



## Mould and moisture in the home (Updated to June 16, 2011)

Although moulds play a vital role in the natural environment by breaking down and recycling plant matter such as leaves and dead trees, when found growing indoors, however, they can present a significant health hazard to occupants from inhaling or touching mould or mould spores. This was a recognized problem for thousands of years. For example in the Bible in Leviticus 14:45 it states: “A house desecrated by mildew, mould, or fungus would be a defiled place to live in, so drastic measures had to be taken”. The section then goes on to describe the measures that had to be taken to decontaminate the home and contents. In her book “Poisons of the Past: Molds, Epidemics, and History”, Mary Kilbourne Matossian presents evidence that contamination of food supplies by moulds and fungi, led to chronic food poisoning that was a major factor in the low birth rate and high death rate during the Middle Ages. Even the Salem witch trials were most likely a result of hallucinations and seizures suffered by people in the early Massachusetts colony who had eaten mould infested rye bread. In the case of exposure to mould in the modern home, the primary exposure to mould toxins is by inhalation of mould spores and mould-contaminated material.

Mould spores, the minute and invisible reproductive "seeds" of moulds are virtually impossible to keep out of the indoor environment. They can enter through open doors and windows, heating and air conditioning systems, clothing and on pets. If your home is close to trees and leaf litter mould spores will be present. This is not a problem, however, as long a care is taken to keep rooms and surfaces dry. Mould spores can only take hold when moisture is present, such as in bathrooms, shower recesses, damp basements, etc. In such areas where moisture is frequently present mould spores can take hold within 24 to 48 hours and will continue to grow until steps are taken to both remove the mould and eliminate the source of moisture. Problem areas can be under leaking roofs, guttering and down pipes, damp

basements, crawl spaces and even under concrete slabs if moisture is chronically present. It is important to note that mould is more of a problem when they grow on porous surfaces such as on wood, plaster, wall board, carpets, concrete, etc. This is because the enzyme roots of the growing mould penetrates down into the material's pores, making successful removal more difficult. Besides colonizing dead and decaying organic material such as textiles, leather, wood, paper, etc., mould can form on inorganic surfaces, such as glass, painter surfaces, bare concrete if moisture and organic nutrients such as dust or soil particles are present. Moulds also produce a large number of volatile organic compounds (VOCs) which are responsible for the musty odours produced by moulds.

### A Hobart Case Study

In a professionally restored sandstone and brick colonial house near Hobart one of the occupants was suffering severe asthma attacks, mainly while home. The home was fitted with under-floor ducted heating and there was no obvious source for a musty odour that could be smelt throughout much of the substantial home. Upon careful inspection a broken storm water pipe was found that had been allowing rainwater to collect under the kitchen concrete slab. The chronic moisture set up a mould infestation under the kitchen and the central heating was then circulating the escaping mould spores throughout the house. Fixing the storm water pipe eventually dried out the soil under the slab and the musty smell slowly disappeared, as well as the occupant's severe asthma.

In addition to causing asthma attacks, inhaling or touching mould and mould spores can cause a number of adverse health effects in sensitive individuals, such as cold and flu-like symptoms, headache, general fatigue, inflammation, allergy, infection, toxic pneumonitis, etc. (See table1)

**Table 1: Selected important moulds found in damp buildings\***

<b>Fungal Species</b>	<b>Substrate Effects**</b>	<b>Possible Metabolites</b>	<b>Potential Health Effects</b>
<i>Alternaria alternata</i>	moist windows, sills and walls	allergens	asthma, allergy
<i>Aspergillus versicolor</i>	damp wood, wallpaper glue	mycotoxins, volatile organic chemicals (VOCs)	unknown
<i>Aspergillus fumigatus</i>	house dust, potting soil	allergens	asthma, rhinitis, hypersensitivity, pneumonitis
<i>Cladosporium herbarum</i>	moist window sills, wood	allergens	asthma, allergy
<i>Penicillium chrysogenum</i>	damp wallpaper, behind paint	mycotoxins	unknown
<i>Penicillium expansum</i>	damp wallpaper	mycotoxins	possible nephrotoxicity***
<i>Stachybotrys Chartarum (atra)</i>	heavily wetted gypsum board	mycotoxins	dermatitis, mucosal irritation, immunosuppression

\*Taken from: Mold & Indoor Air Quality, California Dept.of Health, Dec 10, 2003

\*\* Specifically from inhalation exposure, based on laboratory animal data

\*\*\* Possibly toxic to kidney cells.

