



S U M M A R Y : 9 J a n 2 0 1 2

A **ARTICLE CATEGORIES:** | 1. INDUSTRIAL SAFETY (biological hazards) | 2. REGULATORY |

MOLD – A SIGNIFICANT BIOLOGICAL HAZARD



According to public health expert, Dr. Joseph Jarvis: “While it may not be possible to determine the level of exposure needed to cause a problem, Dr. Jarvis said, there is much documentation that exposure to indoor mold can cause respiratory allergies in some people. Often, some experts say, the first sign of mold is an allergic reaction that occurs only inside the house and improves when the person leaves. Also, a musty odor generally indicates mold.” As is apparent in the advice provided by the State of Washington, once mold has taken hold

in a home or business, adequate cleanup can become a complex and cumbersome process. In order to avoid excessive costs linked to repeated ineffective cleanup efforts, *Aerotech* recommends that a professional assessment be completed to ascertain the original source of the problem, the current extent of the problem and to determine options with regard to ideal courses of action. Where necessary we may recommend that professional cleanup (remediation) be performed in order to insure that your mold problem is thoroughly addressed. Prevention, early identification, and rapid remediation are the keys to maintenance of healthy indoor air conditions.

[Image credit: www.bud.gov]

JM - Aerotech Environmental Consulting, Inc. – staff

B **NEW YORK TIMES ARTICLE**

9 Jan 2012

New York State Supreme Court Ruling: No Scientific Consensus Regarding Linkage between Mold and Human Health

<http://topics.nytimes.com/topics/reference/timestopics/subjects/m/mold/index.html>

NYT TOPICS: Mold

Mold loves dampness, in places like the insides of ceilings and walls where there is moisture from a roof or plumbing leak. Some people have no reaction to mold spores in a home, but those who are sensitive can have allergic reactions



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that range from mild to life-threatening, some experts say. People with asthma, allergies, lung problems and immune-system dysfunction are usually more prone to problems, the experts say.

In September 2006, though, a justice in State Supreme Court in Manhattan — after the testimony of four experts and a review of more than 70 scientific articles and books — ruled that there was insufficient evidence to support the contention that mold or a damp indoor environment causes illness. The judge ruled in a case brought by a Manhattan family who contended that mold near windows and doors in their apartment had caused respiratory problems, a rash and fatigue. (The family has filed notice that it intends to appeal.)

After the judge's ruling, Dr. Joseph Q. Jarvis, an expert in public health who is affiliated with the University of Nevada School of Medicine in Reno, said he was surprised that the comprehensive review of the medical literature undertaken by the judge led her to conclude there was no consensus that mold can cause illness.

While it may not be possible to determine the level of exposure needed to cause a problem, Dr. Jarvis said, there is much documentation that exposure to indoor mold can cause respiratory allergies in some people.

Often, some experts say, the first sign of mold is an allergic reaction that occurs only inside the house and improves when the person leaves. Also, a musty odor generally indicates mold.

A home-test kit that costs less than \$50 can determine whether mold is present. It uses petri dishes to capture mold spores; after spending time in the home, the dish is sent to the manufacturer to test whether mold spores are there.

The kits, however, do not determine the source of the mold. For that, it is often necessary to have a professional mold inspection, which can cost several hundred dollars.

After the moldy area is found, it is usually necessary to open the area and remove and replace wallboard or insulation that has mold. And while it is often said that washing down a moldy surface with a bleach solution will remove the mold, doing so typically will not work on porous surfaces like wallboard and wood.

"You might be killing the spores that are there," said Edward Olmsted, an industrial hygienist in Garrison, N.Y., "but in most cases the mold will grow right back." Mr. Olmsted said that generally, the only way to get rid of mold is to eliminate the moisture causing it.

"Mold is like a factory that produces billions of spores," he said. "The factory runs only when moisture is available. Eliminate the moisture, and you shut down the factory."

NATIONAL ASSOC. OF HOME BUILDERS: <http://www.moldtips.com/>

NEW YORK TIMES: <http://www.nytimes.com/2003/01/26/realestate/residential/26HOME.html?ref=mold>



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C WASHINGTON STATE DEPT. OF HEALTH

Washington State Department of Health

What are molds? Molds are tiny microscopic organisms that digest organic matter and reproduce by releasing spores. Molds are a type of fungi and there are over 100,000 species. In nature, mold helps decompose or break-down leaves, wood and other plant debris. Molds become a problem when they go where they are not wanted and digest materials such as our homes.

