

Episode 655 | February 25, 2022 | 12:00 PM EST J. David Miller, PhD The Life and Times of an IEQ Founding Father It's Hard to Run Away from Evidence

This week we welcomed Dr. David Miller for our first Founding Fathers of IEQ shows. Dr. Miller is a Distinguished Research Professor at Carleton University in Ottawa, Ontario Canada. He and others whom we spoke about have been instrumental in getting IEQ recognized as a public health issue. We discussed his career and how he and others were able to help ensure that Indoor Environmental Quality (IEQ) issues are recognized as a public health concerns. When it comes to affecting change Dr. Miller says "it's hard to run away from evidence".

Prof. J. David Miller Dr. Miller received his secondary education at the University of New Brunswick, before studying at the University of Portsmouth in England, where he was also a NATO Science Postdoctoral Fellow. His post-university career at Agriculture Canada, and became head of the Fusarium mycotoxin program. He became a Professor & NSERC Research Chair in fungal toxins and allergens at Carleton University in 2000. In 2020, he was appointed as a Distinguished Research Professor. From 1999-2008, he was a visiting scientist and science advisor at Health Canada in the air health effects division. Among other tasks, Dr. Miller helped to draft the guidelines for mold and dampness published by Health Canada. Over the past several decades, he has co-managed many large studies of housing and health including in First Nations Communities.

Dr. Miller has published >350 papers on fungi and fungal toxins and has co-written 10 books on the public health aspects of exposures to fungi, and has several patents. Miller has served on many national and international committees on mold and dampness in the built environment including on the American Academy of Allergy Asthma & Immunology committee that produced practice parameters for environmental allergens. He was chief editor of the American Industrial Hygiene Association "Green Book" (2008, 2020) and the second edition of the "Field Guide" (2005) that lay out guidelines for addressing mold and dampness in public buildings.

Miller is an elected member of the International Academy of Indoor Air Sciences. Among other awards, he received the AgExcellence Award from Agriculture Canada, the Toxicology Forum Scott Award for contributions to toxicology, the Applied Research Award from the Ottawa Life Sciences Council, an AIHA award for contributions to the field of industrial hygiene and the 2017 Award of Merit from the Ontario Maple Syrup Producers Association. In 2013, Miller was elected as a Fellow of the American Industrial Hygiene Association. In 2016, he received the prestigious NSERC Synergy Award for his research partnership with JD Irving, Limited. In 2021, he received the inaugural Philip R. Morey award from the ACGIH for contributions to bioaerosol guidance.

Nuggets mined from today's episode:

Carleton University is situated on unceded Algonquin territory beside the historic Rideau Canal, an official UNESCO World Heritage Site, Carleton University was founded by the community in 1942 to meet the needs of veterans returning from World War II.

Your academic path and how it led to your work in mycotoxins, mold, allergens, etc.? Dr. Miller's scientific interest is in how fungi compete with other fungi and organisms. Fungi make allergens, poisons and toxins with which they compete. While at AgCanada he studied grain toxins. He went to Portsmouth University in England to study biodegradation under a world authority, finding that biodegradation is more of a problem in the cool and moist climate of the "old world" than it was in North America. In England, he also learned about building engineering, water movement and wood decay.

While at Agriculture Canada working on mycotoxins, the issue of mold and health in buildings came up for the Canadian Government and he was voluntold to study the problem. He investigated 60 homes with urea formaldehyde insulation complaints. He began the investigation with no bias. He measured everything he could think of in the homes. It takes big analytical labs with research horsepower to do this type of research. While other researchers searched for the single cause, it was found that a combination of issues was responsible for the problems. High levels of formaldehyde were found in homes in Canada and New England but the homes also had mold and dampness and ventilation problems that had been overlooked.

Two studies one by Health Canada with 15,000 children and another from Harvard with 4,600 children found an association between mold and dampness and asthma and increased upper respiratory disease. People doubted the studies but Miller and policy makers felt it important to understand if the epidemiology was right or an artifact of the studies. A likely estimation was that 20% of homes in US and Canada have moisture problems. If the health outcome was correct, that would be very serious. Molds in outdoors caused allergies in 8% of population and people could not understand why the molds that grow indoors have such effects. No one doubts the importance of mold and dampness now.

