

Restorer's Corner



Fine-tune your disaster restoration skills via Q&A with Cleanfax® magazine's expert consultants.

By Richard Driscoll

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KEYWORD mold

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Q: *How long does it take mold to grow?*

A: Interesting question. As a technician who has performed many water damage mitigations and mold remediations, the answer to this question has always been elusive.

In my experience, when performing water damage mitigation work on some projects that had been wet for two or three days when we arrived, there was minimal indication of microbial growth.

If there were any indications, it was usually that "musty" odor, which we know are microbiological volatile organic compounds (MVOCs). We normally associate these odors with mold growth.

But, with no visible signs of mold growth, was mold contamination an issue? Or could the problem have been something other than mold?

On other jobs, upon arrival it was immediately apparent that the building had more issues than just being flooded. In these instances, we observed visible growth, assumed it was mold and determined that the site would have to be properly remediated.

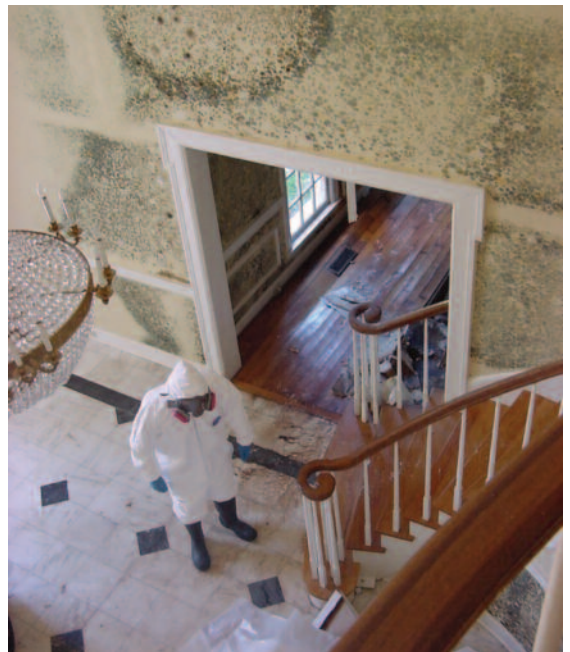
From the 2002 New York City Guidelines of Assessment and Remediation of Fungi in Indoor Environments, the inference was that mold would begin to grow in 24 to 48 hours. That statement was removed in the 2008 version. Additionally, the U.S. Environmental Protection Agency (EPA) in its publication, *Mold Remediation in Schools and Commercial Buildings*, references the time line of 24 to 48 hours to prevent mold growth and states that "even if materials are dried within 48 hours, mold growth may have occurred."

While both publications do not specifically state that mold begins to grow in 24 to 48 hours, this is the generally accepted time frame used by water damage responders to determine when mold begins to grow.

So we have the inference from the guidance documents that mold can begin to grow in 24 to 48 hours. We also have personal conflicting evidence: On some losses mold seems to grow, and on other losses mold does not seem to grow.

Observations from mold jobs

Being a mold remediator/educator, I have gathered similarly confusing, often conflicting input, from numerous jobs.



We observed that mold grew on some surfaces, but not others. We learned that the type of mold contamination found in homes is almost always what is called saprophytic mold. Saprophytic mold lives by decaying dead organic material, meaning the major ingredient we build with in North America — wood and wood-related products like paper on drywall.

Additionally, research has shown that different types of saprophytic molds (different species) prefer different types of organic material (food), and different temperatures. They also prefer different amounts of wetness, usually called moisture content, but is correctly referred to as water activity.

So does mold really begin to germinate and grow (the term used in the mold world is colonize) in 24 to 48 hours?

In doing major mold remediations, the usual process is to work in conjunction with an industrial hygienist (IH) or other mold professionals, such as a certified industrial hygienist (CIH) or indoor environmental professional (IEP).

Their job is to help identify what the contamination issues are, quantify the problem/issues and prepare a working plan, or protocol, for remediation.

In some situations, the IH will take samples from a suspect surface with a sterile swab. Sometimes the IH will collect air samples directly onto petri dishes containing an agar food source favorable to most molds.

