

Identification of bacteria, mold and pollen in indoor environments with the WIBS coupled with a database of laboratory generated bioaerosols

D. Baumgardner¹, M. Hernandez² and A. Perring³, G. McMeeking¹

¹Droplet Measurement Technologies, Boulder, CO, USA

²Dept. of Civil, Environmental and Architectural Engineering, University of Colorado, Boulder, USA, 80309

³National Oceanic and Atmospheric Administration, Boulder Colorado, USA, 80305

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Presenting author email: Darrel.baumgardner@gmail.com

A Wideband Integrated Bioaerosol Spectrometer (WIBS) has been deployed in a laboratory to measure 15 types of bacteria, 29 types of mold and 13 types of pollen in a carefully controlled environment. The WIBS measures the equivalent optical diameter (EOD) and the fluorescence of individual particles in three spectra bands when the particle is excited at two wavelengths: 280 nm and 370 nm (Kaye et al., 2005, Huffman et al. 2010).

The EOD and the fluorescence intensity at one or more of the emitting wavelengths was used to cluster the bacteria, mold and pollen into three distinct groups as can be seen in Fig. 1. In addition, within each of these three groups there were sub-groups that could be identified and that allowed additional separation within a bioaerosol species.

The grouping and sub-grouping database, designated the University of Colorado Bioaerosol Data Base (UCBDB) that has been developed in the laboratory environment has been used to evaluate measurements that have been made in over 1000 rooms in residential and office buildings located in six states in the United States, over all the seasons of the year.

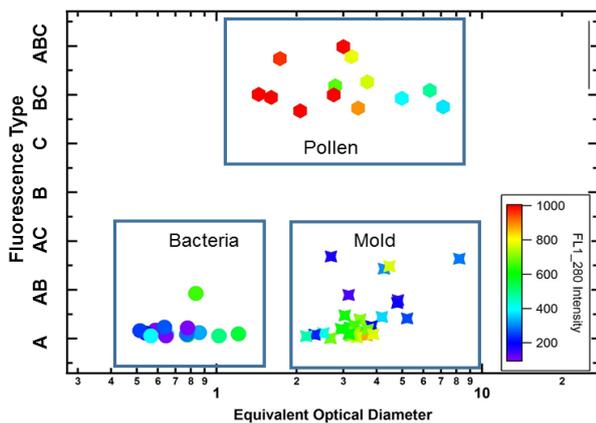


Figure 1. This chart illustrates how pollen, bacteria and mold cluster in separate groups based on the size, fluorescence intensity of fluorescence type.

The measurements from each of these rooms were compared with the UCBDB to evaluate the statistics for bacteria, mold and pollen at these locations. Figure 2 summarizes the results for mold using rank order percent to compare the relative amount of mold found in the different types of indoor environments. From this figure

we see that offices have the least amount of mold whereas areas close to entryways have the largest.

This data base of measurements in indoor environments continues to grow as measurements with a number of WIBS-like instruments are still in progress across the United States.

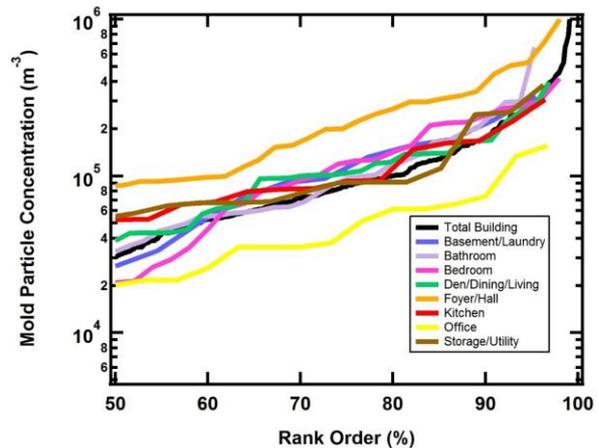


Figure 2. This chart shows that mold is detected most frequently in the area closest to the principal entry to a dwelling and least often in an office area.

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