Identifying Mold on paintings
What is supporting mold
What you can do
When to call a conservator

- David Goist, Conservator of Paintings
- Fellow, American Institute for Conservation
- Member, National Heritage Responders
- Asheville, North Carolina
- gocon@aol.com
Fine art museums attempt to maintain a climate range of 65-75 degrees F. and 45-55 percent relative humidity. Maintaining this range is often required by institutions lending valuable artworks and artifacts which are sensitive to changes in temperature and relative humidity. Many collections and archives items are constructed of materials which are hygroscopic, that is, they attract moisture from the air. Research indicates that within 40-60 percent relative humidity many materials do not change sufficiently enough to cause detectable damage. Maintaining below 65 percent RH is important for preventing mold growth.

Elevated relative humidity at a surface – 70 percent or higher - can lead to problems with mold, corrosion, decay and other moisture related deterioration. When relative humidity reaches 100 percent, condensation can occur on surfaces leading to a whole host of additional problems. An elevated relative humidity in carpet and within fabrics can lead to dust mite infestation and mildew (mildew is mold growing on fabrics).
Cross-section diagram of complex construction often seen in altar paintings of the early Renaissance in Italy.
68 percent relative humidity for more than several days can provide the environment for mold spores to grow.
The surge of seawater that flooded much of Lower Manhattan during Hurricane Sandy inundated the basement of Westbeth Artists Housing, which was the first and largest federally subsidized artist’s colony in the country when it opened 42 years ago at the westernmost edge of the West Village. With five separate buildings sprawling across an entire city block overlooking the Hudson River, the community supported a 78,000-square-foot underground labyrinth that artists used as communal (and free) studio space. (November, 2012)
Chris Stavroudis, of the first Louisiana HEART at the Old Mint Museum, New Orleans.
Interior climate was 90°F and 65–70 % RH
Interior climate was 90°F and 65-70 % RH. Collections housed in archival boxes on clean shelves did not have mold growth even after three weeks.
Frequently handled surfaces such as hand railings did have abundant mold growth.
What is not mold... may be efflorescence or blanching...
Blanching of paint and varnish layers in easel paintings: …
By Anaïs Genty-Vincent and others (2015)

The blanching of easel paintings can affect the varnish layer and also the paint layer with a blurring effect. The understanding of the physicochemical and optical phenomena involved in the whitening process remains an important challenge for the painting conservation.

… the altered layers have an unexpected highly porous structure with a pore size ranging from ca. 40 nm to 2 μm. The formation mechanism of these pores should mostly be physical as the supplementary analyses do not reveal any noticeable molecular modification. Considering the tiny size of the pores, the alteration can be explained by the Rayleigh or Mie light scattering.
The Rocky Mount (NC) Children’s Museum was flooded by rains following Hurricane Floyd in September, 1999. Floyd dumped 15-inches of rain across several counties. The Tar River at Tarboro reached 40.9 feet, a record high. The previous record was at 34 feet in 1919. Flood stage is at 19 feet.
Hurricane Floyd rains caused flooding in Rocky Mount, NC, September 10, 1999
Emergency Response Plan (3/96)
Mold growing on Linoxin or oxidized linseed oil
As Hurricane Harvey roared through Houston last month, an unlikely victim was left behind: the monumental 1953 mural by John Biggers, titled *Contribution of Negro Women to American Life and Education.*

For more than 60 years, the massive work has stood in the Blue Triangle Community Center in Houston’s Third Ward. It was the first important mural the artist painted following his move to the area from New York.
Centre d'Art damage  Artist Maritou Chenet looks over what is left of the Centre d'Art museum in Port-au-Prince. The building was destroyed in the quake, and some artworks were crushed or exposed to the elements.
October 29, 2012, 8 p.m.: Sandy’s center comes ashore near Atlantic City, New Jersey. The storm is no longer considered a hurricane but is now classified as a post-tropical nor’eastern. But the storm’s unusual path from the southeast makes its storm surge much worse for New Jersey and New York. A cyclone’s strongest winds and highest storm surge are to the front and right of its circulation because the power of the storm’s strongest winds is combined with its forward motion. New York Harbor receives this part of Sandy’s impact. The surge — nearly 14 feet — is a new record for a storm surge in the harbor. The previous record of just over 10 feet was set in 1960 when Hurricane Donna passed just offshore. The surge tops the seawall at The Battery in Lower Manhattan and floods parts of the city’s subway system. The surge also floods the Hugh Carey Tunnel, which links Lower Manhattan and Brooklyn.

