NEMESIS : Use of IA and genetic edition tools for the engineering of phages as bioprotection agents in industrial processes.

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Résumé

Microbes such as bacteria and fungi are at the origin of many pathologies and represent a high risk of contamination for many industrial processes. They are the first organisms involved in biofouling phenomena. Biocides are commonly used in the industry for curative or preventive purposes. However, these substances can cause negative effects on both health and the environment. Thus, the reduction or elimination of biocides is strongly encouraged by various EU regulations. Lytics bacteriophages are promising biotechnological alternatives to biocides which present many advantages, such as the host specificity and absence of toxicity for workers and consumers. However, their applications are limited by several barriers among which : narrow host ranges, erratic developments of resistant host strains or their stability in the industrial environment. The use of bacteriophages as biocontrol agents in industry requires a new R&D and production strategy. The Nemesis project, cofunded by the ANRt (french national agency for research) aims to resolve these limitations by exploring 3 new research axes : • Are exogenous lytic enzymes and proteins effective in enhancing the interspecific biocontrol potential of a phage? • Is the PHEIGES engineering protocol sufficiently robust and rapid for industrial biotechnological application? • Can the contribution of AI be a game changer in the design of optimized phages for biocontrol in an industrial environment? As a main outcome of the project, we aim to establish a research pipeline for the rapid development of engineered phages targeting contamination or biofouling issues into specific industrial environments.

Mots-Clés: Phages, genetic, engineering, Bioprotection

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