Comparative Analysis of Carbon Dioxide Sequestration and Calcium Carbonate Precipitation in Two Species of Cyanobacteria: Tolypothrix distorta and Fischerella muscicola

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This project focuses on comparing two different species of cyanobacteria, Fischerella muscicola and Tolypothrix distorta, and their ability to sequester carbon dioxide in the form of calcium carbonate precipitate. Cyanobacteria have many advantages towards mitigating excess atmospheric carbon dioxide, which is one of the major causes of global warming. Many species of cyanobacteria have the ability to remove carbon dioxide from the carbon cycle and fix it into inorganic calcium carbonate. I hypothesized Tolypothrix may be a more effective bioagent in sequestering carbon dioxide in the form of calcium carbonate based on its close morphological homology to Calothrix which has been shown to produce visible calcium carbonate deposits. To test how much carbon dioxide was sequestered, each strain was put in an enclosed chamber and placed in a plant growth chamber for 84 hours. The change in carbon dioxide levels was recorded and analyzed. Subsequently, hydrochloric acid was added to the samples to determine how much calcium carbonate was precipitated via an indirect measure of carbon dioxide release. Tolypothrix distoria sequestered the most carbon dioxide over a span of 84 hours. Interestingly, however, Fischerella muscicola precipitated the largest quantity of calcium carbonate. This discovery supports that the two strains disproportionately converted the carbon dioxide into two forms: Fischerella to calcium carbonate and Tolypothrix to organic compounds.