

Bacteriophages VS *Pseudomonas aeruginosa* Biofilms

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ABSTRACT:

P. aeruginosa biofilms are difficult to treat due to the thick extracellular matrix and acquired antibiotic resistance. The bacteriophage (virus that infects bacterial cells) can destroy and prevent further growth of the bacterial biofilms. The goal of this project has been to treat biofilms with phages and check for antibiotic resistance.

P. aeruginosa infections are a worldwide healthcare issue
-World Health Organization

PHAGE & BIOFILMS:

Bacteriophages:

- Phages can treat *P. aeruginosa* infections
- Even with biofilms and antibiotic resistance
- *Pseudomonas* phages kill clinical *P. aeruginosa* isolates
- Most abundant entity on planet, far surpassing the population of bacteria

What Is A Biofilm?

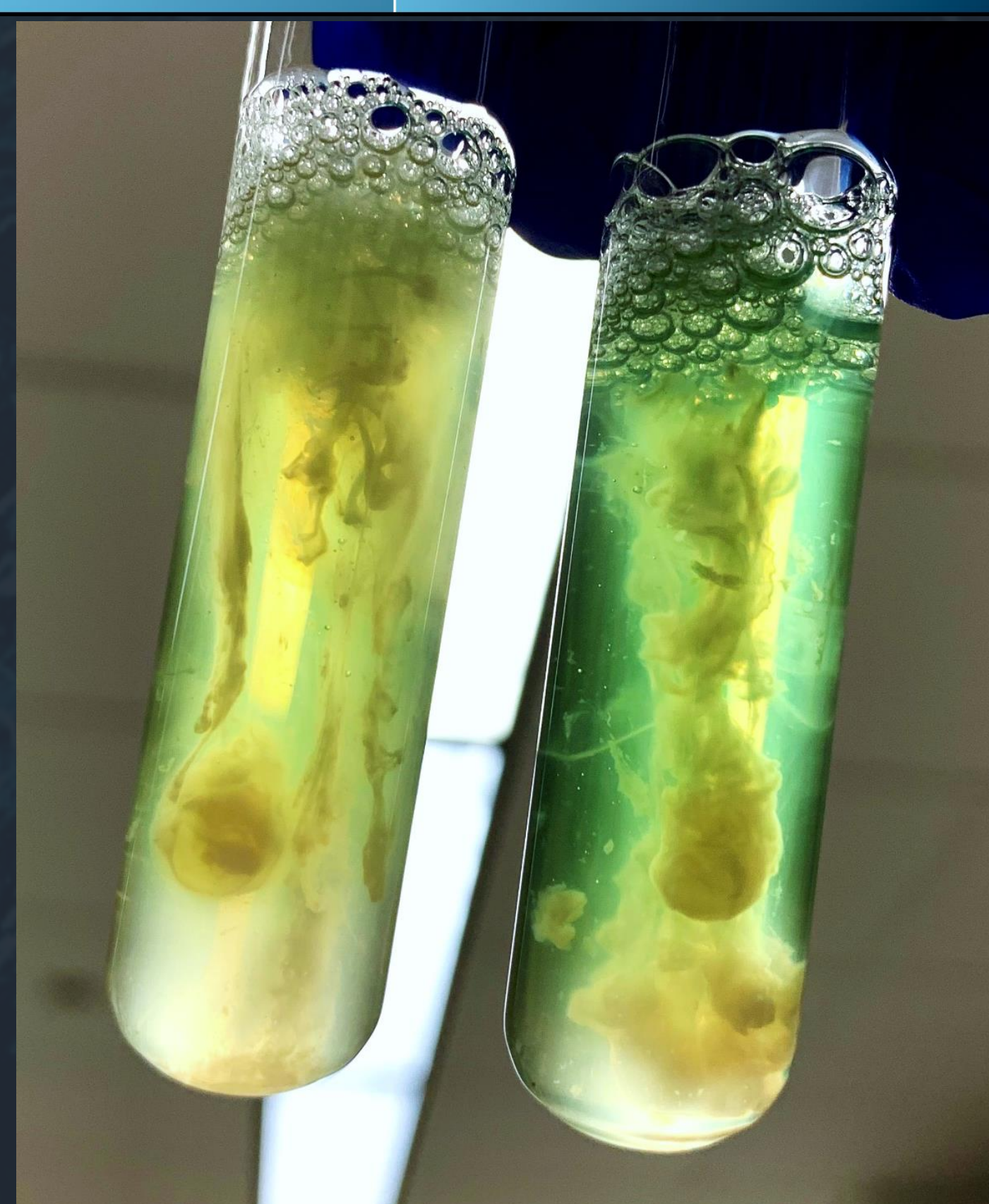
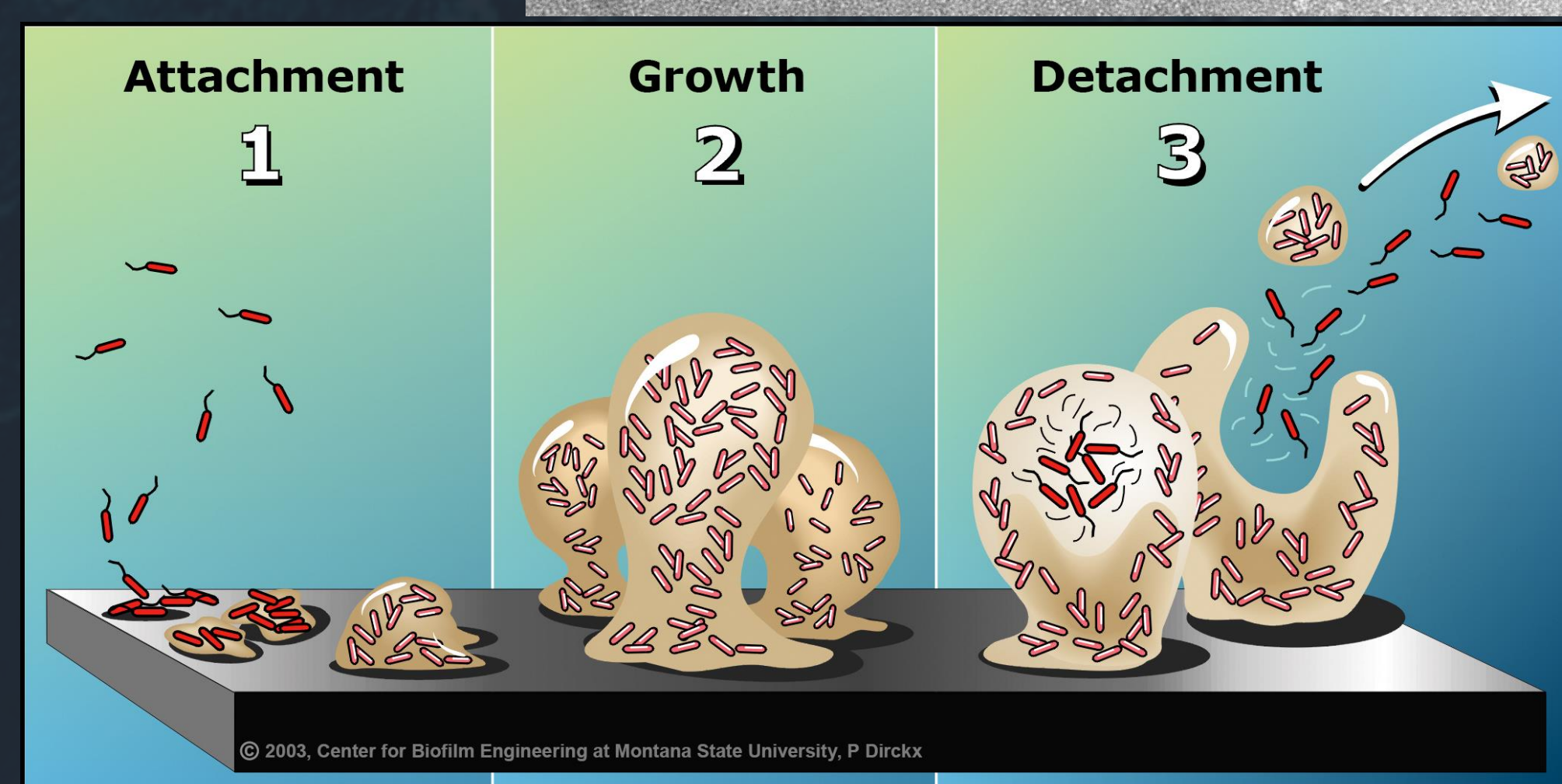
- Aggregation of microbial cells enclosed in a polysaccharide matrix that is attached to a surface
- Thrive on moist or wet surfaces
- Medical Implants
- Catheters
- Organs – Bladder & UTIs

Types of Biofilm Formations:

- Surface attachment
 - More permanent through cell adhesion structures
- Flocking
 - Cells anchor themselves to the matrix itself or to the other nearby cells

Interactions:

- How do phage work within biofilms?
 - Phage can penetrate and kill cells within biofilms
 - Phage reproduce to attack the nearby bacterial cells
- Phage can make antibiotic resistant bacteria susceptible to antibiotics again!



METHODS:

P. aeruginosa Strains:

- Clinical isolates from urinary samples:
 - Voided Urine
 - Catheterized Urine
 - Kidney Stones
 - Vaginal Swabs

Growing the Biofilms:

- 37°C in 6-Well Plates
- 4 mL LB in each well & 1 mL overnight culture
- Replace LB every 2 days
- Repeat for 2 weeks for surface attaching biofilms

Characterization:

- Crystal Violet Assays
- Spectrophotometer- Biofilm Density

Bacteriophage Treatment:

- SPAM, Spike!, Dobby, D3112
- Variable amounts of phage lysate

RESULTS:

Biofilms:

- *P. aeruginosa* biofilms grew sufficiently but tended towards flocking rather than surface attachment

Bacteriophage Treatment:

- Clear, initial lysis of biofilm by added phage lysate

