FEMS-1929 Pollutant degradation

NOVEL ANAEROBE OBTAINED FROM A HEXADECANE-DEGRADING CONSORTIUM

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Background: Aliphatic hydrocarbons (AHC) are abundant in crude oil and fuels, and are frequent contaminants of water, soil and sediments. There is potential for AHC bioremediation using sulfate as electron acceptor, due to its abundance in marine environments and natural presence in soils and groundwater.

Objectives: In this work sulfate-reducing anaerobic microorganisms involved in AHC biodegradation were studied.

Methods: Anaerobic sludge was incubated at 37ºC with hexadecane (1mM) and sulfate (20mM) in serum vials. Cultures were successively transferred to fresh medium until a stable enrichment was obtained (monitored by microscopy and PCR-DGGE of 16S rRNA gene). For isolation of AHC-degrading bacteria, serial dilutions and successive transfers are now running using palmitate (1mM) as an easier substrate.

Conclusions: Cultures growing on palmitate show two main bacterial cell types: a rod-shaped bacterium closely related to Desulfomonile limimaris (94% identity) was predominant in the first 30 days of incubation, when 83% of the added palmitate was degraded coupled to 4 mM sulfate reduction (suggesting stoichiometric palmitate conversion to acetate); and an oval-shaped bacterium related to Desulforhabdus amnigena (99% identity) that mainly developed when incubations where extended and a total of 11.5 mM sulfate was reduced. Growth of Desulforhabdus was stimulated when incubated with acetate. The role of the Desulfomonile in AHC degradation will be further discussed in the presentation, as well as its halorespiring ability, a characteristic of the Desulfomonile genera. Further characterization of this novel bacterium is important due to its high potential for bioremediation of hydrocarbons, fats and halogenated pollutants.