Université de Montréal

MICROBIOLOGIE, INFECTIOLOGIE ET IMMUNOLOGIE

CONFERENCE

June 18 at 11:30AM
Room N-833

Université de Montréal, Pavillon Roger-Gaudry.
2900 boul. Édouard Montpetit (Chemin de la tour), Montréal.

Caleb Veilleux-Gravel

Master student at Le Roux's Laboratory, Faculty of Medicine, department of microbiology, infectiology and immunology, Université de Montréal, Canada

Infection non canonique par un phage virulent / Non-canonical infection by a virulent phage

Antibiotic resistance is one of the major global public health challenges, and the use of bacteriophages (the natural predators of bacteria) represents a promising therapeutic alternative. Phages are canonically described as either (a) virulent, undergoing immediate replication and host cell lysis, or (b) temperate, whereby the phage can integrate the host genome. In clinical practice, only virulent phages are used in phage therapy to ensure treatment efficacy (1). However, environmental studies suggest that certain virulent phages can adopt infection strategies alternative to the classical lytic/lysogenic model, such as the carrier state, pseudolysogeny, and lysis inhibition (2).

Preliminary data including infection dynamics in *Vibrio crassostreae*, time-lapse microscopy, and serial passage experiments suggest that Schizotequatrovirus can persist within bacterial populations and coexist with their hosts. We hypothesize that this persistence explains the acquisition of anti-phage defense systems encoded in the viral genome, notably viperin (3). To test this hypothesis, two objectives are pursued: 1) characterizing the function of viral viperins and 2) analyzing the infection dynamics of Schizotequatrovirus.

Viperin genes were identified, phylogenetically analyzed, cloned into a plasmid, expressed in *E. coli* and *V. crassostreae*, and the resulting strains were challenged with various phages. In parallel, infections involving 34 *Vibrio* strains × 14 phages were carried out, combining liquid and solid cultures, bacterial growth measurements, and kinetic analyses of viral production. This approach identified three infection phenotypes all yielding similar progeny production characterized by rapid lysis, delayed lysis, or normal bacterial growth.

References :

1. Lauman, P. & Dennis, J.J. Re-evaluating what makes a phage unsuitable for therapy. *npj Antimicrob Resist* (2025).
2. Dougherty, P.E., Bernard, C., Carstens, A.B. et al. Persistent virulent phages exist across bacterial isolates. *Nat Microbiol* **11**, 31–41 (2026).
3. Bernard, C. et al. Adaptive genomic plasticity in large-genome, broad-host-range vibrio phages. *ISME J.* **19** (2025).