

## Introduction

Antibiotic resistance is an issue facing the medical field due to the over prescription and overuse of antibiotics. 2.8 million people are infected every year by a strain of antibiotic resistant bacteria resulting in 35,000 deaths in the US alone [1]. Bacteriophage therapy could be the answer to treating these infections. For a phage to be effective in lysing bacteria, it must be able to attach and inject its DNA into the bacterial cell. Calcium plays a key role in allowing the adsorption of the phage to the bacteria [2]. It causes a conformational change in channel proteins in the bacterial host's cell wall. This makes a point of entry for the phage to insert its spike and inject its viral DNA [4].

## Methods

Following the protocol outlined by SEA-PHAGES [3], a direct isolation was performed from a soil sample of a *Dracaena fragrans* houseplant. The samples were plated on *Arthrobacter globiformis* and PYCa media. Next, the grown plaques were picked and named 'ORB'. Two other soil samples were picked as well from *Haworthiopsis attenuata*, named 'Cax21' and a compost pile, named 'RP'. Calcium concentrations of 0 mM, 0.45 mM, 2.25 mM and the recommended amount of 4.5 mM were made for the host culture, plates, and top agar. The three phages were plated onto the different concentrations of calcium and were incubated for 24 hours at 30 degrees Celsius.

Figure 1



Figure 2

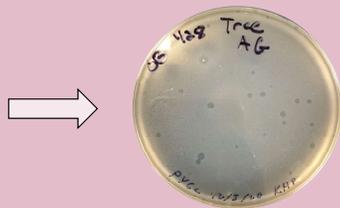


Figure 1 houseplant *Dracaena fragrans*. Figure 2 ORB phage from the direct isolation from soil sample of *Dracaena fragrans*.

## Results

### 0 mM of Calcium



Figure 3 ORB, Cax21, and RP phage samples grown on PY media with 0 mM of calcium.

### 0.45 mM of Calcium



Figure 4 ORB, Cax21, and RP phage samples grown on PY media with 0.45 mM of calcium.

### 2.25 mM of Calcium



Figure 5 ORB, Cax21, and RP phage samples grown on PY media with 2.25 mM of calcium.

### 4.5 mM of Calcium



Figure 6 ORB, Cax21, and RP phage samples grown on PY media with 4.5 mM of calcium which is the recommended amount of calcium by SEA-PHAGES [3].

### Number of Plaques vs Concentration of Calcium

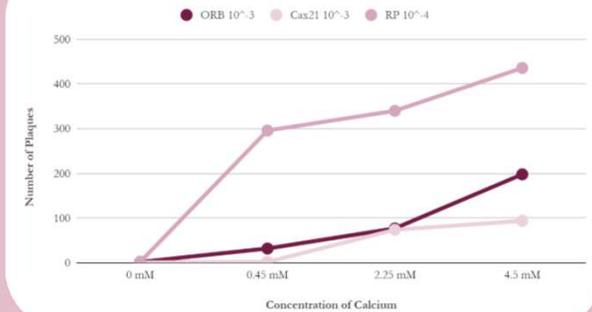


Figure 7 concentration of calcium vs the number of plaques for each of the 3 phage samples.

## Conclusion

It appeared calcium concentration had a positive effect on the number of plaques for the phages ORB and RP. This supports literature already established that 5 mM of calcium in the media increases phage adsorption and produces a higher titer [2]. Both phages showed an increase in number of plaques as the concentration of calcium increased. Cax21 had anomalies in the results and further testing would be required to test if that is due to the concentration of calcium or experimental error. Each phage has its own individual requirement of calcium and that must be met regarding phage therapy to produce the best outcome of treatment. The next step in this experiment would be to set up further trials of each of the phages to confirm these results and possibly set up different calcium variations.

## Acknowledgements

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## Works Cited

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