CBI Toulouse
Centre de Biologie Intégrative

# CBI SEMINAR

14h00 P.M

Friday
JUNE 02 TH 2023

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## “Viruses of (hyper)thermophilic archaea and bacteria isolated from deep-sea hydrothermal vents”

Abstract:
Viruses have a potential to be powerful agents that drive evolution and adaptation of their cellular hosts even in extreme marine environments. Deep-sea hydrothermal vents represent one of the most extreme environments on Earth. These ecosystems are characterized by steep physicochemical gradients, high hydrostatic pressure, high to low temperatures, obscurity and the prevalence of chemosynthesis. Our knowledge of the viral diversity associated to microorganisms inhabiting these deep sea hydrothermal vents is still limited: only 13 viruses, 4 archaeoviruses and 9 bacterioviruses, were isolated and described; we have characterized seven of them in the laboratory. Two lemon-shaped viruses, PAV1 and TPV1, associated to hyperthermophilic anaerobic Archaea, Thermococcales order, have been well studied.  The only two genes that are homologous between TPV1 and PAV1 encode proteins containing a concanavalin A-like lectin/glucanase domain that might be involved in virus–host recognition. Methanogens represent another important group of archaea colonizing deep sea hydrothermal vents. Few viruses infecting methanogens have been discovered and none of them from an abyssal ecosystem. We characterized MFV1 (Methanocaldococcus fervens virus 1), the first head-tailed virus providing from a deep sea hyperthermophilic archaea. In order to deepen our knowledge on the viral diversity of marine hydrothermal microorganisms, we have extended our investigation to the Bacteria domain. Indeed, by studying these two domains of life we will be able to better apprehend the viral diversity of these extreme ecosystems. In particular, we characterized MPV1 that infects Marinitoga piezophila, a thermophilic, anaerobic and piezophilic bacterium. MPV1 is a temperate siphovirus with a 43.7 kb genome. Surprisingly, we found that MPV1 virions carry not only the viral DNA but preferentially package a plasmid of 13.3 kb (pMP1) also carried by M. piezophila. This ‘ménage à trois’ highlights potential relevance of selfish genetic elements in facilitating lateral gene transfer in the deep-sea biosphere. Comparative studies of these mobile genetic elements from Archaea and Bacteria will help us understand the dynamic genetic network of the microbial communities in the deep biosphere.

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