

MICROBIOLOGIE, INFECTIOLOGIE ET IMMUNOLOGIE

## CONFERENCE

February 12 at 11:30AM

Room N-833

2900 boul. Édouard Montpetit (Chemin de la tour), Montréal.

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### Exploring the diversity of bacterial holdfast polar adhesins from Québec aquatic environments

Biofilms are complex microbial communities that adhere to surfaces, often in response to their environment. Irreversible attachment in these biofilms is mediated by bacterial adhesins, and, in many Alphaproteobacteria, those adhesins are located at the cell pole. To examine the prevalence and natural variation of polar adhesins, 76 water samples were collected across Québec through a citizen science initiative. Environmental isolates were screened for their ability to form biofilms, and strains exhibiting polar attachment were selected. A subset of 21 representative strains was used for phenotypic assays and whole-genome sequencing. Phylogenetic analysis showed that most belonged to the order *Caulobacterales*, and microscopic characterization indicated variability in the polysaccharide composition of polar adhesins in these environmental strains. By integrating comparative genomics with phenotypic assays, this work establishes a unique framework for linking microbial ecology to molecular mechanisms of adhesion. Our results highlight intra-order natural variations in polar adhesin structure and composition. Such variations may be signatures of adaptive adhesive performances across diverse environments. These findings not only advance the understanding of biofilm biology but also open avenues for bio-inspired applications, including the development of next-generation adhesives and anti-biofouling materials.