The samples are sent to a qualified mycology laboratory. The material collected on a swab is "plated" onto a petri dish like that used for air samples.

The lab will "culture" what the IH has collected under ideal conditions of temperature and humidity in an incubator.

Payam Fallah, a PhD mycologist with the Indoor Environmental Hygiene Laboratory (IDEHL), reported in a personal communication with me that, in the lab, spores begin to germinate and form microscopic structures in few hours. The first tiny visible colonies of fast-growing mold types may arise in about three days (72 hours).

Colonies become large enough to visibly identify and are counted in about four days

(96 hours), before the petri dish is overgrown.

Some slow growing types of mold may not grow colonies fast enough within this time frame. A technical report will be prepared advising "what" species of mold grew and "how many" colonies of each were observed.

But... if it takes 72 hours for mold to germinate and grow on samples that are in a lab under ideal growth conditions, then how can mold germinate and grow in a normal building in 48 hours?

“We expected to see visible mold colonies. What we observed was *nothing*.”

A real-world test

When Restoration Sciences Academy instructors were writing our mold manual for the three-day and four-day mold courses, this same question became a major unanswered point. We decided to run an experiment.

During the late summer at our Pittsburgh facility, we decided to see if we could determine how long it takes for mold to colonize (grow).

We took a normal 4-foot by 8-foot by ½-inch piece of drywall, cut it in half, making two pieces with dimensions of 4-foot by 4-foot each. One piece was placed in a wallpaper wetting trough, and the other was left alone leaning against the wall (what would be called a "control" specimen).

Both pieces were placed in a two car garage. The trough with the drywall was

filled with water. Both pieces were allowed to just sit there. We filled the trough every day as was needed, and took pictures every two to three days.

The garage door on the facility was opened and closed, as the building was used for other work. As such, the garage area was exposed to normal outdoor air, including airborne mold spores.

Temperatures ranged from a low of 60 degrees Fahrenheit to a high of 85 degrees Fahrenheit. The humidity levels were not recorded, but were typical for the month of September in Pittsburgh.

This was just a "let's see what happens" experiment, not a scientific experiment; therefore, we did not accurately monitor or try to control the environment.

The surprising results

We expected that in two to three days we would see visible mold colonies (mold growth) on the drywall piece that was in the wet wallpaper trough. What we observed was *nothing*.

Thinking "maybe the air is dryer in Pittsburgh" we should see mold growth in four or five days. Still *nothing*. At eight to nine days, still nothing had developed.

It was a full 18 days until we could see visible mold growth!

And as expected, nothing grew on the non-wet "control" piece of drywall.

Everyone who is reading this and been involved with mold is probably saying something like "It may not be visible, but it was there."

Are you sure?

We have some very conflicting information:

- Personal experience at water jobs: Mold does not seem to grow on every job in 24 to 48 hours
- Personal experience on mold jobs: The labs take 48 to 72 hours to grow mold under ideal conditions
- Non-scientific experiment where mold was not visible until day 18
- The guidance documents imply 24 to 48 hours for mold growth.

The science

With this conflicting information, it is time for more research.

Working in conjunction with my fellow instructors, we did a detailed scientific/technical literature review and found a peer reviewed paper entitled "Controlled Study of Mold Growth and Cleaning Procedure on Treated and Untreated Wet Gypsum Wallboard in an Indoor Environment," by Michael Krause, CIH, with Veritox Inc.

Krause and his associates performed basically the same test that we did, except they did it with a number of untreated and treated wallboard sheets under very controlled scientific conditions.

According to Krause, it took at least a week to confirm that invisible microscopic growth structures (hyphae) had formed on wet untreated wallboard in a closed office.

Mold growth colonies were not visible on untreated drywall until three weeks into their eight week experiment.

The first mold types seen were *Acremonium*, *Penicillium* and *Cladosporium*. *Stachybotrys* was never seen. Visible mold did not grow on wallboard that was coated with a primer.

Additionally, a study done by Dr. Michael Berry, prepared for the Carpet and Rug Institute (CRI), showed that drywall and framing lumber, when exposed to a controlled environment with a temperature of 80 degrees Fahrenheit and a relative humidity of 80 percent, did not display visible mold until week five (35 days).

