CBI Toulouse
Centre de Biologie Intégrative

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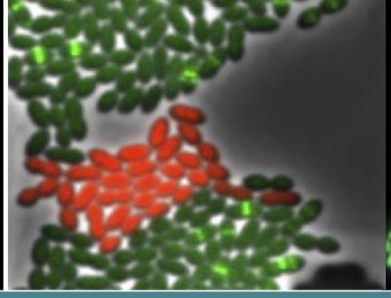
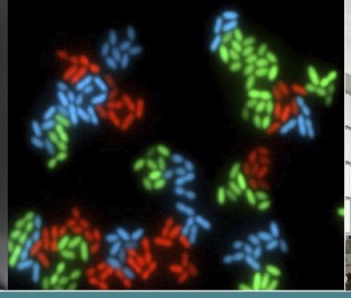
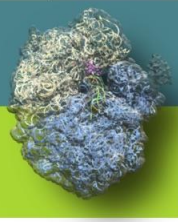




MICROBIAL SYSTEMS



15h00

Tuesday
January 24TH 2023

Cécile Philippe

Université Emory, Atlanta, USA

"Exploitation of CRISPR-Cas systems and anti-CRISPRs in Streptococcus thermophilus"

Résumé:
Streptococcus thermophilus is a lactic acid bacterium commonly used for the manufacture of yogurt and specialty cheeses. Bacteriophages (or phages) that inactivate the added starter bacterial cells are considered hindrances for fermentation processes as they can cause manufacture failures and alter product quality (de Melo et al., 2018). Various strategies can be implemented to control phage-associated risks, by closely monitoring the expanding diversity of dairy phages and by generating resistant strains (Philippe et al., 2020). Among these resistance mechanisms to phage infections, the role of CRISPR-Cas systems was described, providing prokaryotic cells with adaptive immunity against phages (Barrangou et al., 2007). This was first demonstrated in the strain Streptococcus thermophilus DGCC7710, in which in vivo spacer acquisition and DNA cutting activity has been observed (Barrangou et al., 2007; Dupuis et al., 2013; Garneau et al., 2010). Streptococcus thermophilus remains a model organism to study CRISPR-Cas systems, but the latter is found in 36% of bacterial genomes, providing protection against invading DNA, such as viral entities or plasmids (Achigar et al., 2021; Philippe and Moineau, 2021). Over the years, advances in the characterization of the type II-A CRISPR-Cas system of Streptococcus thermophilus and Streptococcus pyogenes led to the development of the CRISPR-Cas9 technology, a revolutionary tool of gene editing (Jinek et al., 2012; Martel and Moineau, 2014). More recently, proteins inhibiting CRISPR-Cas systems were identified (Bondy-Denomy et al., 2013). Bacteriophages produce these proteins, called anti-CRISPRs (ACRs) to counteract bacterial immunity. To this day, numerous ACR types have been discovered and have many potential applications in genome editing and to improve gene therapy. Among others, ACRs inactivating Cas9 could provide new possibilities of control for this ever-expanding technology (Hynes et al., 2017, 2018; Philippe et al., 2022).

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