In 1969-1970 dust mites were rare both in Canada and the US. Now dust mites are ubiquitous. When early research was published that dust mites were both allergens and caused asthma many doubted. It took 20 years to bring consensus that dust mites are the most important cause of asthma.

You said it's not about me it's about the journey. Who were some of the people that influenced you early in your career? And what did they say that got you interested in seeing if it was real?

Miller said that his work has involved hundreds of students, post docs and colleagues over the decades and considerable support from governments, the private sector and the academic granting system. This was critical.

When asked who he might identify as important in the journey, Miller said there is a long list. However, he mentioned a number of folks.

The late Phil Morey was key.

In Canada, colleagues at CMHC, Jim White, Don Fugler, Ken Ruest, as well as Mark Lawton from the private sector. Clinician/ epidemiologists', Dr. Bob Dales and Dr. Tom Kovesi, other colleagues at Health Canada and many students. The late Ken Dillon who led the development of the first edition AIHA Field Guide in 1996.

In the US, he singled out Laura Kolb at the EPA, the late Phil Morey, Terry Brenan and Dr. Jay Portnoy. In the AIHA community, the late Ken Dillon, editor of the first edition of the AIHA Field Guide (1996), H.K. Dillon, University of Alabama

We changed our buildings in the late 70s early 80s, this cemented your thought that IEQ was important. What changes were most problematic? A violent change has taken place in what we build and how we build them? Enormous amounts were spent on military housing producing steel led to slag which led to insulation then there was a consequence.

How do we manage what is tolerable? Mold is bad but how much is bad? These were the kinds of questions being asked. Let's talk about how you affected change over the years.

Occupants are the 2nd largest driver as to whether a building will fail. Buildings must be properly designed. Buildings must be operated properly. Problems in buildings must be promptly fixed. This emphasizes the importance of consumer education which has been a focus for Health Canada, CMHC and the US EPA.

What was learned from "Housing Interventions and Control of Asthma-Related Indoor Biologic Agents: A Review of the Evidence"? Subject matter experts systematically reviewed evidence on the effectiveness of housing interventions that affect health outcomes, primarily asthma, associated with exposure to moisture, mold, and allergens. Three of the 11 interventions reviewed had sufficient evidence for implementation: multifaceted, in-home, tailored interventions for reducing asthma morbidity; integrated pest management to reduce cockroach allergen; and combined elimination of moisture intrusion and leaks and removal of moldy items to reduce mold and respiratory symptoms. Four interventions needed more field evaluation, one needed formative research, and three either had no evidence of effectiveness or were ineffective. The three interventions with sufficient evidence all applied multiple, integrated strategies. This evidence review shows that selected interventions that improve housing conditions will reduce morbidity from asthma and respiratory allergies.

Household determinants of bio-contaminant exposures in Canadian homes?

Household characteristics including presence of carpeting, low floor cleaning frequency, older home age, presence of pets, and indoor relative humidity above 45% were positively associated with the presence of multiple indoor biocontaminants. High floor cleaning frequency and use of dehumidifiers were negatively associated with the presence of multiple indoor bio-contaminants. Mold odor was positively associated with older home age, past water damage, and visible mold growth.

Measure everything!

The open access <u>AAAAI Clinical Practice Parameters</u> on furry pets, rodents, cockroaches and house dust mites are really good as is the material on mold from the panel in 2016.

What other research stands out in your mind?

Krieger et al. reported that providing HEPA filter-equipped vacuum cleaner and education in using it on a regular basis reduced incidence of urgent care for asthmatic children. The dust loading reflects the particular cleaning practices and occupancy of the homes studied. Based on the values recovered after dust recovery had become asymptomatic using the high effort cleaning described, dust accumulation was calculated to be 1 mg/m2/day aver-aged over all homes and all surface Elliott et al. [8] found that associations of varying strengths were seen for wheezing and asthma for mass loading of dusts on floors, beds, and soft furniture.

An important segment where Dr. Miller discusses his thoughts on the current research of how fungi and dampness affect health starts <u>here</u>.

What is the future of IEQ?

New Solutions are Creating New Problems:

We have been reminded of the critical role of ventilation in reducing risk of virus transmission.

Green buildings can have more Legionella and non-TB mycobacteria

References:

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Z-Man Signing Off

Trivia:

Name what by the early 1990s had become the top complaint of occupants in non-industrial workplaces?

Answer: Mold

Answered by: Jack Springston, CIH, CSP, FAIHA, Atlas