Bacteriophage Isolation for *Elizabethkingia meningoseptica*

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**Abstract**

*Elizabethkingia Meningoseptica* is an disease that is found mostly in immunocompromised patients and neonates, and it is responsible for the death of many people that contract the bacteria. Since *E. meningoseptica* is such a rare disease, there is no known cure. The goal of the lab was to find a bacteriophage in the environment to destroy the *E. meningoseptica* bacteria. Environmental samples were collected and plated in order to isolate the bacterium and phage that were previously thought to be ubiquitous. No bacteriophage was found for the bacteria, and it was concluded that the phage is not found in this part of the world.

**Introduction**

Background:
- *Elizabethkingia meningoseptica* is an antibiotic resistant bacteria that causes meningitis.
- It has primarily been found in neonatal patients, and patients in long term care.
- A bacteriophage is a virus that parasitizes bacteria.
  - Currently, no bacteriophages have been isolated that affect *Elizabethkingia meningoseptica*.

Research Goal:
- We attempted to isolate bacteriophages that infect *Elizabethkingia meningoseptica* from various environmental samples.
  - Environmental samples used: water from Theta pond, compost heap, and sewage water.

**Methods and Materials:**
- We first obtained environmental samples to test for the presence of phages.
- The samples were filtered using a .8 microliter filter, and then a .45 microliter filter.
- We then prepared bacteria plates for *Elizabethkingia meningoseptica* using Nutrient Base Agar.
  - The plates were prepared with 3 micro liters soft agar, 1 ml of the environmental samples, 30 micro liters *Elizabethkingia meningoseptica*, and 100 micro liters CaCl2
  - The plates were incubated and observed.

**Results:**

![Figure 1: Bacteria plates with Theta pond environmental samples. No evidence of clearing.](image1)

![Figure 2: Bacteria plates with the compost environmental sample. No clearing evidence.](image2)

![Figure 3: Bacteria plate with the first trial of .45 microliters filtered sewage water. Circles indicate clearing.](image3)

![Figure 4: Bacteria plates with unfiltered, .8 filtered, and .45 filtered sewage samples.](image4)

![Figure 5: Up close of second trial of .45 microliter filtered sewage water. No evidence of clearing.](image5)

![Figure 6: All of the bacteria plates for the second trial of .45 filtered sewage water. No clearing evident.](image6)

**Conclusion**

- The Theta pond, compost, and second sewage samples showed no evidence of clearing.
- While the first sewage sample showed clearing, the serial dilution showed no plaques.
  - The lack of plaques indicate no phages were present.
  - The clearing could be due to a microbe smaller than .45 microliters that is not a phage, but still affects *Elizabethkingia meningoseptica*.
  - This is possibly a small microbe secreted form another bacteria that was able to pass through the .45 microliter filter.

**Discussion**

- It is possible that we did not find any phages in our environmental samples because *Elizabethkingia meningoseptica* is not found naturally in Oklahoma.
- Since this species has been isolated more in third world countries, perhaps similar methodology could be replicated in such places where the species has been isolated.
- This bacterium is not ubiquitously located in this area; therefore no phage would be found also.

**Resources:**
- Weaver, K; Jones, R; Albright, R; Thomas, Y; Zanbrano, C; Costello, M; Havel, S; Price, J; Gerber, S. 2010. Acute Emergence of *Elizabethkingia meningoseptica* Infection Among Mechanically Ventilated Patients in a Long – Term Acute Care Facility. Infection Control and Hospital Epidemiology. 31(1).
- Lin, Y; Chiu, C; Chan, Y; Lin, M; Yu, K; Wang, F, and Liu, C. 2009. Clinical and Microbiological Analysis of *Elizabethkingia meningoseptica* Bacteremia in Adult Patients in Taiwan. Scandinavian Journal For Infectious Diseases. 41(9): 628-634.