弘前大学
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Phage Tail-like Proteins: A Novel Antibacterial Solution Beyond Antibiotics and Phages

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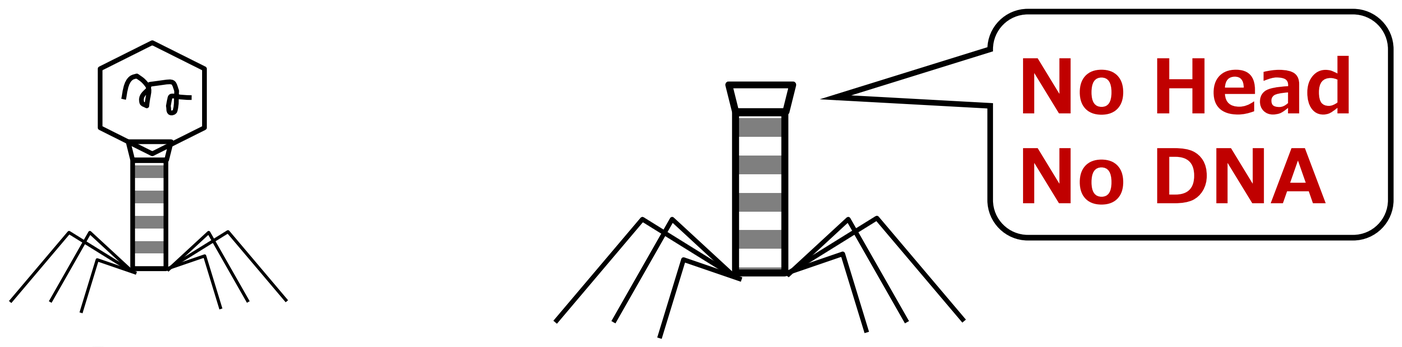
Overview

Antibiotic resistance is increasing, creating a need for new bactericidal methods. We have demonstrated a PTLP (Phage Tail-Like Protein) technology, a complex resembling phage tails, that selectively destroys target bacteria.

(Japanese Patent Application No. 2025-090578)

A protein complex forming the phage tail

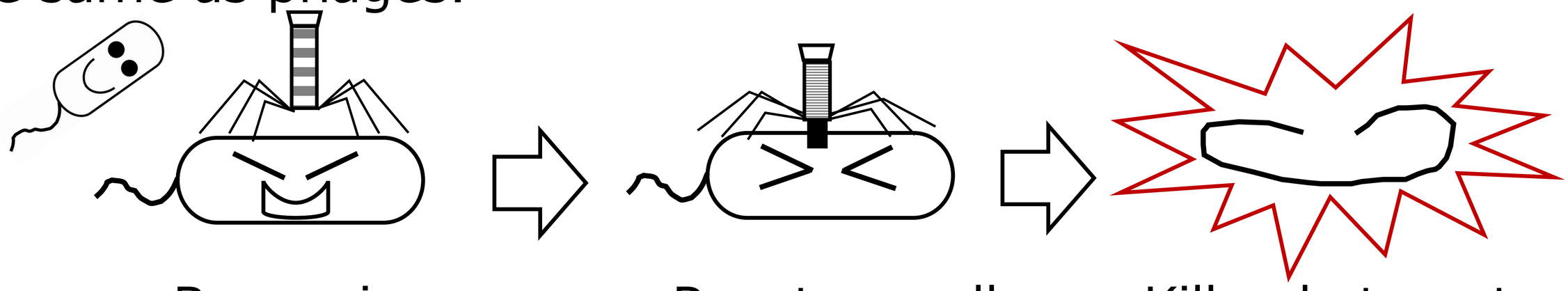
A headless phage tail protein complex without genetic material



Phage **PTLP**

How It Works

The way it recognizes bacteria and disrupts membranes is the same as phages.



