In their report of a worker with lung damage associated with microbial exposure, Trout et al. (1) emphasized the need for further research on markers of exposure to bioaerosols, particularly fungi that produce mycotoxins. The authors presented an interesting pilot serologic investigation for IgG and IgM antibodies to rotodin (a macrocyclic trichothecene mycotoxin produced by Stachybotrys chartarum) and found no elevation of antibodies in the index case, an individual with repeated exposure to a water-damaged building. The clinical evaluation of the index case did not reveal elevation of IgG or IgE responses to S. chartarum, although precipitating antibodies were reportedly positive “only to Thermoaclinomyces vulgaris.”

Although the environmental evaluation and subsequent discussion on bioaerosols focuses on fungi (particularly S. chartarum) and mycotoxins, Trout et al. (1) did not discuss the role that inhaled bacterial antigens may have played in this individual’s illness. This is perplexing, as inhalation exposure to T. vulgaris is listed as one of the most frequent causes of hypersensitivity pneumonitis by Cormier (2), who was cited by Trout et al. (1). Similar to fungi, actinomycetes can grow on building materials in wet and warm places, and spread their spores into the air (3).

The pulmonary and immunologic effects of repeated exposure to T. vulgaris have been studied in animal models (4), and the clinical relevance of elevated and repeated serologic testing of IgG and IgA for T. vulgaris has been described after human exposures in agricultural settings (5). In a more recent EHP Grand Rounds article describing a case of hypersensitivity pneumonitis from residential exposure, the presence of another clinically significant thermophilic bacteria (Saccharopolyspora rectivirgula) was documented in a water-damaged home, and precipitating antibodies to this organism were present in the affected individual (6).

Although I acknowledge the importance of reducing or preventing exposure to bioaerosols in the indoor environment as well as the need for reliable biomarkers of exposure, limiting the extent of the reported investigation and discussion in this case to fungi and mycotoxins seems unjustified. It would be helpful if Trout et al. (1) could further discuss the results of the serologic testing with respect to T. vulgaris and if the environmental assessment of bioaerosol exposure included bacterial antigens.

Correspondence
Daniel L. Sudak
Oregon State University
Corvallis, OR
E-mail: sudakind@ace.orst.edu

REFERENCES AND NOTES
1. Trout D, Bernstein J, Martinez K, Biagini R, Wallingford K. Bioaerosol lung damage in a worker with repeated exposure to fungi in a water-damaged building. Environ Health Perspect 109:641–644 (2001).
2. Cormier Y. Hypersensitivity pneumonitis. In: Environmental and Occupational Medicine (Rom E, ed). Philadelphia: Lipincott-Raven; 1998:457–465.
3. Gazecke SV, Reponen T A, Birgshopp SA, Willeke K. Analysis of airborne actinomycete spores with fluorogenic substrates. Appl Environ Microbiol 64(11):4410–4415 (1998).
4. Jägerroos HJ, Seppä AV, Mäntyjarvi RA. Pulmonary and immune responses to a Thermoaclinomyces vulgaris antigen respiratory sensitization in C57BL/6J mice. Exp Pathol 29(2):95–102 (1998).
5. Ojanen T, Terho ED, Tukainen H, Mäntyjarvi RA. Class-specific antibodies during follow up of patients with farmer’s lung. Eur Respir J 3(5):257–260 (1990).
6. Apostolakos MJ, Rossmore H, Beckett WS. Hypersensitivity pneumonitis from ordinary residential exposures. Environ Health Perspect 106:979–981 (2001).

Bioaerosol Lung Damage: Trout’s Response
In his letter referring to our recent paper in EHP (1), Sudak points out that hypersensitivity lung diseases have been shown to be associated with exposure to thermophilic actinomycetes such as Thermoaclinomyces vulgaris. Exposures to these organisms related to lung disease have been reported in both outdoor settings (when handling materials such as compost or decomposing organic matter—the classic example being farmer’s lung) and indoor settings (2). Regarding the indoor environment, reported exposures to thermophilic organisms that cause documented hypersensitivity lung disease have occurred in situations involving contamination of air-handling systems, primarily heating and/or humidification systems (3–7). Thermophilic fungi (thermophiles) grow optimally at temperatures between 35° and 50°C (95°–122°F) or hotter. In contrast, most fungi are considered mesophiles, growing optimally between 15° and 30°C (59°–86°F) (8).

Precipitating antibodies indicate exposure to a substance and may provide supporting evidence for a specific etiologic exposure; these tests do not independently prove or disprove a diagnosis of hypersensitivity lung disease (9). Although the presence of precipitating antibodies can provide justification for environmental evaluation of exposure to specific antigens (10), the results of precipitin testing must be interpreted with knowledge of potential occupational and/or environmental exposures experienced by the patient. One of the limitations of these antibody tests is that a single test that indicates the presence of precipitating antibodies does not provide any information concerning the source of the antigens to which the person was exposed.

