

Title: The biochemistry of chemosynthetic life: the study of epsilonproteobacteria growth at various pressures

Authors: Sarah Fong, Dionysis Foustoukos

Abstract

The performance of chemosynthesis, energy production using inorganic elements, by bacteria found in deep sea hydrothermal vents can have numerous implications on the atmosphere, both below and above sea level. Using biological assays, we measured the nitrate reduction rate in *Nautilia abyssi* at both ambient pressure (5 bars) and high pressure (200 bars) at 55°C to determine the role of pressure in metabolic activity and physiology. The $^{15}\text{N}/^{14}\text{N}$ isotope composition of the NO_3 consumed and the NH_4 excreted was measured using IR-MS, which confirmed the same $^{15}\text{N}/^{14}\text{N}$ isotopic signature previously associated with DRNA-performing organisms. The measured kinetic rates of nitrate reduction matched the expected behavior of genetically similar microbial species (Vetriani, 2020); this coupled with *N. abyssi*'s more efficient activities and greater cell growth at lower pressures suggests that *N. abyssi* displays piezotolerant physiology.