

*EMBARGOED until Sept 22<sup>nd</sup>, 2015: 7 am EDT; 11 am GMT*

## **PRESS RELEASE**



# **New Research Finds that People Emit Their Own Personal Microbial Cloud**

We each give off millions of bacteria from our human microbiome to the air around us every day, and that cloud of bacteria can be traced back to an individual. New research focused on the personal microbial cloud -- the airborne microbes we emit into the air -- examined the microbial connection we have with the air around us. The findings demonstrate the extent to which humans possess a unique 'microbial cloud signature'.

To test the individualized nature of the personal microbial cloud, University of Oregon researchers sequenced microbes from the air surrounding 11 different people in a sanitized experimental chamber. The study found that most of the occupants sitting alone in the chamber could be identified within 4 hours just by the unique combinations of bacteria in the surrounding air. The findings appear in the September 22 issue of the open-access, peer-reviewed journal PeerJ.

The striking results were driven by several groups of bacteria that are ubiquitous on and in humans, such as *Streptococcus*, which is commonly found in the mouth, and *Propionibacterium* and *Corynebacterium*, both common skin residents. While these common human-associated microbes were detected in the air around all people in the study, the authors found that the different combinations of those bacteria were the key to distinguishing among individual people.

The analyses, utilizing analysis of suspended particulate matter and short-read 16S sequencing, focused on categorizing whole microbial communities rather than identifying pathogens. The findings emerged from two different studies and more than 14 million

sequences representing thousands of different types of bacteria found in the 312 samples from air and dust from the experimental chamber.

“We expected that we would be able to detect the human microbiome in the air around a person, but we were surprised to find that we could identify most of the occupants just by sampling their microbial cloud,” said lead author James F. Meadow, a postdoctoral researcher formerly from the Biology and the Built Environment Center at the University of Oregon.

“Our results confirm that an occupied space is microbially distinct from an unoccupied one, and demonstrate for the first time that individuals release their own personalized microbial cloud,” the authors concluded.

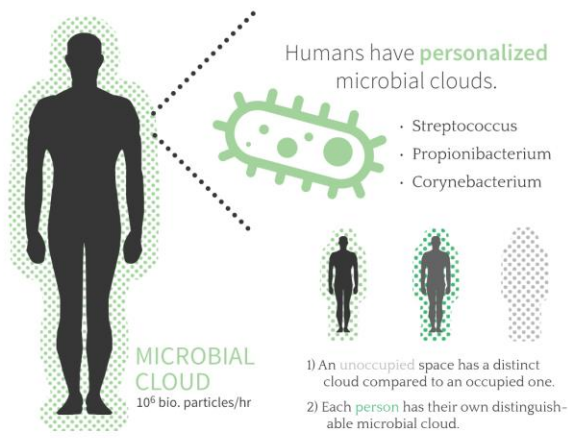
The research sheds light on the extent to which we release our human microbiome to our surrounding environment, and might help understand the mechanisms involved in the spread of infectious diseases in buildings. The results also suggest potential forensic applications, for example to identify or determine where a person has been, though it is unclear whether individual occupants can be detected in a crowd of other people.

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**Media:**

**Zip file** of high resolution images of the infographic (in PDF and JPEG format) and a PDF of this press release: [http://static.peerj.com/pressReleases/2015/1258\\_media.zip](http://static.peerj.com/pressReleases/2015/1258_media.zip)

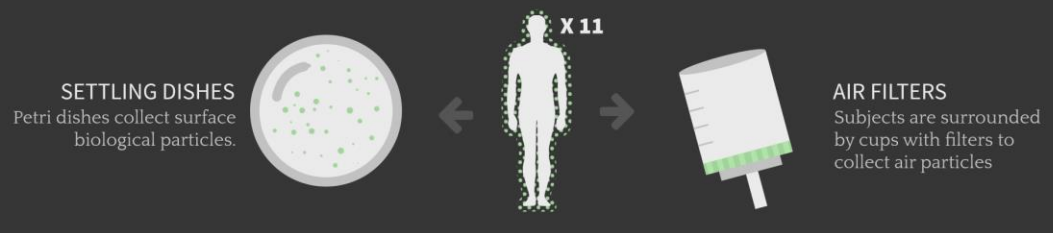
**Direct link to the Infographic:** <http://static.peerj.com/infographic/2015/personal-microbial-cloud/personal-microbial-cloud.pdf>



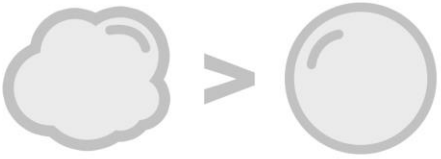
“ The findings emerged from two different studies and more than 14 million sequences representing thousands of different types of bacteria found in the 312 samples from air and dust. ”



**METHODS**



Airborne particles were more **identifiable** than settled ones.



**SUBJECT 1** Dolosigranulum  
**SUBJECT 2** Streptococcus  
**SUBJECT 3** Lactobacillus

**KNOWN BACTERIA**



Most of the 11 subjects had a **unique** microbial cloud.

**Title:** Infographic of the study.

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### Abstract (from the article):

Dispersal of microbes between humans and the built environment can occur through direct contact with surfaces or through airborne release; the latter mechanism remains poorly understood. Humans emit upwards of  $10^6$  biological particles per hour, and have long been known to transmit pathogens to other individuals and to indoor surfaces. However it has not previously been demonstrated that humans emit a detectable microbial cloud into surrounding indoor air, nor whether such clouds are sufficiently differentiated to allow the identification of individual occupants. We used high-throughput sequencing of 16S rRNA genes to characterize the airborne bacterial contribution of a single person sitting in a sanitized custom experimental climate chamber. We compared that to air sampled in an adjacent, identical, unoccupied chamber, as well as to supply and exhaust air sources. Additionally, we assessed microbial communities in settled particles surrounding each occupant, to investigate the potential long-term fate of airborne microbial emissions. Most occupants could be clearly detected by their airborne bacterial emissions, as well as their contribution to settled particles, within 1.5–4 h. Bacterial clouds from the occupants were statistically distinct, allowing the identification of some individual occupants. Our results confirm that an occupied space is microbially distinct from an unoccupied one, and demonstrate for the first time that individuals release their own personalized microbial cloud.