What makes molds grow in my home? Mold enters your home as tiny spores. The spores need moisture to begin growing, digesting and destroying. Molds can grow on almost any surface, including; wood, ceiling tiles, wallpaper, paints, carpet, sheet rock, and insulation. The mold grows best when there is lots of moisture from a leaky roof, high humidity, or flood. There is no way to get rid of all molds and mold spores from your home. But you can control mold growth by keeping your home dry.

Can I be exposed to mold? When molds are disturbed, they release spores into the air. You can be exposed by breathing air containing these mold spores. You can also be exposed through touching moldy items, eating moldy food or accidental hand to mouth contact.

Do molds affect my health? Most molds do not harm healthy people. But people who have allergies or asthma may be more sensitive to molds. Sensitive people may experience skin rash, running nose, eye irritation, cough, nasal congestion, aggravation of asthma or difficulty breathing. People with an immune suppression or underlying lung disease, may be at increased risk for infections from molds.

A small number of molds produce toxins called **mycotoxins**. When people are exposed to high levels of mold mycotoxins they may suffer toxic effects, including fatigue, nausea, headaches, and irritation to the lungs and eyes. If you or your family members have health problems that you suspect are caused by exposure to mold, you should consult with your physician.

When is mold a problem?

You know you have mold when you smell the "musty" odor or see small black or white specks along your damp bathroom or basement walls. Some mold is hidden growing behind wall coverings or ceiling tiles. Even dry, dead mold can cause health problems, so always take precautions when you suspect mold.

Mold is often found in areas where water has damaged building materials and furniture from flooding or plumbing leaks. Mold can also be found growing along walls where warm moist air condenses on cooler wall surfaces, such as inside cold exterior walls, behind dressers, headboards, and in closets where articles are stored against walls. Mold often grows in rooms with both high water usage and humidity, such as kitchens, bathrooms, laundry rooms, and basements. If you notice mold or know of water damaged areas in your home, it is time to take action to control its growth.



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When should I sample for mold? You don't need to sample for mold because in most cases you can see or smell mold. Even a clean, dry house will have some mold spores, but not enough to cause health problems. If you smell mold it may be hidden behind wallpaper, in the walls or ceiling, or under the carpet. If you suspect you have hidden mold be very careful when you investigate, protect yourself from exposure in the same manner as you would for a clean-up. See the chart below.

Can I control mold growth in my home?

Yes you can. Dry out the house and fix any moisture problems in your home:

1. Stop water leaks, repair leaky roofs and plumbing. Keep water away from concrete slabs and basement walls.
2. Open windows and doors to increase air flow in your home, especially along the inside of exterior walls. Use a fan if there are no windows available.
3. Make sure that warm air flows into all areas of the home. Move large objects a few inches away from the inside of exterior walls to increase air circulation.
4. Install and use exhaust fans in bathrooms, kitchens, and laundry rooms.
5. Ventilate and insulate attic and crawl spaces. Use heavy plastic to cover earth floors in crawl spaces.
6. Clean and dry water damaged carpets, clothing, bedding, and upholstered furniture within 24 to 48 hours, or consider removing and replacing damaged furnishings.
7. Vacuum and clean your home regularly to remove mold spores.
8. Check around your windows for signs of condensation and water droplets. Wipe them up right away so mold can't start to grow.

What can I use to clean up mold?

Clean up mold and take care of the problem by following the advice above to keep your home dry and keep mold out. Act fast! Mold damages your home as it grows. Clean it up as soon as possible. If using a commercial mold removal product, remember to read and follow the label, which will help you get the most out of the product and keep you and your family safe.

For detailed clean-up advice: http://www.doh.wa.gov/ehp/ts/IAQ/got_mold.html



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D1 ALTERNATE SOURCE

CDC - Atlanta

<http://www.cdc.gov/mold/stachy.htm>

I heard about "toxic molds" that grow in homes and other buildings. Should I be concerned about a serious health risk to me and my family?

The term "toxic mold" is not accurate. While certain molds are toxigenic, meaning they can produce toxins (specifically **mycotoxins**), the molds themselves are not toxic, or poisonous. Hazards presented by molds that may produce mycotoxins should be considered the same as other common molds which can grow in your house. There is always a little mold everywhere - in the air and on many surfaces. There are very few reports that toxigenic molds found inside homes can cause unique or rare health conditions such as pulmonary hemorrhage or memory loss. These case reports are rare, and a causal link between the presence of the toxigenic mold and these conditions has not been proven.