The primary problem in the building of concern in our report around the time of the patient’s illness (and our evaluation) was large-scale water incursion allowing for massive fungal contamination of building materials in multiple areas of the building. These types of environmental conditions are not conditions in which thermophiles would be expected to grow well. As is commonly found in hotels, each room of the building in question had a dedicated unit ventilator to condition the occupied space. Inspection of selected unit ventilators in the building at the time of our evaluation revealed no obvious reservoirs of microbial growth. In addition, our evaluation, and the illness experienced by the patient in our report, took place during the cooling season when heating units would not routinely be in use.

Given the above and the activities of the patient likely leading to aerosolization of the fungal contamination, there is no reason to believe exposure to thermophilic organisms played a role in this patient’s building-related illness. It is unlikely that an environmental evaluation for thermophilic organisms in the areas that were grossly contaminated with fungi would have provided any useful information regarding the illness experienced by the patient discussed in our report. Additional discussion of the potential role of thermophilic organisms in the etiology of hypersensitivity lung diseases in general was beyond the scope of our paper.

Douglas B. Trout
National Institute for Occupational Safety and Health
Cincinnati, Ohio
E-mail: dtrout@cdc.gov

REFERENCES AND NOTES
1. Trout D, Bernstein J, Martinez K, Biagini R, Wallingford K. Bioaerosol lung damage in a worker with repeated exposure to fungi in a water-damaged building. Environ Health Perspect 109:641–644 (2001).
2. Stetzenbach LD. Introduction to aerobiology. In: Manual of Environmental Microbiology (Hurst CJ, Knudsen GR, McInerney MJ, Stetzenbach LD, Walter MV, eds). Washington, DC:ASM Press, 1997;819–628.
3. Banaszak EF, Barbiroli JJ, Fink JN. Hypersensitivity pneumonitis due to contamination of air conditioner. N Engl J Med 283:271–276 (1970).
4. Fink JN, Banaszak EF, Thiéde WH, Barbiroli JJ. Intestinal pneumo-nitis due to hypersensitivity to an organism contaminating a heating system. Ann Int Med 74:48–73 (1971).
5. Sweet LC, Anderson JA, Callies GC, Coates EO Jr. Hypersensitivity pneumonitis related to a home furnace humidifier. J Allergy Clin Immunol 48:171–178 (1971).
6. Tourville DR, Weiss WI, Wertiak PE, Leutermann GM. Hypersensitivity pneumonitis due to contamination of a home humidifier. J Allergy Clin Immunol 49:245–251 (1972).
7. Burge HA, Otten JA. Fungi. In: Bioaerosol Assessment
Confirmation of Uterotrophic Activity for 4-MBC in the Immature Rat

Schlumpf et al. (1,2) reported that the ultraviolet (UV) sunscreen component 3-(4-methylbenzylidene)camphor (4-MBC) is uterotropic when administered either in diet to immature Long-Evans rats or by whole body immersion of immature hairless hr/hr rats into an oil solution of 4-MBC. Subsequently, Bolt et al. (3) questioned the validity of those data and referred to two negative unpublished immature rat uterotrophic assays of 4-MBC (4,5).

When the discussion between Bolt et al. (3) and Schlumpf et al. (6) appeared, we had already studied the uterotropic activity of 4-MBC in immature rat uterotrophic assays using both oral gavage and subcutaneous injection as the route of administration. The report on these studies has been submitted for publication (7). Of particular relevance to the recent discussion (3,6), we found 4-MBC to be clearly positive in our standard immature rat uterotrophic assay (8). Activity was apparent in the oral study at 500 and 800 mg/kg/day and in the subcutaneous injection study at 500 and 1,000 mg/kg/day. In the oral gavage study (7), uterine weights were 22.0 ± 2.5 for controls and 32.5 ± 6.5 and 42.4 ± 6.0 for 500 and 800 mg/kg 4-MBC, respectively (mean ± SD; p < 0.01 by analysis of variance and analysis of covariance with terminal body weight).

John Ashby
Syngenta Central Toxicology Laboratory
Alderley Park, Cheshire, United Kingdom
E-mail: john.ashby@syngenta.com

REFERENCES AND NOTES
1. Schlumpf M, Cotton B, Conscienc M, Haller V, Steinmann B, Lichtensteiger W. “In vitro and in vivo estrogenicity of UV screens. Environ Health Perspect 109:239–244 (2001).
2. Schlumpf M, Berger L, Cotton B, Conscienc-Egli M, Durr S, Fleischmann I, Haller V, Maerkel K, Lichtensteiger W. Estrogen active UV screens. Seifen-Öle-Fette-Wachse 127:10–18 (2001).
3. Bolt HM, Guhe G, Degen GH. Comments on “In vitro and in vivo estrogenicity of UV screens” [Letter]. Environ Health Perspect 109:A358–359 (2001).
4. Comotta L, Busi R. Unpublished data.
5. Bachmann S, Hellwig J. Unpublished data.
6. Schlumpf M, Lichtensteiger W. “In vitro and in vivo estrogenicity of UV screens”: Response [Letter]. Environ Health Perspect 109:A359–360 (2001).
7. Tinwell H, Lefevre PA, Moffat GJ, Burns A, Odum J, Ashby J. Unpublished data.
8. Ashby J, Tinwell H. Uterotropic activity of bisphenol A in the immature rat. Environ Health Perspect 106:719–720 (1998).