

Perceived stress levels and bacteriophage presence on the campus of Coastal Carolina University

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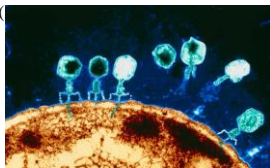
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Research Questions:

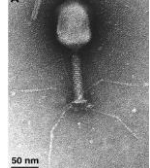
1. Does the presence of bacteriophage on students and faculty at Coastal Carolina University change throughout the year?
2. Can a correlation between the perceived stress level of the participant and bacteriophage presence be determined?

Introduction:

Approximately 2.8 million people each year are diagnosed with an antibiotic resistant bacterial infection, and more than 35,000 of those diagnosed die. In the 1920s, there was a surge in use of antibiotics to treat all bacterial infections. However, in 1947, penicillin resistance was observed, and it was found that bacteria was rapidly evolving to evade antibiotics. Since this discovery scientists have been trying to discover innovative ways to treat antibiotic resistant bacterial infections, such as bacteriophage. Bacteriophage are naturally occurring viruses that are non-pathogenic to humans, whose hosts are bacteria. The isolation and characterization of bacteriophage will one day allow for the natural sourcing of bacteriophage, which can be used to fight antibiotic resistant bacterial infections like Methicillin Resistant *Staphylococcus Aureus*





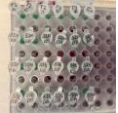
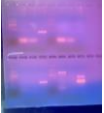


E.coli cell attacked by bacteriophage.



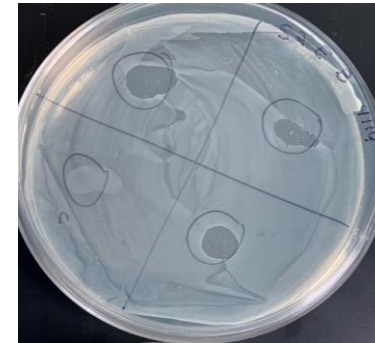
Electron micrograph of bacteriophage

Methods:

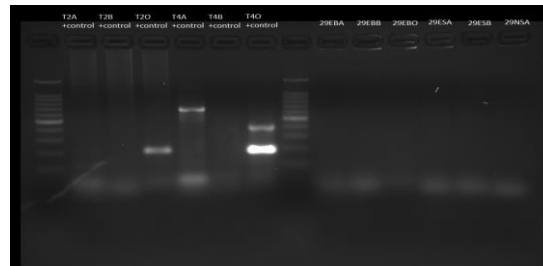
1. Sample Collection 
2. Sample Filtration 
3. Sample Amplification 
4. Microbial Testing 
5. PCR 
6. Gel Electrophoresis 

Results:

2020-21 Data	
Plaque Assays	0/52 Staph phage
	1/52 Coliphage
PCR	0/33
	0/44
Perceived increase in stress due to COVID-19	5.73



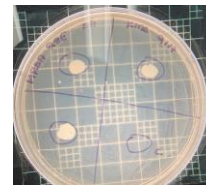
Positive Plaque Assay from 2020-21



Gel with controls positive for T2 and T4 phage. Samples are negative.



Negative plaque Assay from 2019-20



Plaque Assay from 2020-21

Summary of Data from 2014-2017 Collections

Year	Coliphage	Staph Phage	PCR
2014	12/30	7/30	Not Done
2015	13/55	21/55	7/55 Orf (Coliphage)
			18/31 77-like (Staph)
2016	17/35	17/35	0/17 Orf (Coliphage)
			3/17 77-like (Staph)
2017	31/60	40/60	0/60 Orf (Coliphage)
			11/31 Siphoviridae (Coliphage)
			11/31 Myoviridae (Coliphage)
			18/40 77-like (Staph)

Stress Survey

1. How much stress do you feel overall this week?
2. How much stress do you feel due to online classes this week?
3. How much stress do you feel due to F2F classes this week?
4. How much stress do you feel due to your social life this week?
5. How much stress do you feel due to changes in everyday life of COVID on campus, i.e. wearing a mask, 6 ft apart, changes in exits/entrances, etc?
6. Do you feel your stress level has increased due to COVID changes? (1 not at all and 10 increased a lot)
7. Please let us know if you have had or will have a quiz or test this week, next week, or last week.
9. Have you felt any physical symptoms of stress in the last week:



Conclusions:

1. There has been a drastic decrease in the presence of bacteriophage on students and faculty, as none of the samples collected contained *Staphylococcus aureus* bacteriophage. 2018 collection data found 44.18% Staph phage in the samples.
2. A dramatic decrease in coliphage presence has been observed. 1/52 samples contained Coliphage (1.92%), which is vastly different from the 2018 collection data which found 39.72% of their samples contained Coliphage.
3. The radical absence in the abundance of bacteriophage between past collections and 2020-21 collections could be due to increased stress levels, hand washing and sanitizing, or mask wearing.
4. There has been an increased in contamination within amplified samples. Since the samples are collected in areas where masks are worn, this indicates a possible change within the human microbiome of the face.