Air Sampling and Analysis for Mold in Hills Building UMass

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Introduction

The Hills building complex has a known history of water intrusion. Remediation to correct current problems is underway and in some areas complete. There are reports of health impacts to building occupants. Upon request of Don Robinson, Environmental Health & Safety UMass, I performed a cursory building walkthrough of the Hills North, South, and connector buildings on Oct 5, 2011. Noticeable odor was present in the 1st floor hallway of Hills North and in room 107. Moisture meter readings indicate an area of dampness on the floor in room 107. Air samples were collected in these areas for mold analysis on October 7, 2011.

Methods

Three 5 minute air samples were collected for mold analysis using a BioPump Plus sampler that operated at a verified flow rate of 15 L/min (0.075 m^3 total volume) and the sample was collected in an Air-O-Cell cassette. One sample was taken outdoors for comparison with 2 indoor samples. Collection media in the cassettes were analyzed microscopically by me, a PAACB certified spore analyst, at 400X magnification. The whole trace was enumerated and counts were converted to concentration and expressed as the number of spores per meter cubed of air (spores/m^3).

Results

Outdoors	
Basidiospores	3,453
Cladosporium	840
Penicillium/Aspergillus-like	333
Ascospores	187
Smut	120
Rust	93.3
Cercospora	26.6
Alternaria	13.3
Mycenastrum	13.3
Unknown	213
Total	5,292.5 spores/m^3

Hills North 1st floor hallway outside room 115	
Basidiospores	973
Smut	587
Cladosporium	373
Penicillium/Aspergillus-like	173
Ascospores	120
Rust	40.0
Pithomyces	40.0
Curvularia	26.6
Epicoccum	26.6
Pestalotia-like	26.6
Ulocladium	13.3
Alternaria	13.3
Drechslera/Bipolaris	13.3
Paecilomyces	13.3
Unknown	240
Pollen	(40) not included in total
Algae	(13.3) not included in total
Total	2,679

Hills North Room 107	
Penicillium/Aspergillus-like	600
Basidiospores	280
Smut	80
Rust	40
Alternaria	26.6
Epicoccum	13.3
Pithomyces	13.3
Unknown	26.6
Pollen	(13.3) not included in total
Total	1,079.8

Interpretation

The hallway air sample had spores that were qualitatively similar to outdoor air but in lower concentrations than outdoor air which is expected if the indoor space is not contaminated. There was one notable exception. Smut spore concentrations were higher indoors than outdoors (and smut moved up in the rank order of taxon abundance). These spores are from fungi that are obligate plant pathogens that are commonly associated with plant material. They do not grow on building materials. It is suspected that the elevated concentrations of smut spores are associated with the plant material that is being brought into the building. The hallway sample was also notable for a moderately heavy amount of airborne debris. The likely source of the particles is the obviously dirty carpet in the hallway.

Room 107 had a profile of airborne spores that was similar to outdoor air, however *Penicillium/Aspergillus*-like spores were the most abundant spores in the space and were in higher concentration than outdoors. These fungi are common in indoor environments where there is moisture intrusion. They are able to grow on a wide variety of substrates including many building materials. The presence of elevated levels of this spore category (above outdoor concentrations and/or concentrations >500 spores/m^3 of *Penicillium/Aspergillus*) is an indication that there may be dampness and mold growth in the space and indicates that further investigation is warranted. The level of airborne *Penicillium/Aspergillus* spore concentrations is not very high and does not indicate a health issue for the majority of the population; however, individuals sensitive to mold could have allergic or asthmatic reactions at this level of exposure.

It is important to note that there are no established standards that deem a particular spore concentration unhealthy and likewise there are no acceptable threshold levels below which prevention of health effects is assured. This is true for particular spore types and for total mold exposure (the sum of the concentration of all taxa). Partly this is because individual sensitivity to mold varies greatly from individual to individual, and from fungal species to fungal species. It is also important to note that our exposure to fungal spores is typically much higher in outdoor air than in indoor air even in contaminated environments. Elevated concentrations of *Penicillium/Aspergillus,* for example above 500 spores/m^3, seem to be most commonly associated with moisture intrusion and health complaints of allergy and asthma.

Recommendations

Remove carpet in Room 107 and investigate source of moisture. Take corrective actions to prevent moisture intrusion. Steam clean carpets using only water (no detergent or deodorant chemicals) and ensure contractor performs water extraction adequately. Once carpets are completely dry, wipe surfaces with a microfiber cloth and HEPA vacuum the occupied space including shelves, furniture, and floor.