

Screening for Antibiotic Resistance in Environmental Samples

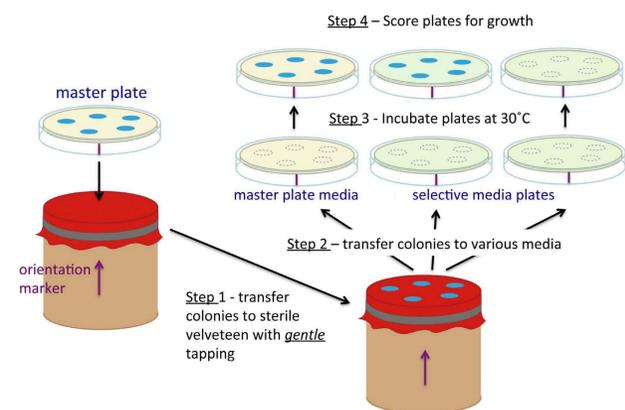
Payton Hlatky-Walters and Michelle M. Valkanas

INTRODUCTION

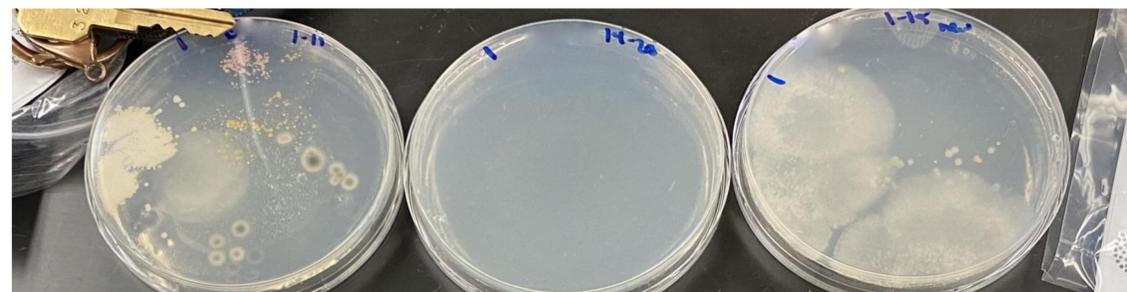
Antibiotic resistance has become a major issues in freshwater enviroments. Due to the limited testing that is done in these enviroments, it is important to test these different antibiotics on bacteria and attempt to prevent further spreading of bacteria and its resistance to antibiotics. . My hypothesis for my experiment is that more acidic enviroments will have more reistance due to the specialized mechanisms that the bacteria must undergo to survive the conditions.

MATERIALS AND METHODS

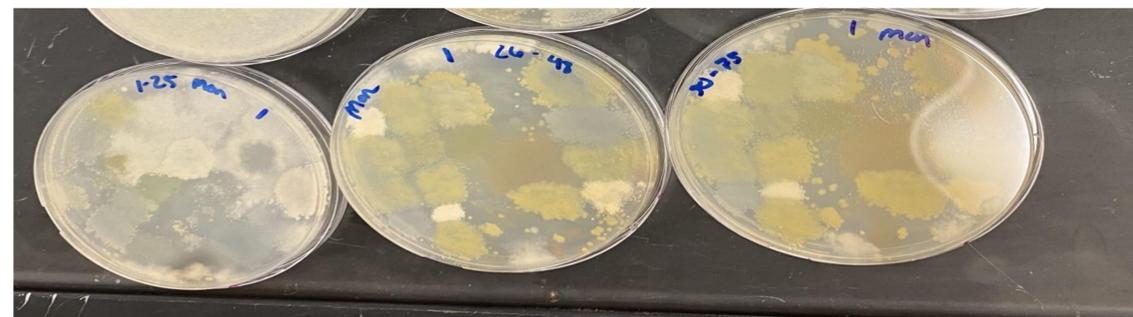
A sampling pool was used and sampled water from three different enviroments: The Boyce Park, Monongahela River, and Cheat Lake. The samples were then put on a master plate and various isolates were grown under growing conditions using R2A media. Using 5 different antibiotics, Streptomycin, Erythromycin, Ampicillin, Tetracycline, and Oxacillin, media was made using various concentrations of each according to previous research methods. A diverse group of isolates were taken from each environmental sample to be screened with the antibiotics using the replica plating method. After the original isolates grown on antibiotic media were taken, the concentration of Ampicillin and Streptomycin were doubled to see if any growth would continue in higher concentrated conditions.



sample of doubled concentrations of streptomycin for Boyce Park



sample of doubled concentrations of streptomycin for Cheat Lake



sample of doubled concentrations of streptomycin for Monongahela River

	Ampicillin 100 mg/ml	Oxacillin 100mg/ml	Streptomycin 50mg/ml	Tetracycline 10 mg/ml	Erythromycin 75mg/ml	Streptomycin 100mg/ml	Ampicillin 200 mg/ml
Boyce Park	30.23%	41.86%	44.19%	65.12%	66.91%	55.81%	48.36%
Cheat Lake	16.92%	26.15%	23.07%	22.85%	32.86%	12.86%	9.67%
Monongahela River	52.86%	37.14%	22.86%	62.05%	72.08%	61.28%	51.25%

RESULTS

- After the various methods were used during the original antibiotics screening, it was found that most isolates from The Cheat Lake were able to grow at base concentrations at a minimal level. Monongahela and the Boyce Park samples exhibited extreme growth in all 5 antibiotics. After doubling the concentrations of Ampicillin and Streptomycin, growth declined in Cheat Lake to almost nothing, but the Monongahela and Boyce was able to still exhibit the extreme growth although it was exposed to a much greater concentration.

CONCLUSION

The results confirmed the hypothesis that the acidic environment (Boyce Park) was more resistant to the antibiotics. The results also show that although the Monongahela was not considered a contaminated and an acidic environment, it still showed significant growth. These results suggest the Monongahela is a contaminated environment possibly due to multiple factors such as the Ashland Oil spill and a leakage that contained manganese, iron, and aluminum that leaked into the river in 2017.

REFERENCES

- *Pouring LB agar plates*. Addgene. (n.d.). Retrieved November 8, 2021, from <https://www.addgene.org/protocols/pouring-lb-agar-plates/>.
- Haran, K. P., Godden, S. M., Boxrud, D., Jawahir, S., Bender, J. B., & Sreevatsan, S. (2011). Prevalence and characterization of *Staphylococcus aureus*, including methicillin-resistant *Staphylococcus aureus*, isolated from bulk tank milk from Minnesota Dairy Farms. *Journal of Clinical Microbiology*, 50(3), 688–695. <https://doi.org/10.1128/jcm.05214-11>
- H, G. (n.d.). Replica Plating: Principle and Procedure | Molecular Biology.