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### Bacteriophages: Paving the Road for the Future of Medicine

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*Ouachita Baptist University*

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The background of the slide is a repeating pattern of stylized bacteriophages. Each phage is depicted with a purple, hexagonal head, a red tail, and several thin, black legs. The pattern is arranged in a grid-like fashion across the entire slide.

# Bacteriophages: Paving the Road for the Future of Medicine

Joseph Weyman Luke Brinkerhoff  
Ouachita Baptist University

# Antibiotics? Effective Indefinitely?



## History

Alexander Fleming, in 1928, had created the first antibiotic, Penicillin. It was a world renowned invention that has saved many lives. Hundreds of other antibiotics have been created since then.

## Future

Scientists predict that, by the year 2050, antibiotic resistance will become a global catastrophe, wiping out millions of lives, especially in lower developed countries.

## Resistance

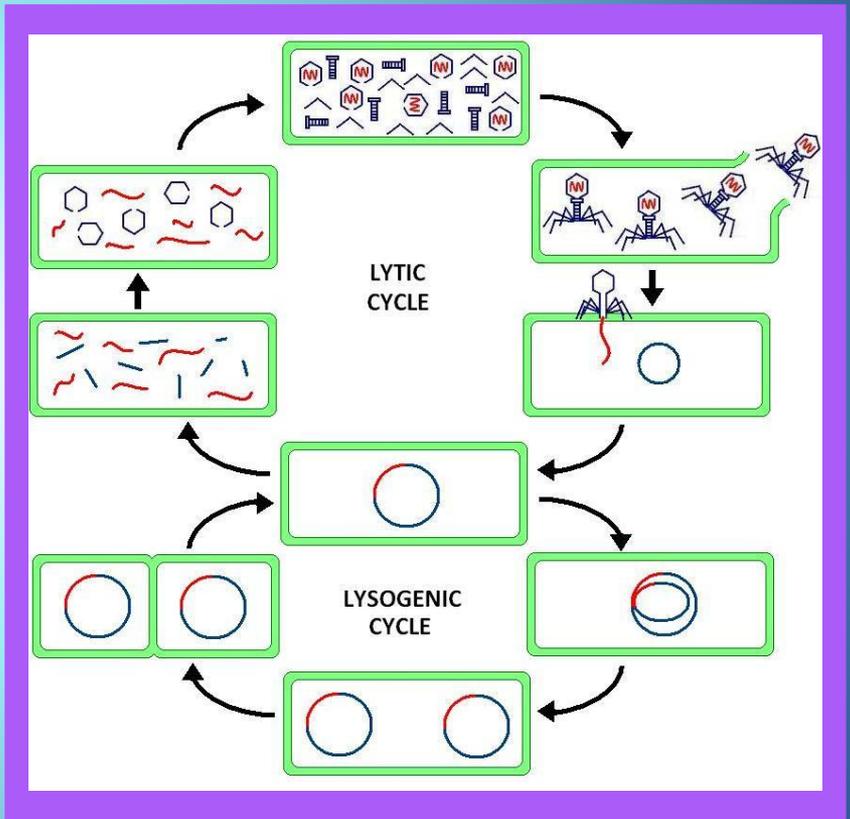
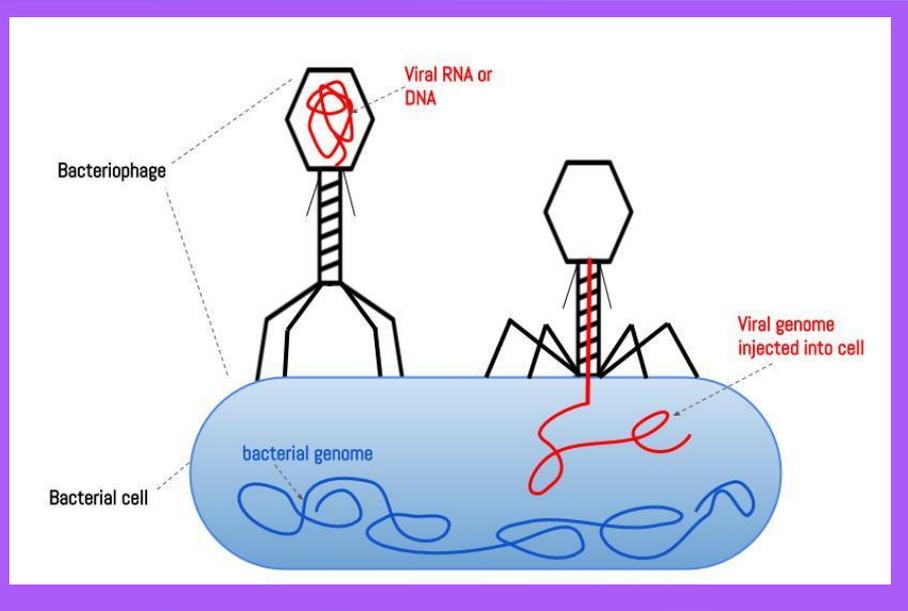
Like other creatures in nature, bacteria, replicate and create more generations, each one having more favorable characteristics for their environment. Antibiotic resistant bacteria are able to live and reproduce offspring that are also resistant to everyday antibiotics. This leaves antibiotics to become ineffective in treatments.

