

How does the difference in air quality between Central Park and Prospect Park affect lichen biodiversity?

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INTRODUCTION

Lichens are complex life forms arising from the symbiotic relationship between fungi and algae. Since they receive nutrients from air and rainwater, lichen absorb particulate matter. Consequently, they can be used as bioindicators to determine pollution levels. There has been extensive research on the diversity of lichen species in Canada, Europe, Long Island, and western New York, but not in NYC. The increase in air pollution and population density over time is bound to have an adverse impact on the climate, and our study provides more insight into understanding NYC lichen biodiversity.

METHODS

Our group collected data from lichen submissions on iNaturalist. We used submissions from both Prospect Park and Central Park to analyze the total number of lichen species as well as the air quality index (AQI) for each park. We completed the t-Test and Shannon Index statistical analyses.

RESULTS

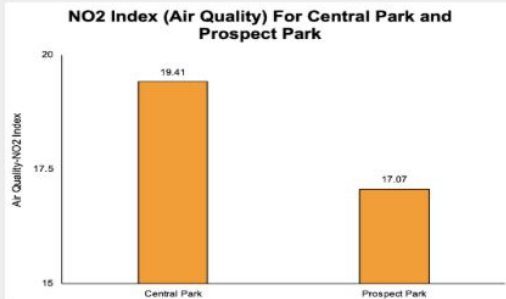
Central Park had a greater number of lichen species ($M = 4$, $SD = 1$) than Prospect Park ($M = 2$, $SD = 1$), $t(6) = 2.9$, $p = 0.026$. Central Park also had worse air quality than Prospect Park yet more biodiversity. Additionally, all but 1 lichen species in this study were pollution-tolerant.

DISCUSSION

Our results were different from what we had expected and it is possible that since Central Park has experienced lower air quality, pollution-tolerant species have survived and reproduced more effectively. Furthermore, a confounding variable that likely factored into our results was the number of iNaturalist observers who recorded observations of lichen. Since Central Park attracts more visitors than Prospect Park, more people are expected to be using iNaturalist resulting in a broader observation of species. Relying on iNaturalist, it was difficult to control for this in our study. Additionally, Central Park and Prospect Park vary greatly in size which would likely affect the total number of lichen species observed in each park.

FUTURE RESEARCH

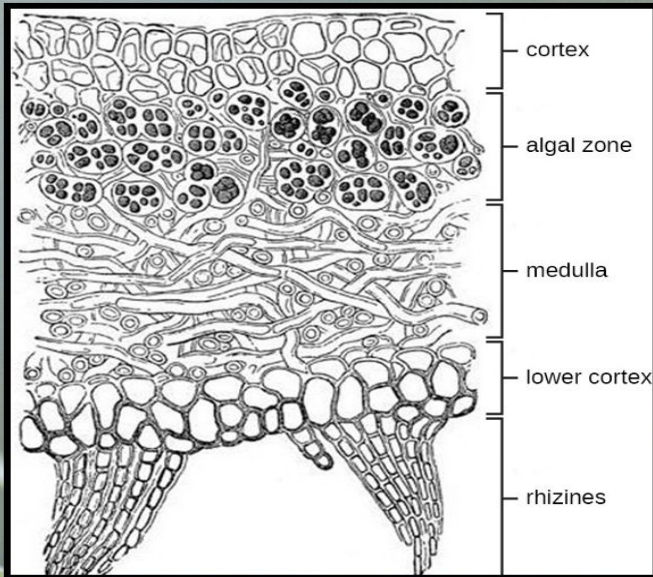
Future research would entail an in-depth analysis of the various lichen species in Central Park and Prospect Park and environmental factors besides air quality that would affect the number of species. There may be several other unknown ecological conditions that impact lichen biodiversity. Hosting a Bioblitz specifically for lichen in both parks would likely yield a much more accurate number of unique lichen species.



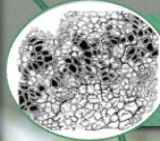
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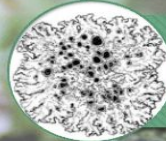
Lichen Morphology and Types



Lichen Morphology



Crustose: Form as a crust and firmly adhere to the substrate as they do not possess a lower cortex. Usually appear in bright, vibrant colors.



Foliose: Form as flattened, leaf-like lobes which are loosely attached to the surface and have distinguishable top and bottom sides.



Fruticose: Form as up-right, three-dimensional structures, usually with round branches, in stringy, spindly, shrubby, or cup-like shapes.