If mould is growing in your home, you have a moisture problem that needs to be addressed. Steps to take include fixing leaky pipes, repairing damaged roofing material that has allowed moisture into your home, and making sure the ground around the house slopes away from the house to keep the basement and crawl space dry.

### **Cleaning mouldy areas**

- Because mould releases an invisible cloud of spores when disturbed, use extreme caution when cleaning and removing items that are mouldy.
- Avoid breathing mold or mold spores. In very mouldy areas it is advised to wear a respirator or fine particle dust mask. Be sure that the mask fits properly as many of the cheaper ones available do not fit properly.

Recommended is the use of a ClassP2 disposable face mask, available in packs of 10 or 20.

- Wear rubber gloves to avoid touching mould or moldy items during clean-up.
- Wear goggles to avoid getting mould or spores in the eyes.

- The best natural ingredients to use on mould are vinegar or Tea tree oil. Tea tree oil is more expensive but it acts as a broad spectrum fungicide and seems to kill all the mould families it contacts.
- When using vinegar you can make a paste by mixing with baking soda. This can be used in stubborn areas like caulking joints in bathroom and shower recesses. Using an old toothbrush is useful to apply the paste to caulking joints.
- NOTE: It is vital NOT to use chlorine bleach, or so called mould removing products containing bleach on porous surfaces. Besides being a corrosive agent, chlorine bleach does not penetrate porous wood-based materials and therefore does not reach and kill the embedded roots of the mould, which can then regrow and recolonize the surface. Using bleach on mould is a bit like mowing your lawn to kill the weeds!
- Chlorine bleach will only be effective in killing mould on hard non porous surfaces.

### **What to do to control the re-emergence of mould**

- Any structural problems that have allowed moisture into or underneath the home must be eliminated to prevent the regrowth of mould.
- Ensure adequate ventilation in damp, humid areas. If possible use a dehumidifier in problem areas to maintain humidity between 25-50%. Do not use a fan until all mould has been removed to avoid spreading the spores.
- In bathroom and laundry areas use an exhaust fan to vent moisture. Clean bathrooms regularly using

environmentally friendly products that kill and prevent mould. Do not use carpets in the bathroom.

- When painting, add a mould inhibitor to paint. Be sure to remove any mould from the surface before painting.
- Avoid sources of outdoor mould spores that could enter the home. Obvious sources would be wet leaves or garden debris building up next to the house.
- Insulate normally cold surfaces, such as water pipes to prevent condensation developing.
- Develop a routine to regularly check moisture prone areas for signs of re-emergence of mould.

### **A brief word on antibacterial household cleaners (as separate from the mould issue).**

The availability of household cleaning products containing antibacterial agents had mushroomed from a few dozen in the mid-1990s to over 700 by 2001. That number is far higher today even though there are scientific concerns that their widespread use may result in antibacterial and antibiotic resistant bacteria, known as multi-resistant organisms (MROs).

According to the U.S. CDC, there is also evidence that their use in the household may be a contributing factor in the rise of allergies in children. See:

[http://www.cdc.gov/ncidod/eid/vol7no3\\_supp/levy.htm](http://www.cdc.gov/ncidod/eid/vol7no3_supp/levy.htm)

The fact is that antibacterial cleaning products are no more effective at preventing infection than good personal and household hygiene using ordinary soap, warm water and plain detergent.

## References:

**A Brief Guide to Mold, Moisture and Your Home** (EPA publication)

<http://www.epa.gov/mold/pdfs/moldguide.pdf>

**Mold Remediation in Schools and Commercial Buildings** (EPA publication)

[http://www.epa.gov/mold/mold\\_remediation.html](http://www.epa.gov/mold/mold_remediation.html)

**Three Ways to Kill Mold Naturally**

<http://www.care2.com/greenliving/three-ways-to-kill-mold-naturally.html>

**Mold & Indoor Air Quality**, McNeel, Kreutzer, California Dept. of Health,

[http://www.healthandenergy.com/mold\\_and\\_indoor\\_air\\_quality.htm](http://www.healthandenergy.com/mold_and_indoor_air_quality.htm)

**Antibacterial Household Products: Cause for Concern**

[http://www.cdc.gov/ncidod/eid/vol7no3\\_supp/levy.htm](http://www.cdc.gov/ncidod/eid/vol7no3_supp/levy.htm)

**Antibacterial cleaning products**

[http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Antibacterial\\_cleaning\\_products](http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Antibacterial_cleaning_products)

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