## Solution?

Thankfully, science has provided a possible solution to combat antibiotic resistance...



# Bacteriophage Infection Infographics





# Phage Therapy!



Treatment alternative to antibiotics.



Used topically, orally, and intravenously such as antibiotics.



First popularized in France in the 1920's, but later overshadowed by the introduction of antibiotics.



Used mostly in eastern European countries such as Russia, Poland, Georgia.



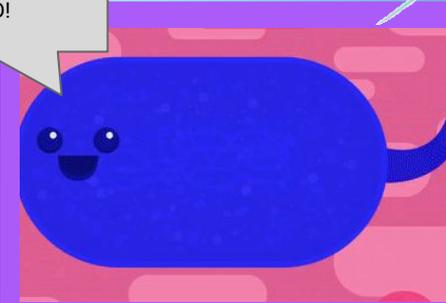
For now, FDA only allows use in "life-or-death" instances.



Rising popularity and research could provide ethics towards FDA decision.



Nothing can kill me!  
I'm resistant... OH NO!  
BACTERIOPHAGES!  
WHAT A WORLD!  
WHAT A WORLD!



# Personal Research: INTRODUCTION



Two phages: BisKit and SketchMex phages acting on *Gordonia terrae* bacteria.



Test virulence and growth curves.



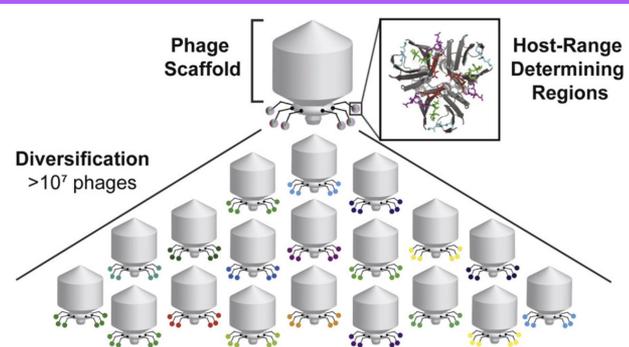
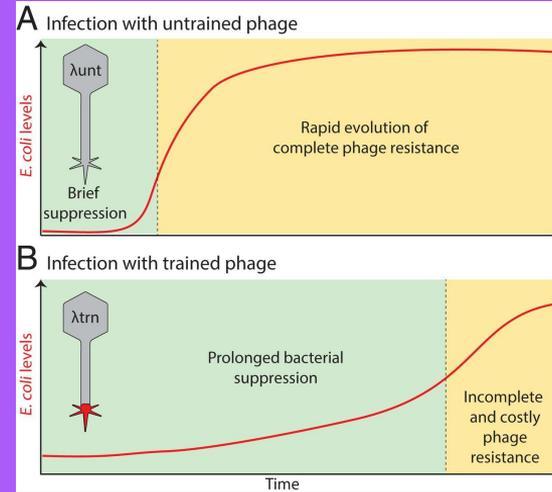
Concentrations! Phage/Host reactions expected to occur in a 1:1 ratio, meaning one phage infects one bacterial host cell.



Temperament vs. Lytic Phages:  
Which is better for research?  
Which is better for therapy?



Benefits of phage research?



# Personal Research: STEP 1



Obtain phage lysates and titers!



Phage lysates are collected for stock in experimentation. Titters are used to quantify pfu concentration as well as phage infectability.



Full Plate Titer 3-5 Results Comparison

Titer	Plate	6 Day Count	6 Day Titer (pfu/mL)
3 (10-4-21)	BK (1E-6)	28	2.80E+09
4 (10-18-21)	BK (1E-6)	156	1.56E+10
5 (10-20-21)	BK (1E-6)	132	1.32E+10
3 (10-4-21)	SM (1E-6)	96	9.60E+09
4 (10-18-21)	SM (1E-6)	180	1.80E+10
5 (10-20-21)	SM (1E-6)	172	1.72E+10

Conclusion: Based on the results obtained, it is best for the project to choose the  $10^{-6}$  concentration for both phages moving forward.