November 4, The Museum of Modern Art holds a consortium to advise artists affected by the hurricane. http://www.moma.org/visit/calendar/events/16783

AIC-CERT begins to field questions from artists on the hotline
Cultural Recovery Center, 21 33rd Street, Brooklyn, NY 11232, operated by the Foundation of the American Institute for Conservation with generous funding support from various groups.

(718) 757-2140
Cultural Recovery Center, 21 33rd Street, Brooklyn, NY after furnishing and stocking of donated supplies. FAIC got occupancy on December 10, 2012, and accepted the first artist’s work on December 13. The CRC was staffed through March 8, 2013.
The Cultural Recovery Center (CRC) in Brooklyn, NY was managed by FAIC from December 10, 2012 through March 8, 2013.
The National Heritage Responders (NHR) respond to the needs of cultural institutions during emergencies and disasters. For 24-hour assistance from trained volunteers, call (202) 661-8068.
Model #100155

7000-Watt Dual Fuel Generator

- 3 Year Limited Warranty
Nature PowerPak 1800-Watt Portable Solar Generator Starter Kit with 100-Watt Solar Panel for Off-grid, Tailgating, RV, Cabin, Emergency, Job site power
Smoke or dry-cleaning sponge

http://www.talasonline.com/Dry-Cleaning-Sponge-Dirt-Eraser

For use on non-friable paint films which have no active cupping or cleavage.

These incredibly effective dry cleaning sponges are suitable for the safe removable of particulate matter on dry surfaces such as paper, leather, walls, paintings, etc. They are incredibly effective on removing dirt, soot from fires and other surface deposits from porous and non-porous surfaces. Made of vulcanized rubber. Non-toxic. Leaves no residue. Always test before using. Also commonly referred to as a smoke sponge or soot sponge.
The following four slides contain quotes from emails that were part of discussions among painting conservators after Hurricane Harvey. The emails discussed some materials used by a few but generally not recommended by the majority. Their use was discouraged during the NCPC 2017 conference, but they were illustrated because such information would appear as the result of an Internet search.
The ingredients in Lysol Disinfectant Spray are alkyl dimethyl benzyl ammonium saccharinate, ethanol/SD alcohol 40 and carbon dioxide. This particular Lysol spray is manufactured by Reckitt Benckiser, Inc.

Lysol Disinfectant Spray is considered to be non-lethal, but can be hazardous to humans and domestic animals through eye irritation. If the eye should come in contact with the spray, then it should be flushed immediately and thoroughly with water for 15 minutes. If irritation remains, then a doctor should be contacted.

Different Lysol products contain different active ingredients. Examples of active ingredients used in Lysol products:
- Ethanol/SD Alcohol, 40 1-3%; fluid that acts as sanitizer
- Isopropyl alcohol, 1–2%; partly responsible for Lysol's strong odor; acts as sanitizing agent and removes odor
- p-Chloro-o-benzylphenol, 5–6%; antiseptic
- o-Phenylphenol, 0.1%; antiseptic; in use circa 1980's
- Potassium hydroxide, 3–4%
- Alkyl (50% C14, 40% C12, 10% C16) dimethylbenzyl ammonium saccharinate, 0.10%; microbiocide
- Alkyl (C12-C18) dimethylbenzylammonium chloride, 0.08%; antiseptic
- Alkyl (C12-C16) dimethylbenzylammonium chloride, 0.02%; antiseptic
- Lactic acid as an antiseptic.
- Hydrogen Peroxide
Thymol

“Old fashion Listerine... water, ethanol 0.001 thymol.”

