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Fluorescence Measurements Of Phototrophic Sulfur Bacteria For Applications In Water Column Profiling

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Unlike plants that produce oxygen during photosynthesis, phototrophic sulfur bacteria use sulfide and sunlight to produce carbohydrates and elemental sulfur. These bacteria require a unique aquatic environment to thrive: one that is anoxic (depleted of oxygen) and rich in hydrogen sulfide. Such conditions are found in a number of stratified lakes around the world including several in Northern Indiana. Studying the ecology and geochemical conditions that promote habitable conditions for phototrophic bacteria in lakes provides insight into the Early Earth (thought to be anoxic), ocean anoxic events of the Mesozoic (70-250 million years ago) and modern low oxygen conditions of coastal environments such as the Dead Zone of the Gulf of Mexico. However, locating and directly sampling these bacterial populations in vast bodies of water is not an easy task. In this project, we investigate fluorescent properties of purple sulfur bacteria in order to develop a dependable sensor that can be deployed in the water column. We report a number of measurements of purple sulfur bacterium fluorescence in the near infrared region when excited at discrete wavelengths in the UV range. We use these bench-top measurements to design a water-proof apparatus equipped with an absorption and luminescent detector for localization of bacteria in lake water. This device will be deployed in anoxic lakes of Northern Indiana to find the *in situ* water column position of phototrophic bacteria.

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