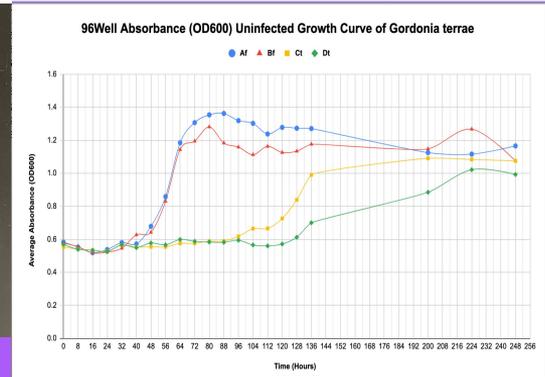
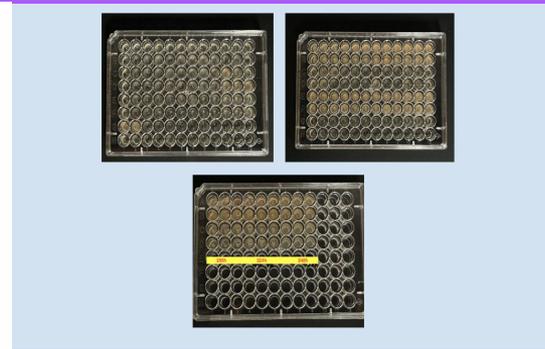
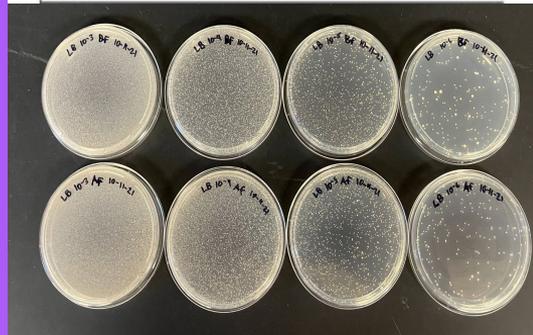
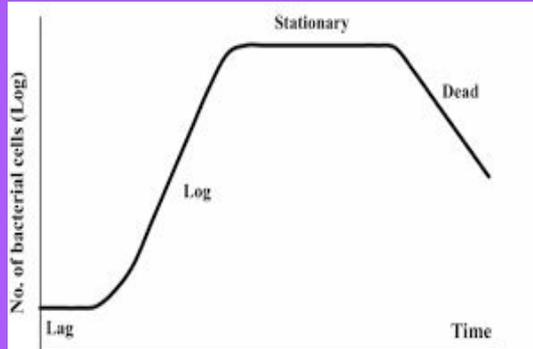
# Personal Research: STEP 2



Establish a growth curve for Uninfected.



Pour plates and assays are used to quantify colony concentration as well as growth curve characteristics.



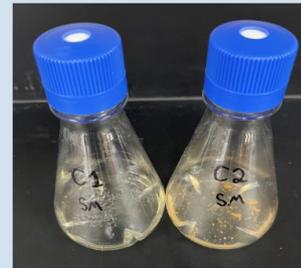
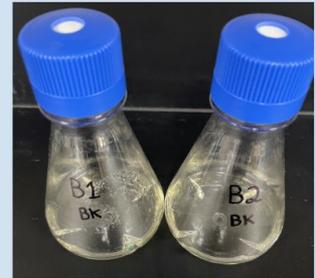
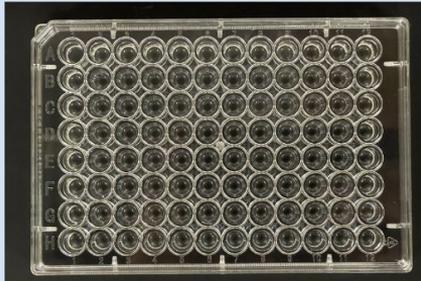
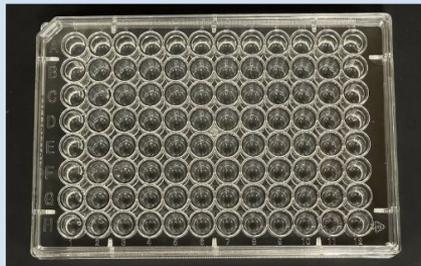
# Personal Research: STEP 3



Establish a growth curve for Uninfected, Biskit, and SketchMex.

