

“ALKALINE MICROALGAE FROM YELLOWSTONE
NATIONAL PARK: PHYSIOLOGICAL AND GENOMIC
CHARACTERIZATION”

Karen Moll

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Department of Microbiology and Immunology

Montana State University

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Diatoms are known for atmospheric CO₂ remediation and decreasing ocean acidification but they also have the potential for photosynthetic biodiesel production. With changes in global temperatures, it is important to characterize diatom genomes as they are integral to understanding global carbon fixation. Isolated from an alkaline stream (pH 9.3) in Yellowstone National Park (YNP), diatom strain RGd-1 has been shown in previous work to yield lipid concentrations up to 30-40% (w/w) triacylglycerol (TAG) and 70-80% (w/w) fatty acid methyl esters (FAMES) that can be transesterified into biodiesel for biofuel applications. Here we report the 24 Mb draft genome for RGd-1, an extremophilic, freshwater, pennate diatom. RGd-1 was found to align best to the centric diatom, *Thalassiosira pseudonana* and *Phaeodactylum tricornutum* on a nucleotide and protein level, respectively. A *de novo* transcriptome assembly was used to annotate the RGd-1 genome assembly. RGd-1 was shown to have a nearly complete glyoxylate pathway that could be used as a carbon conservation strategy to accumulate high concentrations of neutral lipids. As part of the RGd-1 whole-genome sequencing project, we assembled an associated, novel 3.1 Mb *Brevundimonas* sp. genome. Nine major bacterial OTUs were found in the RGd-1 culture through 16S amplification and sequencing. Of those strains, seven may produce iron chelating siderophores, which could make iron biologically available to RGd-1 in an alkaline environment.