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Carbon Utilization in an Anaerobic Interdomain Consortium

A syntrophic relationship with a feedback loop occurs in a coculture between the sulfate reducing bacterium, Desulfovibrio vulgaris Hildenborough, and the hydrogen oxidizing archaeon, Methanococcus maripaludis. In this relationship, M. maripaludis utilizes hydrogen produced by D. vulgaris Hildenborough thus lowering the partial pressure of hydrogen gas through the production of methane allowing for D. vulgaris Hildenborough to avoid experiencing an inhibition in growth due to excess hydrogen thus forming a syntrophic feedback loop. Previous work in this field identified the potential for D. vulgaris Hildenborough and M. maripaludis to have genes that encourage syntrophy and the potential to adapt to using other metabolites to increase syntrophy and this project aimed to complement that work by testing monocultures of these organisms in several different metabolic growth substrates. This project studied the metabolites acetate, alanine, ethanol, formate, lactate, pyruvate, and sulfoacetate under anaerobic conditions in monoculture batch tubes where growth was determined through optical density (OD) readings. For comparison of growth, a control of D. vulgaris HIldenborough was done with lactate and added sulfate and, for M. maripaludis, the control was done with acetate and an overpressurization of hydrogen. Tests were also run to examine the growth differences between growing D. vulgaris Hildenborough with and without added sulfate and M. maripaludis with and without an overpressurization of hydrogen gas.

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