In 2004 the Institute of Medicine (IOM) found there was sufficient evidence to link indoor exposure to mold with upper respiratory tract symptoms, cough, and wheeze in otherwise healthy people; with asthma symptoms in people with asthma; and with hypersensitivity pneumonitis in individuals susceptible to that immune-mediated condition. The IOM also found limited or suggestive evidence linking indoor mold exposure and respiratory illness in otherwise healthy children. In 2009, the World Health Organization issued additional guidance, the [WHO Guidelines for Indoor Air Quality: Dampness and Mould](#) [PDF, 2.52 MB].

A common-sense approach should be used for any mold contamination existing inside buildings and homes. The common health concerns from molds include hay fever-like allergic symptoms. Certain individuals with chronic respiratory disease (chronic obstructive pulmonary disorder, asthma) may experience difficulty breathing. Individuals with immune suppression may be at increased risk for infection from molds. If you or your family members have these conditions, a qualified medical clinician should be consulted for diagnosis and treatment. For the most part, one should take routine measures to prevent mold growth in the home.

How common is mold, including *Stachybotrys chartarum* (also known by its synonym *Stachybotrys atra*) in buildings?

Molds are very common in buildings and homes and will grow anywhere indoors where there is moisture. The most common indoor molds are *Cladosporium*, *Penicillium*, *Aspergillus*, and *Alternaria*. We do not have precise information about how often *Stachybotrys chartarum* is found in buildings and homes. While it is less common than other mold species, it is not rare.



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D2 ALTERNATE SOURCE

USEPA

<http://www.epa.gov/mold/index.html>

Things You Should Know About Mold

1. Potential health effects and symptoms associated with mold exposures include allergic reactions, asthma, and other respiratory complaints.
2. There is no practical way to eliminate all mold and mold spores in the indoor environment; the way to control indoor mold growth is to control moisture.
3. If mold is a problem in your home or school, you must clean up the mold and eliminate sources of moisture.
4. Fix the source of the water problem or leak to prevent mold growth.
5. Reduce indoor humidity (to 30-60%) to decrease mold growth by: venting bathrooms, dryers, and other moisture-generating sources to the outside; using air conditioners and de-humidifiers; increasing ventilation; and using exhaust fans whenever cooking, dishwashing, and cleaning.
6. Clean and dry any damp or wet building materials and furnishings within 24-48 hours to prevent mold growth.
7. Clean mold off hard surfaces with water and detergent, and dry completely. Absorbent materials such as ceiling tiles, that are moldy, may need to be replaced.
8. Prevent condensation: Reduce the potential for condensation on cold surfaces (i.e., windows, piping, exterior walls, roof, or floors) by adding insulation.
9. In areas where there is a perpetual moisture problem, do not install carpeting (i.e., by drinking fountains, by classroom sinks, or on concrete floors with leaks or frequent condensation).
10. Molds can be found almost anywhere; they can grow on virtually any substance, providing moisture is present. There are molds that can grow on wood, paper, carpet, and foods.



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D3 OTHER INDUSTRY SOURCE

OSHA (Occupational Safety and Health Administration)

<http://www.osha.gov/SLTC/molds/>

Molds are fungi that are found everywhere – both indoors and outdoors all year round. The terms fungi and mold are often used interchangeably, but mold is actually a type of fungi. Concern about indoor exposure to mold has increased along with public awareness that exposure to mold can cause a variety of adverse health effects. There are many thousands of species of mold and most if not all of the mold found indoors comes from outdoor sources. It seems likely to grow and become a problem only when there is water damage, high humidity, or dampness.

Molds produce and release millions of spores small enough to be air-, water-, or insect-borne. They can also produce toxic agents known as mycotoxins. Spores and mycotoxins can have negative effects on human health. For those people who are affected by mold exposures there can be a wide variation in how they react. People at greatest risk of health effects are individuals with allergies, asthma, sinusitis, or other respiratory conditions, as well as infants and children, elderly people, and pregnant women. In addition, individuals with a weakened immune system are at risk.

Mold is addressed in specific standards for the general industry, shipyard employment, and the construction industry.

Standards

This section highlights OSHA standards, Federal Registers (rules, proposed rules, and notices), standard interpretations (official letters of interpretation of the standards), and national consensus standards related to mold.

Note: Twenty-five states, Puerto Rico and the Virgin Islands have [OSHA-approved State Plans](#) and have adopted their own standards and enforcement policies. For the most part, these States adopt standards that are identical to Federal OSHA. However, some States have adopted different standards applicable to this topic or may have different enforcement policies.

