



Expanding the Potential for Bacteriophage Therapy: Isolation of Phages against ESKAPE Pathogens

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Bacteriophages are viruses that selectively infect bacteria and propagate to overtake the host species. They are also being developed as a treatment for otherwise drug-resistant infections. Though bacteriophage therapy has not been FDA approved; it has been used in cases of compassionate care. Because of the success in these cases, bacteriophage is offering a promising alternative to antibiotics in the fight against antibiotic resistance. One issue in mainstream bacteriophage use is their selectivity. Phages infect a specific bacterial species or a particular strain within the species. Therefore, multiple phages may be required in a ‘phage cocktail’ to ensure there is a phage that infects a target bacterial strain. The goal of our bacteriophage study was to gather data about where phages are heavily populated and to refine protocols to ensure optimal bacteriophage collection. Bacteriophage that attacks different bacterial hosts tends to be found in locations that commonly accumulate that specific host bacteria. A secondary goal is to isolate as many phages as possible against bacterial species known as the ESKAPE pathogens. The ESKAPE pathogens are *Staphylococcus aureus*, *Enterobacter aerogenes*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*. These are clinically relevant because their antibiotic resistance poses a threat to public health due to their ability to cause severe infections. We have successfully isolated bacteriophage for *Pseudomonas aeruginosa*, *Klebsiella*, and *Enterobacter* and we are actively exploring different environments for phages that will infect *S. aureus*.



Isolation Methods

- Utilized a direct isolation protocol whereby bacteriophage are filtered directly from their environmental sample.
- Utilized ESKAPE pathogens, *Staphylococcus aureus*, *Enterobacter aerogenes*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* as host species for bacteriophage.
- Allowed 5-10 minute attachment period for bacteriophage to host bacteria
- Plated bacteriophage with top agar

Purification Methods

Isolated and Purified Bacteriophage

Conclusions

- Shoes have been found to be a fruitful source of Bacteriophage, regardless of strains.
- From isolation, it was also noted that ant hills are a good source of *S. aureus*, hypothesized because it is such a high population community.
- In our samples, there has been success isolating and purifying *S. aureus*, *K. pneumoniae*, *P. aeruginosa*

Future Directions

- Establish titer counts for all current bacteriophage
- Propagating more phage from additional locations
- Purifying the new phage
- Handing over new phage to Memsel

References

- Memsel
- SEA-PHAGES. (n.d.). SEA-PHAGES: Phage discovery and genomics. <https://seaphages.org/>
- <https://www.biorender.com/>

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