



## QSB SEMINAR SERIES 291

### How Bacteriophages Protect Themselves from CRISPR-Cas Immunity

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#### ABSTRACT

Bacterial CRISPR-Cas systems utilize sequence-specific RNA-guided nucleases to defend against bacteriophage (phage) infection. As a counter-measure, numerous phages produce proteins to block the function of the Class 1 CRISPR-Cas systems, which utilize multi-subunit protein complexes to enact immunity. Our group recently developed and utilized novel bioinformatics strategies to identify Class 2 (e.g. Cas9 and Cas12) anti-CRISPR proteins. We have identified anti-CRISPR proteins encoded by phages and mobile genetic elements from many organisms, including *Pseudomonas aeruginosa*, *Listeria monocytogenes*, *Moraxella bovoculi*, and *Streptococcus pyogenes*, suggesting widespread and common CRISPR-Cas inactivation. More recently, we have identified a phage with a novel mechanism of CRISPR evasion that does not rely on anti-CRISPR proteins, but instead physically segregates its genome from nucleases. I will discuss our progress towards understanding these mechanisms that phages deploy to avoid destruction by CRISPR-Cas and how this work benefits CRISPR-Cas technologies.

