed areas such as bookshelves.

Floods

Paper which has been in a flood can be contaminated by bacteria in the water, and by mold and bacteria in the mud. After the flood water subsides, additional types of mold can grow quickly on the surface of the paper.

If you handle the paper when it is wet or damp, wear plastic or "rubber" gloves. Once you have decided that the paper must be kept, and once it has been dried (following the advice of a conservator for the salvage procedure), more precautions are necessary. As dried mud is cleaned from the paper it usually "powders." These fine particles can be ingested or breathed. Once again, all three types of healthy behavior guidelines should be followed.

Storage in infested areas

Paper materials are found in basements, barns, and other sites which are prone to infestation. In these areas, rodents and insects might eat paper or make a home in paper. Birds might nest in the area. Rodent and bird droppings (and the dead bodies of insects) harbor bacteria, mold, and other toxins.

It would be a good idea to wear a dust mask and gloves when retrieving paper materials from their "storage" area. Then decide whether the paper really needs to be saved. Finally, get advice on how the paper should be cleaned, and do the cleaning in a healthy manner (using all three sets of guidelines). If the paper does not "clean up" thoroughly, it would be wise to continue wearing gloves when handling the items.

Insecticide/fungicide exposure

Insecticides and fungicides have been used to control bugs and mold around books. Sometimes these biocides were put on shelves or in storage areas, and sometimes they were applied directly to books and papers. Biocides have been applied as water-based and oil-based sprays, and as dusts.

Through the years, different substances have been used for insect control, and some of them are now banned from sale or use. For instance, arsenic compounds and DDT were used in museums, and also may have been used in homes.

With this range of chemicals and applications, it is not possible to say whether there are any residual toxic chemicals on books. If you believe that your book or manuscript was exposed to a biocide, wash your hands with soap and water after using the item. If you use suspect materials for many hours, periodic hand washing is a good idea.

If you have an insect problem now, obtain recommendations about bug control. You should use an extermination method that will be effective on your particular type of insects, and one which will not hurt your paper materials or your health.

Further information

In Nebraska, one source of information (especially if the question is a job-related health concern) is the Nebraska Division of Safety. In other states, ask for the state department which is the "OSHA consultant office." (OSHA is the Occupational Safety and Health Administration.)

The Center for Safety in the Arts is another helpful organization. They publish data sheets, answer questions, and can often recommend state or local agencies that provide additional information. This is how they describe themselves:

The Center for Safety in the Arts (CSA) is a national clearing-house for research and education on hazards in the visual arts, performing arts, museums, and school art programs. The *Art Hazards News*, published 10 times per year, covers such topics as hazards, precautions, government regulations, lawsuits, calendar of events, and other topics...

The newsletter has the modest subscription price of \$18.50 a year. The CSA can be reached at: 5 Beekman Street, Suite 1030, New York, N.Y. 10038. Their phone number is (212) 227-6220.

A short list of printed material that I used while writing this article is provided at the end. This is not a bibliography; better and more numerous sources are probably available!

Thanks

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Of course, any errors of fact, interpretation, or emphasis are mine alone.

Sources

Neal D. Buffaloe and Dale V. Ferguson. *Microbiology*. Boston: Houghton, Mifflin, 1981 (second edition).

Mary Davis. Preservation using pesticides: some words of caution. *Wilson Library Bulletin*, February 1985, pp. 386-88, 431.

Lucy Kavalier. *Mushrooms, molds, and miracles*. NY: New American Library, 1966.

Peter M. McLellan and Gordon P. Baker. Incidence of allergy in archival work. *American Archivist*, October 1965, pp. 581-84.

Lynda A. Zycherman and John R. Schrock. *A guide to museum pest control*. Washington, D.C.: Foundation of the American Institute for Conservation and the Association of Systematics Collections, 1988.