Recognize specific bacteria

Puncture cell membrane

Kill only target bacteria

A new option beyond antibiotics and phages

	Antibiotics	Phage	PTLP
Genetic material	None	Present	**None**
Replication	None	Present	**None**
Specificity	None or Low	Present	**Present**
Safety / Environmental impact	Resistance spread	Gene transfer risk	**Safer**

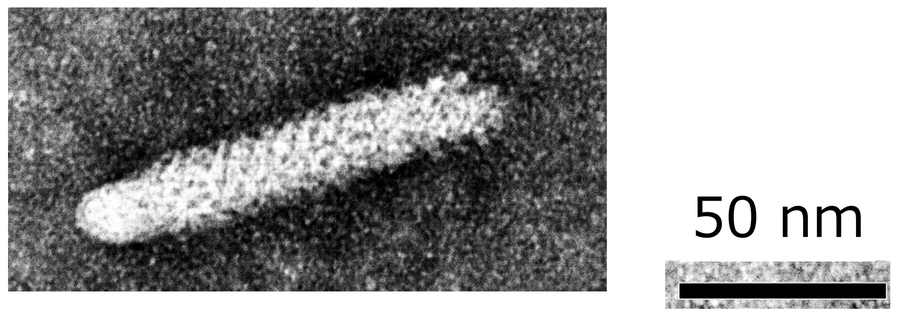
No genetic material, no replication → safer.

Results

Bacteria isolated from raw milk produce PTLPs.

A Pseudomonas lactis YT4 strain isolated from raw milk (Tanaka et al., AEM, 2018) was found to produce PTLPs. (Japanese Patent Application No. 2025-090578)

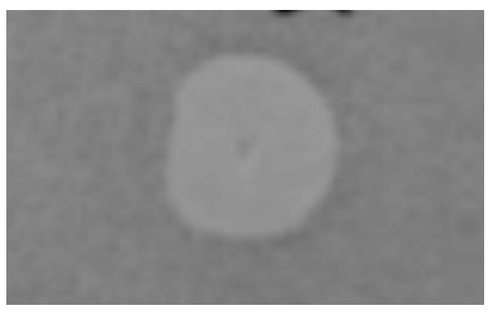
A protein complex composed of 16 proteins



Electron micrograph of PTLP

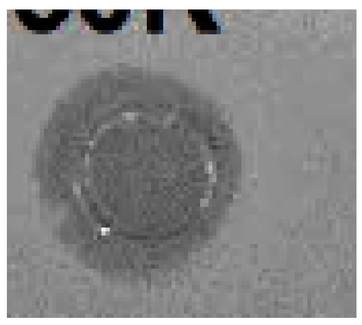
Inhibits growth of Gram-negative bacteria across genera

Non-pigmented *Serratia*



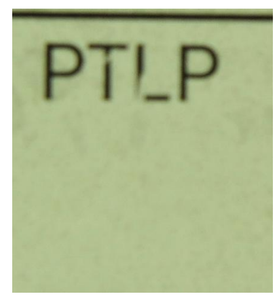
Growth inhibition (+)

Pseudomonas aeruginosa



Growth inhibition (+)

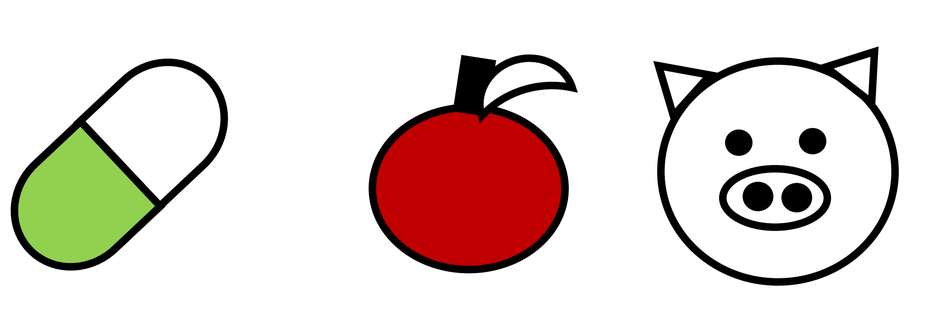
Fluorescent *Pseudomonads*



Growth inhibition (−)

Applications

Potential applications in fields requiring microbial control, such as medicine, agriculture/livestock, food fermentation, and cosmetics.



medicine

agriculture/ livestock

food fermentation

cosmetics

For inquiries about introduction or application, please contact:

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