

195b Kinetics and Metabolism of the Biodegradation of Vanillic Acid and Other Aromatic Compounds by a Halotolerant Alkaliphile from Soap Lake, Wa

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As part of the Soap Lake Microbial Observatory, this research focuses on the kinetic and metabolic characterization of novel extremophile species during the biodegradation of aromatic compounds. The saline and alkaline nature of Soap Lake, WA, makes it a unique environment that is conducive to the growth of certain types of haloalkaliphilic bacteria. These bacteria have been shown to utilize lignin hydrolysis products as the only source of carbon and energy. The single-ring aromatic products such as vanillic acid are found as contaminants in paper-pulp, olive oil, and other industrial waste streams. One isolated bacterium, most closely related to bacteria in the beta sub-classes of Proteobacteria, *Azoarcus* and *Thauera*, has been observed to completely degrade vanillic, coumaric, and ferulic acids. Complete degradation of 100mg/L vanillic and coumaric acids had maximum specific growth rates of 0.98/h and 1.10/h, respectively. Protein yields were 0.085mg protein per mg vanillic acid, and 0.125mg protein per mg coumaric acid. The metabolic pathway of vanillic acid biodegradation has been shown to follow a non-oxidative decarboxylation to guaiacol. In addition to having applications for industrial waste stream clean-up, haloalkaliphilic extremophiles are also of interest in such areas as bioremediation and synthesis of useful chemical products.