General Industry ([29 CFR 1910](#))
[1910.141](#), Sanitation

Shipyard Employment ([29 CFR 1915](#))
[1915.97](#), Health and sanitation

Construction Industry ([29 CFR 1926](#))
[1926.51](#), Sanitation

Federal Registers



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[Assigned Protection Factors](#). Final Rules 71:50121-50192, (2006, August 24). Revises the existing Respiratory Protection Standard to add definitions and requirements for Assigned Protection Factors (APFs) and Maximum Use Concentrations (MUCs). The revisions also supersede the respirator selection provisions of existing substance-specific standards with these new APFs (except for the respirator selection provisions of the 1,3-Butadiene Standard).

[Indoor Air Quality](#). Notice 66:64946, (2001, December 17). OSHA withdrew its Indoor Air Quality proposal and terminated the rulemaking proceeding.

[Respiratory Protection](#). Final Rules 63:1152-1300, (1998, January 8). Justifies the use of respirators to prevent the inhalation of harmful airborne contaminants that are alive or were released from a living organism. Respirators protect against bacterial infections resulting from inhalation of bacteria and their products that cause a range of diseases.

[Indoor Air Quality](#). Proposed Rules 59:15968-16039, (1994, April 5). OSHA proposed to adopt standards that addressed indoor air quality in indoor work environments.

Search all available [Federal Registers](#).

Standard Interpretations

[Enforcement Policy for Respiratory Hazards Not Covered by OSHA Permissible Exposure Limits](#). (2003, January 24).

[Record retention requirements for indoor air quality documents and reports](#). (2002, August 1).

Search all available [standard interpretations](#).

National Consensus and Industry Standards

Note: These are NOT OSHA regulations. However, they do provide guidance from their originating organizations related to worker protection.

American National Standards Institute (ANSI)/American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)

62.1-2007, Ventilation for Acceptable Indoor Air Quality. Sets minimum ventilation rates and other requirements for commercial and institutional buildings.

Institute of Inspection, Cleaning and Restoration Certification (IICRC)

S500, Standard and Reference Guide for Professional Water Damage Restoration. Provides a specific set of practical standards for water damage restoration. It does not attempt to teach comprehensive water damage restoration procedures; rather it provides the foundation for basic principles of proper restoration practices.

S520, Standard and Reference Guide for Professional Mold Remediation. Establishes mold contamination definitions, descriptions and conditions (1, 2, 3), and general guidance, which, when properly applied, can assist remediators and others in determining criteria that trigger remediation activities or confirm remediation success.



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E BIOLOGICAL REFERENCE

<http://en.wikipedia.org/wiki/Mold> 9 Jan. 2012

Introduction: Although Wikipedia cannot necessarily be considered a properly vetted source, some sections often provide useful introductory material as well as references. Its sources must always be verified independently.

“Molds (moulds) are [fungi](#) that grow in the form of [multicellular](#) filaments called [hyphae](#).^[1] Molds are not considered to be [microbes](#) but microscopic fungi that grow as single cells called [yeasts](#). A connected network of these tubular branching hyphae has multiple, genetically identical [nuclei](#) and is considered a single organism, referred to as a [colony](#).

Molds do not form a specific [taxonomic](#) or [phylogenetic](#) grouping, but can be found in the divisions [Zygomycota](#), [Deuteromycota](#) and [Ascomycota](#). Some molds cause disease or [food spoilage](#), others play an important role in [biodegradation](#) or in the production of various foods, beverages, [antibiotics](#) and [enzymes](#).

Biology: There are thousands of known species of molds which include [opportunistic pathogens](#), [saprotrophs](#), aquatic species, and [thermophiles](#).^[2] Like all fungi, molds derive energy not through [photosynthesis](#) but from the [organic](#) matter in which they live. Typically, molds secrete hydrolytic [enzymes](#), mainly from the hyphal tips. These enzymes degrade complex [biopolymers](#) such as [starch](#), [cellulose](#) and [lignin](#) into simpler substances which can be absorbed by the hyphae. In this way, molds play a major role in causing [decomposition](#) of organic material, enabling the recycling of nutrients throughout [ecosystems](#). Many molds also secrete [mycotoxins](#) which, together with hydrolytic enzymes, inhibit the growth of competing [microorganisms](#).

Molds reproduce through small [spores](#),^[2] which may contain a single [nucleus](#) or be [multinucleate](#). Mold spores can be asexual (the products of [mitosis](#)) or sexual (the products of [meiosis](#)); many species can produce both types. Mold spores may remain airborne indefinitely, may cling to clothing or fur, or may be able to survive extremes of temperature and pressure.

Although molds grow on dead organic matter everywhere in nature, their presence is only visible to the unaided eye when mold [colonies](#) grow. A mold colony does not comprise discrete organisms, but an interconnected network of hyphae called a [mycelium](#). Nutrients and in some cases organelles may be transported throughout the mycelium. In artificial environments like buildings, humidity and temperature are often stable enough to foster the growth of mold colonies, commonly seen as a downy or furry coating growing on food or other surfaces.

