Outlook

Contact 9th Meeting of the Swiss Microbial Ecology from mazbinden@ethz.ch

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Type of presentation:
Oral presentation

Title:
Fluid flow generates bacterial conjugation hotspots by increasing the rate of shear-driven cell-cell encounters.

Authors:
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Abstract (300 words maximum): :
Conjugation accelerates bacterial evolution by enabling bacteria to acquire genes horizontally from their neighbors. Because donors must physically connect with recipients, environmental fluid flows may increase conjugation rates by increasing cell-cell encounters through mixing driven by fluid shear, which creates relative movement between donors and recipients. However, existing experimental assays do not directly control cell-cell encounters, which hinders the establishment of a connection between the population-level conjugation rate and the microscale mechanisms that bring cells together. Here, we describe the results of conjugation experiments using E. coli bacteria in which we varied the shear flow to control the rate of cell-cell encounters. We discovered that the conjugation rate increases with shear until it peaks at an optimal shear rate of approximately 100/s, reaching a conjugation rate five-fold higher than the baseline set by diffusion-driven encounters. This optimum marks the transition from a regime in which shear promotes conjugation by increasing the rate of cell-cell encounters to a regime in which shear disrupts conjugation. Fluid flows are widely present in aquatic systems, the gut of hosts, and the soil, and our results indicate that fluid shear could induce hotspots of bacterial conjugation in the environment.

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