Contribution ID: **23** Type: **Talk from invited speaker**

Horizontal Gene Transfer Shapes Bacterial Defense in Vibrio cholerae

Tuesday, 6 October 2026 16:10 (30 minutes)

Horizontal gene transfer has played a central role in the evolution of *Vibrio cholerae*, transforming an environmental bacterium into the causative agent of cholera through the acquisition of key virulence determinants. Recent work has revealed that the same evolutionary process has also shaped the bacterium's arsenal of defense systems against bacteriophages and plasmids. In this talk, I will show how pandemic *V. cholerae* lineages have acquired diverse antiphage and antiplasmid defense systems through mobile genetic elements, including pathogenicity islands and prophages, and discuss how these systems may have contributed to the evolutionary success of the distinct seventh-pandemic El Tor lineage. I will then present our recent discovery that natural competence enables the horizontal acquisition of chromosomal integron cassettes, allowing *V. cholerae* to rapidly sample and express novel defense systems from lysed bystander cells. Together, these findings establish horizontal gene transfer not only as a driver of virulence evolution but also as a key mechanism underlying the diversification, dissemination, and continual renewal of bacterial immunity.

Reference #1

Righi L., Stutzmann S., Bader L., Lemopoulos A., Blokesch M. (2026) Competence-mediated DNA uptake diversi

Reference #2

Adams D.W., Jaskólska M., Lemopoulos A., Stutzmann S., Righi L., Bader L., Blokesch M. (2025) West Africa

Reference #3

Jaskólska M., Adams D.W., Blokesch M. (2022) Two defence systems eliminate plasmids from seventh-pandemic

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Session Classification: Novel anti-viral defence systems

Track Classification: Novel anti-viral defence systems