“Thymol is listed as the active ingredient in many antiseptic and anti-fungal ointments for skin infections, toenail fungus, etc., so I don't imagine it to be a problem for use on mold. There are others, tea tree oil, camphor, menthol, etc. See https://en.m.wikipedia.org/wiki/Antiseptic

The reason Thymol got bad rap in the conservation field, was its affect of rendering some paint films sticky when applied in a vapor form in sealed Thymol cabinets, usually to disinfect artwork on paper.

See http://cameo.mfa.org/wiki/Thymol

In a weak alcohol solution I consider it to be safe. I frequently use it on secondary papers, backings and supports, which do not come into direct contact with the artwork, but which remain enclosed in the common airspace, where the residual Thymol continues to out-gas and provide a prophylactic against mold bloom.”
Orthophenyl phenol $\text{C}_{12}\text{H}_{10}\text{O}$

2-Phenylphenol is found in low concentrations in some household products such as spray disinfectants and aerosol or spray underarm deodorants. Eye contact can cause severe irritation and burns with possible eye damage. For some individuals, 2-phenylphenol can also irritate the skin.\[4\] It is one of the chemicals that the Hyperactive Children's Support Group recommends be eliminated from the diet of children. The sodium salt of orthophenyl phenol, sodium orthophenyl phenol, is a preservative,\[5\] used to treat the surface of citrus fruits to prolong shelf life.\[3\]

Orthophenyl phenol is also used as a fungicide in food packaging and may migrate into the contents.\[6\]

2-Phenylphenol (ortho-phenylphenol, OPP), and sodium o-phenylphenate, SOPP, were first evaluated by the 1962 JECFA for their use for the post-harvest treatment of fruits and vegetables to protect against microbial damage during storage and distribution in commerce.\[3\]
“Does anyone know whether the use of a UV-C "wand" is worthwhile for treating paintings with mold or should we consider these as potentially more harmful than beneficial? We are receiving paintings with mold, specifically acrylic paint, that are ay too sensitive to the 70% isopropanol/30% H2O solutions that we normally use on less sensitive oil paintings. Any published info would be particularly welcome. Also, has anyone had any experience, or know of the effectiveness of a product called Bacterart(e)?”

“I refer to this table when I consider using UV exposure. [http://www.americanairandwater.com/uv-facts/uv-dosage.htm](http://www.americanairandwater.com/uv-facts/uv-dosage.htm)

Verilux CleanWave Portable Sanitizing Travel Wand – UV-C Technology – Kills Germs and Bacteria
by Verilux
The following recipes are more generally accepted but must be used with informed knowledge and great caution. When in doubt, contact a conservator.

http://www.conservation-us.org/membership/find-a-conservator

Keep on file the hotline telephone number for the American Institute for Conservation National Heritage Responders 202.661.8068
http://www.conservation-us.org/emergencies/national-heritage-responders#.WgsD_k8XDFy
Chris Stavroudis solution published in WAAC Newsletter, January 2013:

(Thanks to Elise Rousseau and her post to the CIPP list, David Goist, Mary-Lou Florian, Hilary Kaplan, Jane Bassett, Rustin Levinson and Marc Williams for their thoughts and contributions.)

For surfaces that can be exposed to a small amount of bleach, eg., the reverse of paintings, stretchers, frames, etc. **Use at your own risk !!!!**

47 ml 100% isopropanol
23 ml 100% ethanol
  7 ml 3% hydrogen peroxide
23 ml distilled water

The same recipe can be made from materials available from any well stocked pharmacy as follows:

44 ml 91% isopropanol rubbing alcohol
30 ml 70% ethyl alcohol rubbing alcohol
  7 ml 3% hydrogen peroxide
19 ml distilled water
Sealing wood stretchers from Chris Stavroudis:

“My further recommendation is to apply dilute shellac to non-art, wooden surfaces. (I have used commercial bleached shellac solution (Zinsser) cut 1:6 with denatured alcohol.)

The additional application of alcohol will help kill any mold (and certainly will not activate it as would a water-based sealant). The solution will penetrate relatively deep into the wood (as opposed to water-based materials or low polarity polymers in solvent solution).”