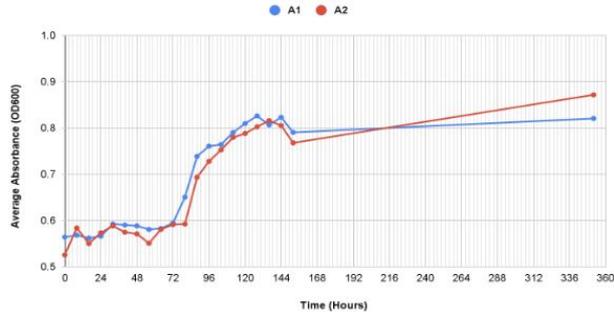


Titers, pour plates, and assays are used to quantify phage and colony concentrations as well as growth curve characteristics for all three subjects.

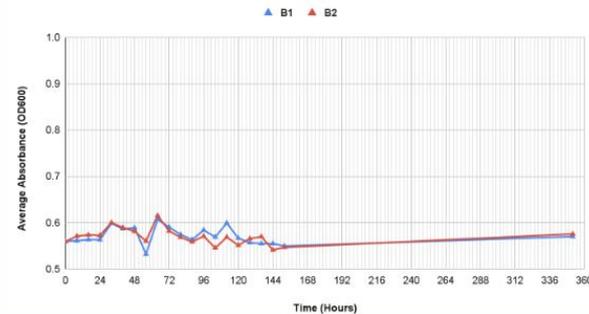


# Personal Research: STEP 3 (Cont.)

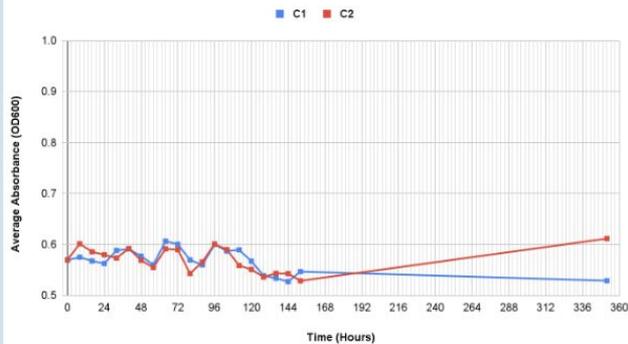
96Well Absorbance (OD600) Uninfected Growth Curve of *Gordonia terrae*



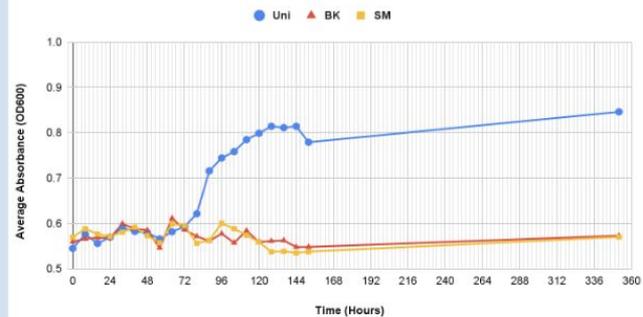
96Well Absorbance (OD600) BisKit Growth Curve of *Gordonia terrae*



96Well Absorbance (OD600) SketchMex Growth Curve of *Gordonia terrae*



96Well Absorbance (OD600) Uninfected, BisKit, and SketchMex Growth Curves of *Gordonia terrae*



# Conclusions and Future



Results!



Need to establish TEMPERATE phages for research purposes.



Change host/phage ratio? 2 bacterial host cells for every one phage?

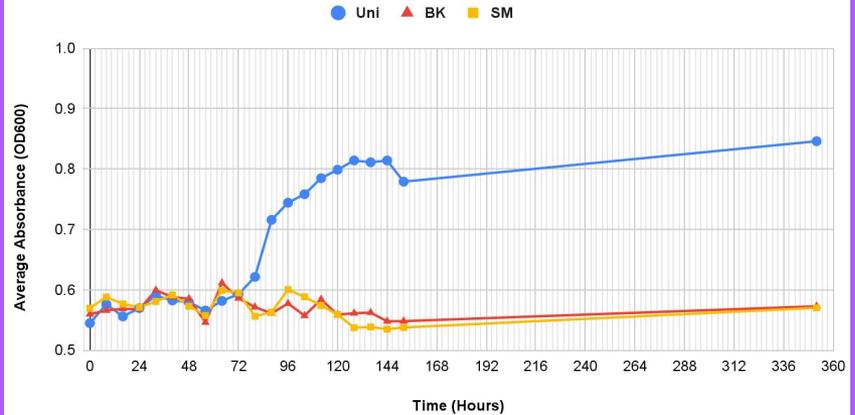


More research needed for this project!



More research completed means more credibility for the FDA to allow phage therapy in the United States!

**96Well Absorbance (OD600) Uninfected, BisKit, and SketchMex Growth Curves of *Gordonia terrae***



# Acknowledgements

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