Effects of Air Quality on Outdoor Aerial Microbial Diversity in Urban Ecosystems

Ashley Sango[1,2], Naupaka Zimmerman[1]

[1]University of San Francisco, [2]ajsango@dons.usfca.edu

Introduction

The novel coronavirus 2019 (COVID-19) pandemic is a stark reminder of the importance of ensuring that every one of us maintains the highest quality of health. One of the approaches through which we can promote population-wide health is by increasing human contact with nature. This is based on the **Biodiversity hypothesis**, which states that living in natural environments is beneficial for the human immune system and microbiome (Haahtela2019). **Urbanization** results in biodiversity loss (Faeth et al. 2001). However, **Urban Green Spaces** are important sources of diverse environmental microbes, thereby reversing the effects (Mhuireach et al. 2019). Unfortunately, the low **air quality** in urban cities is threatening the gains.

Research Questions

1. Assess the current practices in vegetation analysis of urban green spaces and the technologies for tracking air quality in urban ecosystems.
2. Carry out a series of experimental procedures to find how land cover in urban green spaces influences outdoor aerial microbial diversity under different levels of air quality.

Study Site

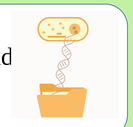
I will sample air from places located in areas of contrasting air quality in San Francisco. This is a coastal city with a Mediterranean climate; warm and dry summers, wet and cold winters. San Francisco is an urban city with a population on over 883 000 people (U.S Census Bureau, 2018). The major source of air pollution in the city is from car emissions (BAAQMD, 2018). San Francisco has green spaces of multiple forms including parks, green roofs, street trees, among others.

Methods

Literature Review

Sample Collection and Processing

DNA Sequencing and Analysis



Expected Results

1. Show how aerial microbial diversity is different between areas of high and low air quality.
2. For places with low air quality, I expect to observe lower microbial diversity and abundance than that seen in places with higher air quality.
3. For each collection site, I expect to observe quantifiable overlap between microbes on the leaves and those from the air I sample.

Implications

We can convert allergen-rich environments into human-microbiome-enriching ecosystems everyone can enjoy, when we know more about how different types of land cover influence the microbial composition of outdoor air. This approach may help reduce the pressure on hospital resources and prevent sick-days which can negatively impact people's earning potential and the economy

References

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Naupaka Zimmerman
USFCA, College of Arts & Sciences, Biology Dept