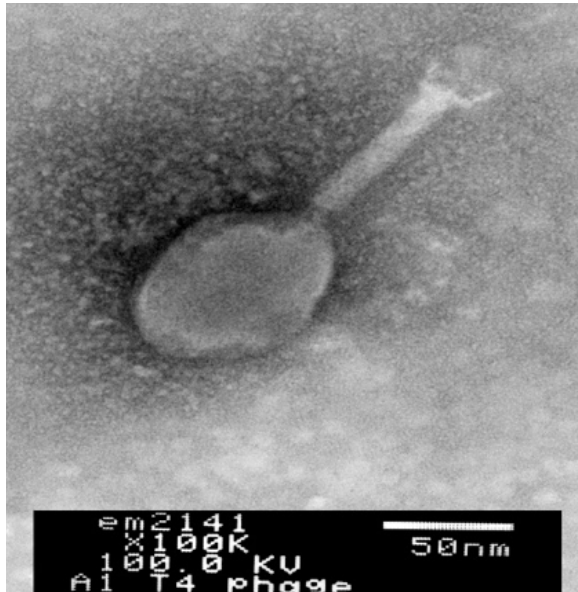


Antimicrobial Resistance Gallery

Bacteriophages and phage therapy

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Transmission electron micrograph of *Enterobacteria* phage T4. Image by Louisa Howard (2021), from the Cell Image Library. CC0 1.0 Public Domain Dedication.

Source:

<https://doi.org/10.6075/J0DN44D8>

Bacteriophages: the viruses of bacteria

In a world where superbugs are outsmarting our antibiotics, researchers are exploring an unexpected hero, a virus! Imagine a virus that doesn't make us sick, but actually helps us fight pathogenic bacteria that cause infections. Sounds like science fiction, right? But it's real! Meet bacteriophages, or simply *phages*, viruses that can infect and destroy bacteria, including pathogenic bacteria, with precision, and they've been doing it for billions of years!!

If we go back to 1915, this was the year when British bacteriologist Frederick Twort was the first scientist to accidentally discover these viruses! Independently, in 1917, the French-Canadian microbiologist Félix d'Hérelle also reported the presence of viruses capable of eliminating bacteria. These groundbreaking discoveries opened the door to the potential therapeutic use of phages in bacterial infections.

How do phages attack bacteria?

Imagine a spaceship docking with a space station: that's what it looks like when a phage lands on a bacterial surface and attaches its special "tail fibers" to its "receptor", its specific entry door. The docked phage then injects its nucleic acid – DNA or RNA – into its victim like a tiny syringe. The phage nucleic acid then takes control of the metabolic and regulatory machinery of the bacterium, turning it into a virus-making factory. Once the factory is full, the bacterium bursts, releasing new phages ready to find their next target! This is the phage "lytic cycle".

A learner-centric microbiology education framework

And the best part? Phages are picky. Each phage attacks only a specific type of bacteria, so they don't harm the good bacteria we need, unlike some antibiotics that wipe everything out.

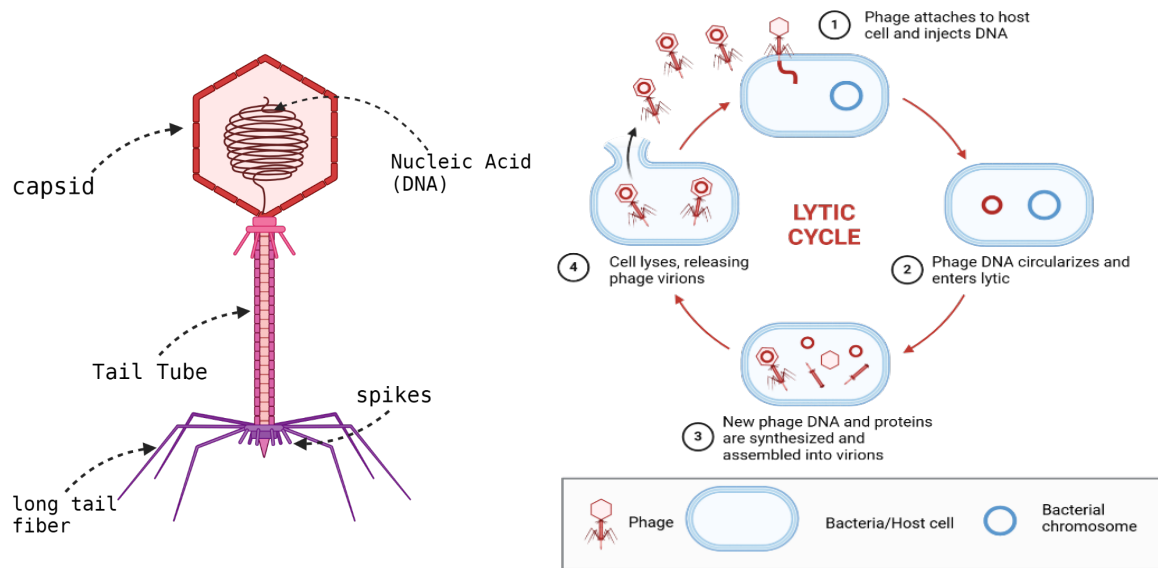


Illustration showing the bacteriophage structure and lytic activity , Retrieved from <https://biorender.com>

Where can we find them?

Everywhere! Welcome to the virosphere: the world of viruses! Phages are the most abundant biological entities on Earth. They're found wherever bacteria are, in oceans, rivers, soil, food, and even inside our bodies. In fact, there are more phages on Earth than there are stars in the universe!

If they're present everywhere, can we easily detect them? the answer is unfortunately no! These viruses are incredibly tiny, tinier than bacteria. To see them, scientists use powerful electron microscopes, because regular ones just aren't enough.

Why are they important now?

Scientists are showing growing interest in phages because of an alarming health threat: antibiotic resistance, meaning a lot of nasty bacterial pathogens are no longer affected by our medicines. Luckily, phages can still take them down. In fact, doctors have already started using phages to save patients who had infections that no antibiotics could cure! One exciting example: phages have been used to treat a young boy in the UK who had a life-threatening infection that no antibiotic could cure. Thanks to personalized phage therapy, his infection was successfully treated and he's back in good health. A real-world superhero moment!

Fun Fact: the word "bacteriophage" is a Greek word that means "bacteria eater". That's exactly what they do!