93. Cloning and Initial Characterization of the Laminarinases from Vibrio breoganii 1C10.

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Project Goals: This project will harvest 'biomass to biofuel' pathways from algae- associated bacteria, and develop these as reusable genetic parts. Marine algae hold great promise for biofuel production and have advantages over terrestrial biomass and freshwater algae. Despite this potential, little effort has been made to date to harness the enzymatic machinery that bacteria use to convert marine algal carbohydrates into bioenergy substrates. Our project capitalizes on this unexplored opportunity *via* three distinct activities: bioprospecting for novel algal polysaccharide-degrading genes, functional screening for enzymes with desired biochemical properties, and repackaging pathways in reusable genetic modules.

Brown seaweeds have proven potential as feedstocks for biofuel production, and have several advantages over other marine algae. Laminarin is one of the major polysaccharides of brown algae. It is one of the least complex carbohydrates in brown algae and consists of β-1,3 and β-1,6 linked glucose residues. Glycoside hydrolases (β-1,3-glucanases) that cleave the β-1,3 linkage belong to the seven GH families: GH3, GH5, GH16, GH17, GH55, GH64 and GH81. However, the glycoside hydrolase that degrades the β-1,6 linkage in laminarin remains unknown.

We are investigating the mechanism of laminarin metabolism in marine *Vibrios*. As a first step, we have cloned, purified, and performed an initial characterization of four laminarinases from *Vibrio breoganii* 1C10. These results represent a first step towards identifying the pathways for laminarin metabolism in marine *Vibrios.*

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