Everyone who is serious about moisture and mold should read both of these studies and the references cited. Please read them before sending me an e-mail, or a letter to the editor. You will find what Krause, Berry, and other papers have proven is very interesting, and goes totally against what most of us have accepted about the amount of time

it takes for mold to colonize.

In addition to Krause's peer reviewed paper, and Dr. Berry's study, additional peer-review research supports their conclusions that mold does not become visible in 24 to 48 hours.

A listing of a few of these papers is at the end of this article.

It is true that different saprophytic mold species colonize at different rates, and the time required for colonization is affected by different climates and different food sources. But Krause's test, which is really quite representative of a normal indoor environment, illustrates that it was 21 days before mold growth was visible.

If a reader of this article wants a reference location for virtually everything that deals with mold — different species, affects on human health, how mold attacks different materials, affects of different chemicals, etc. — then the just released New York State Toxic Mold Task Force report is for you. It is 150 pages in length, with 108 references. In my opinion, this report is probably the most complete document compilation of what is *really* known about mold.

What does this mean to us as water damage mitigators and/or mold remediators? We will continue this topic soon in *Cleanfax* magazine.

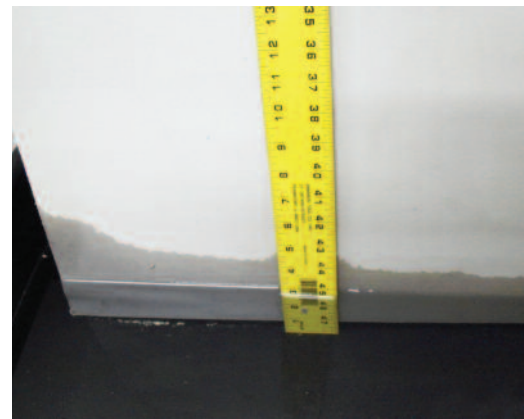
References:

- Krause M, Geer W, Swenson L, Fallah P, and Robbins C. 2006. Controlled study of mold growth and cleaning procedure on treated and untreated wet gypsum wallboard in an indoor environment. *J Occup Environ Hyg.* 3: 435-441.
- Berry MA, Foarde K, Mitchell C, Bolden K, Walton C, and Adams R. 2002. Final report of the hydrolab project 2001 flooring, humidity, and mold growth.
- Menetrez MY, Foarde KK, Webber TD, et al. 2008. Testing

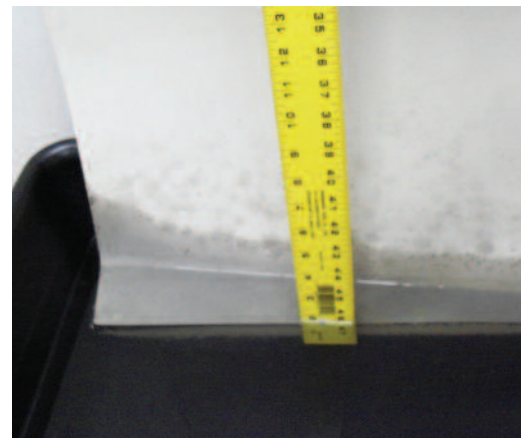
antimicrobial paint efficacy on gypsum wallboard contaminated with *Stachybotrys chartarum*. *Journal of Occupational and Environmental Hygiene.* *J Occup Environ Hyg.* 5: 63-66.

- Menetrez MY, Foarde KK, Webber TD. 2007. Testing antimicrobial cleaner efficacy on gypsum wallboard contaminated with *Stachybotrys chartarum*. *Env Sci Pollut Res.* 14(7): 523-528.
- Price DL, and Ahearn DG. 1999. Sanitation of wallboard colonized with *Stachybotrys chartarum*. *Curr Microbiol.* 39: 21-26.

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This is a piece of regular drywall in a wallpaper wetting trough at the start of the experiment; note the date of September 2.



This is the same piece of drywall in the same wallpaper wetting trough; note the date of September 21.