Outlook

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

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Type of presentation:
Oral presentation

Title:
Thin water films on leaves support bacterial motility and chemotaxis

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Abstract (300 words maximum): :
Many environments on Earth harbor microbiomes and bacterial communities confined within thin water films, bounded by various physical and biological surfaces such as plant surfaces and soil particles. While motility and chemotaxis are well recognized as critical processes enabling bacterial life and shaping ecological niches, they become increasingly complex in confined environments, as they are hindered by hydrodynamic interactions with the surrounding surfaces. Natural bacteria isolates from the leaf microbiome were found to express genes associated with flagellar motility and chemotaxis, however, it remains unclear how, and under what specific hydration conditions, they can effectively perform these functions. We employ microfabricated chambers and video microscopy to investigate the efficiency of chemotaxis towards chemoattractant pulses in thin water films confined by solid surfaces, as well as in micron-thin films bounded by a solid surface and an air interface. In the former case, we observe enhanced chemotaxis due to the reduced dimensionality of the system. For the latter case, we demonstrate that efficient motility and chemotaxis occur in thin water films only when a protein layer adsorbed at the air-water interface restores favorable hydrodynamic conditions for swimming. In particular, we show that compounds naturally present on the leaves of Arabidopsis thaliana can provide these favorable hydrodynamic conditions, allowing bacteria to perform motility and chemotaxis even in films whose thickness is comparable to the cell size.

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