Adaption of bacteria to the assimilation of hydrocarbons

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The very low water solubility of hydrocarbons makes them weakly bioavailable. Despite this obstacle, many microbes are able to assimilate them because of specialized uptake strategies such as biofilm formation at the hydrocarbon-water interface. However, the involved molecular mechanisms remain to be discovered. A complete understanding of these mechanisms would be a strong asset to predict and eventually control the impacts of microbes on hydrocarbons fate in the environment. We have investigated the molecular processes taking place in biofilms of Marinobacter hydrocarbonoclasticus SP17 (MhSP17) during degradation of alkanes.

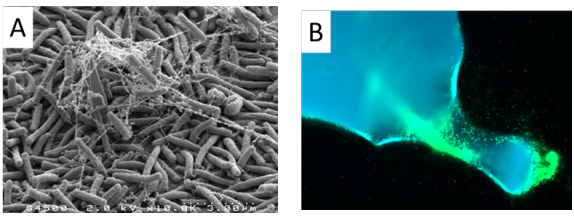

Figure. A Scanning Electron Microscopy image of MhSP17 biofilm on hexadecane. B Epifluorescence microscopy image of MhSP17 cells (green) colonizing hexadecane surface (blue)

The genetic response of the adhesion was investigated by transcriptomic. Genes involved in the metabolism of alkanes, motility, chemotactism, signal transduction and gene regulation were found to be overexpressed during adhesion. Selected genes were deleted and the analysis of the phenotype of the mutants demonstrated the importance of pili, alkane transporters, protein secretion pathways and regulation of transcription in the adaptation to the assimilation of poorly soluble hydrocarbons.