Few molds can begin growing at 4 °C (39 °F), the temperature within a typical refrigerator, or less. When conditions do not enable growth, molds may remain alive in a dormant state depending on the species, within a large range of temperatures before they die. The many different mold species vary enormously in their tolerance to temperature and humidity extremes. Certain molds can survive harsh conditions such as the snow-covered soils of Antarctica, refrigeration, highly acidic solvents, anti-bacterial soap and even petroleum products such as jet fuel.

[Xerophilic](#) molds use the humidity in the air as their only water source; other molds need more moisture.”

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Common molds

[Acremonium](#)
[Aspergillus](#)
[Cladosporium](#)
[Fusarium](#)
[Mucor](#)
[Penicillium](#)
[Rhizopus](#)
[Stachybotrys](#)
[Trichoderma](#)
[Alternaria](#)

Food production

The Kōji (麹) molds are a group of [Aspergillus](#) species, notably [Aspergillus oryzae](#), and secondarily [A. sojae](#), that have been cultured in eastern Asia for many centuries. They are used to ferment a soybean and wheat mixture to make [soybean paste](#) and [soy sauce](#). Koji molds break down the [starch](#) in rice, barley, sweet potatoes, etc, a process called [saccharification](#), in the production of [sake](#), [shōchū](#) and other distilled spirits. Koji molds are also used in the preparation of [Katsuobushi](#).

[Red rice yeast](#) is a product of the mold [Monascus purpureus](#) grown on rice, and is common in Asian diets. The yeast contains several compounds collectively known as [monacolins](#), which are known to inhibit cholesterol synthesis.^[3] According to a study published in the journal Mayo Clinic Proceedings by Dr. David Becker, red rice yeast used as a dietary supplement, combined with fish oil and healthy lifestyle changes, may help reduce "bad" [cholesterol](#) as effectively as certain commercial [statin](#) drugs.^[4] Some [sausages](#), such as [salami](#), use starter cultures^[5] in their production, to improve flavour and reduce spoilage during curing. Other molds that have been used in food production include:

[Fusarium venenatum](#) – [quorn](#)
[Geotrichum candidum](#) – [cheese](#)
[Neurospora sitophila](#) – [oncom](#)
[Penicillium](#) spp. – [cheese](#)
[Rhizomucor michei](#) – [rennet](#) for making vegetarian and other cheese
[Rhizopus oligosporus](#) – [tempeh](#)
[Ustilago maydis](#) – filling in [tortilla](#)-based foods

Drug creation

[Alexander Fleming](#)'s famous discovery of the antibiotic [penicillin](#) involved the mold [Penicillium chrysogenum](#).

Several cholesterol-lowering drugs (such as [Lovastatin](#), from [Aspergillus terreus](#)) are derived from molds.

[Howard Florey](#) made Penicillin into a miracle drug which saved over 6 million lives.

The immunosuppressant drug [cyclosporine](#), used to suppress the rejection of transplanted organs, is derived from the mold [Tolypocladium inflatum](#).

Health effects

Molds are ubiquitous in nature, and mold spores are a common component of household and workplace dust. However, when mold spores are present in large quantities, they can present a health hazard to humans, potentially causing allergic reactions and respiratory problems.

**SUMMARY : 9 Jan 2012**

Some molds also produce mycotoxins that can pose serious health risks to humans and animals. Some studies claim that exposure to high levels of mycotoxins can lead to neurological problems and in some cases death. Prolonged exposure, e.g. daily workplace exposure, may be particularly harmful. Research on the health effects of mold has not been conclusive. The term "toxic mold" refers to molds that produce mycotoxins, such as [Stachybotrys chartarum](#), and not to all molds in general.^[6]

Mold in the home can usually be found in damp, dark or steam filled areas e.g. bathroom or kitchen, cluttered storage areas, recently flooded areas, basement areas, plumbing spaces, areas with poor ventilation and outdoors in humid environments. Symptoms caused by mold allergy are watery, itchy eyes, a chronic cough, headaches or migraines, difficulty breathing, rashes, tiredness, sinus problems, nasal blockage and frequent sneezing.

Growth in buildings and homes

Mold growth in buildings can lead to a variety of health problems. Various practices can be followed to mitigate mold issues in buildings, the most important of which is to reduce moisture levels that can facilitate mold growth.^[6] Removal of affected materials after the source of moisture has been reduced and/or eliminated may be necessary for remediation.

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