

The Effects of Water Fountain Filter Status on Microbial Diversity

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Introduction

- Access to safe drinking water remains a challenge for many populations worldwide and tremendous efforts have been made by various organizations to increase its accessibility.
- For tap water, filtration and purification systems have been employed and are continually evolving to enhance the safety of drinking water.
- **Hypothesis:** It is hypothesized that the water fountains at Carroll College with red filter status will contain higher microbial diversity compared to the water fountains with green filter status, assuming that expired filters are less efficient.

Methodology

- **Sample Locations:** A green filter status sample was collected from the Nursing floor of Simperman. The red filter status samples were collected from the following sites: All Saints' Chapel, Corette Library, PE Center, and 3rd floor Simperman. Helena wastewater was utilized as a control sample.
- **Water Filtering:** Each sample contained 2 liters of water from each fountain. A 0.22 μm filter paper and pad were used in vacuum filtration. The filter paper was frozen and cut in half to generate duplicate samples.
- **DNA Sequencing:** DNA was extracted and the 16S rRNA gene was amplified by PCR. Samples were then placed on a MinION Nanopore sequencer machine.

Results

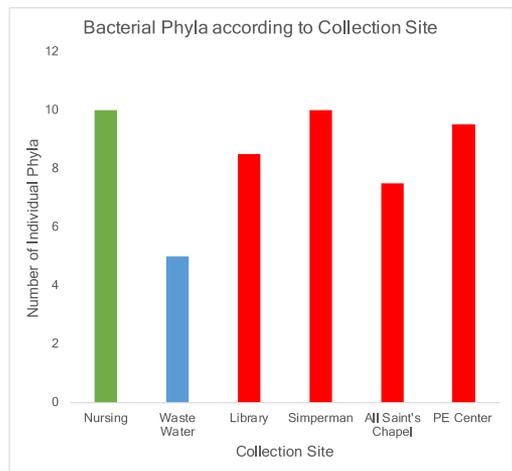


Figure 1. Average bacterial phyla identified in each collection site (includes only phyla representing > 0.1% of the entire bacterial population).

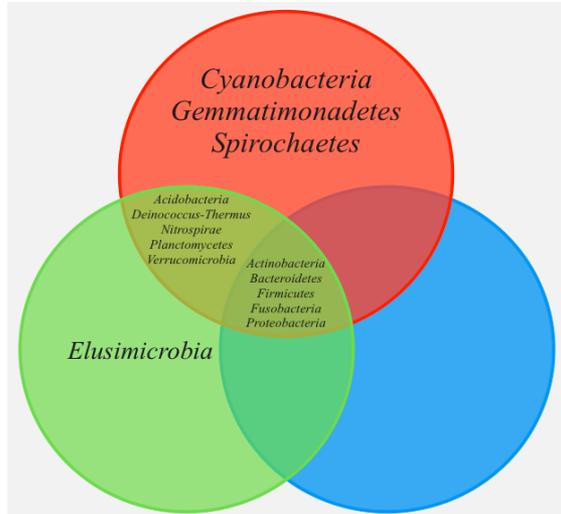


Figure 2. Unique and shared phyla between filter status and control (all red filter status collection sites have been grouped).

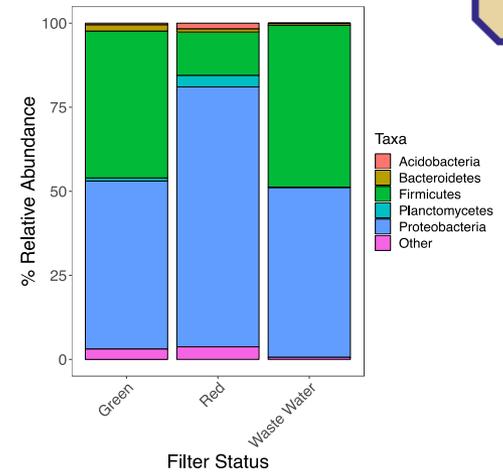


Figure 3. Percent relative abundance of bacterial phyla according to filter status (all red filter status collection sites have been grouped).

Conclusions

- Data suggests wastewater (control) is the least diverse habitat for bacterial phyla.
- Groupwise comparisons show *Proteobacteria* and *Firmicutes* dominate the microbiome regardless of collection site.
- There is no evidence to suggest a correlation between filter status and microbial diversity, nor evidence that suggests filters limit diversity.
- Future research should include additional green status filter collection sites. A much larger sample size of campuses nationwide would likely benefit the purpose of this study.

References

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Acknowledgments

A tremendous thank you to Dr. Beck for all the guidance and support along the way.