Influence of microbial biofilms on the transfer of non-indigenous species by navigation

Managing economic and ecological risks related to the biological colonization of immersed surfaces (biofouling) in the marine environment requires effective and sustainable controls to limit or prevent the adhesion and growth of marine organisms. The maritime industry currently carries out this control through the preventive and regular application of antifouling paints, which release biocide products that are toxic to the colonizing organisms. Unfortunately, these products can also have harmful effects on non-target organisms present in marine ecosystems as well as on humans.

The research project aims to demonstrate the potential of new antifouling coatings (AF) that are free of harmful biocide molecules to reduce the microbial biofilm formation on ship hulls and the spread of non-indigenous species on an international scale. The specific objective of the research project is to increase our knowledge on the transfer of non-indigenous species through biofouling between contrasting environments (Quebec vs. France) according to the type of antifouling coating used. This project is part of an international research project (PAINTS project) combining French and Quebec expertise in marine microbial ecology and biofouling control.

During this research project, the effectiveness of biocide-free coatings will be evaluated on an international scale through parallel immersions of experimental surfaces in five contrasting natural environments located in France and Quebec. The risk of introduction of invasive species linked to international navigation will be determined through an original and innovative experiment involving the transplantation of colonized surfaces between immersion sites in order to simulate the introduction of species via ship hulls into a new environment. These transplantations will allow us to highlight which species (bacteria and eukaryotes) remain competitive from one site to another and are consequently likely to present an increased risk of inter-site transfer via navigation. This project will require the use of molecular tools (PCR, high-throughput sequencing data processing, 16S and 18S metabarcoding), flow cytometry, and confocal laser scanning microscopy.

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