2BA.7
Diversity and Abundance of Microorganisms in Individual Raindrops Isolated from Natural Precipitation Events.
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Precipitation samples collected at or near the surface of the earth are usually composite samples of many different raindrops. Little is known about the abiotic and biotic components found within individual raindrops. We used a liquid nitrogen bath to collect and isolate individual raindrops from a series of natural rain events. The raindrops fell into the bath, froze instantaneously, and were recovered in a sterile colander placed at the bottom of the bath. The mean droplet volume observed across all of the natural rain events was 7.6 µL (+/- 0.41). Twenty eight percent (40/143) of the natural raindrops isolated contained culturable microbes. Cell counts with an ImageStream® Mark II flow cytometer showed that a single raindrop (10 µl) contained over 1600 fluorescent objects, many of which were bioaerosols. Our ongoing work aims to elucidate the diversity and abundance of microorganisms in natural rain events. By isolating and studying individual raindrops, we hope to increase our understanding of the specific bioaerosols that may be drivers of precipitation processes.

2BA.8
Effect of Airborne Ion Emissions on Microbial Viability and Culturability.
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A personal electrostatic bioaerosol sampler (PEBS) has been recently developed at Rutgers University to assess exposure to airborne microorganisms. The key features of PEBS are the wire-to-wire charging section and a removable, superhydrophobic, dual-sided collection plate. This study evaluated the effect of airborne radioactive ions and ions produced during charging process on airborne microbial viability and culturability when sampled by PEBS. Airborne gram-positive bacteria Bacillus atrophaeus and fungal spores Penicillium chrysogenum were aerosolized and collected by PEBS under three conditions: 1) particles were charge-neutralized by a radioactive Po-210 source, and then those that retained any amount of charge were collected, 2) aerosolized particles were allowed to retain charge imparted by aerosolization and then collected , and 3) particles were neutralized, imparted positive ions and then collected. Total bacteria and fungi were counted by epifluorescence microscope and hemocytometer chamber. Viable bioaerosols were detected using bioluminescence of Adenosine Triphosphate and Thiazole Orange/Propidium Iodide cell viability assays. Culturable bacteria and fungi were determined by plating aliquots on nutrient agar and malt extract agar plates, respectively.

The bacteria collected by PEBS had a viability of 64% in the absence of any ions, while the viability decreased to 52% when the bacteria were charge-neutralized; the viability was 58% when bacteria were charge-neutralized and then charged by positive ions. The culturability was higher in the absence of ions but not statistically different to the other conditions ($p>0.05$). For fungi, the viability and culturability were not different in the three conditions ($p>0.05$).

These results suggest that the airborne ion emissions from PEBS do not affect fungal spores but might have a small effect on the viability of sensitive bacteria. Future tests will include extended sampling time and outdoor testing with Button Sampler and BioSampler at instrument standard flow rates.