CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)

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Project Number

34459

Project Title

A Study on the Effect of Aqueous Carbon Dioxide on a Freshwater Microorganism Ecosystem

Abstract

Objectives/Goals

This study was designed to 1) determine the change in population of keystone microorganisms with an increase in aqueous carbon dioxide, and 2) determine possible connections/applications in freshwater ecology observed from the population change.

Methods/Materials

Two identical cultures of lake water (850 ml each in volume) were placed under a grow light with microorganisms collected via a plankton net surface trawl with a yeast carbon dioxide reactor bubbling carbon dioxide through an airstone into one of the setups. After four weeks of growth, both setups were preserved, and a Bogorov chamber and microscope were used to count the number of specific microorganisms, particularly those that were ecologically important.

Results

The total number of calcareous algae forms found in the control water sample was nearly 9 times greater than in the water sample grown with the bubbled-in carbon dioxide. There were also a total of 7 more mineral-shelled invertebrates believed to be alive at the time of preservation found in the control water sample than in the carbon dioxide sample (including species such as Chydorus sp., Bosmina sp., and an ostracod and copepod species). However, there were approximately 23% more filamentous algae colonies observed in the carbon dioxide water than in the control, along with 5 Microcystis (a cyanobacteria) colonies, whereas none were recorded in the control.

Conclusions/Discussion

Essentially, the carbon dioxide water sample has the microorganism inhabitants and in the populations, that more closely resemble a highly nutrient-rich pond or lake in the middle of summer, whereas the control sample resembled the original lake sample that was collected, at least visually. Thus, this experiment shows a connection between water eutrophy, initial carbon dioxide concentrations, and the related life associated with such conditions, and also that carbon dioxide can cause the corrosion of mineral parts of organisms in other aquatic environments than in the ocean, where its effects are the most notable.

Summary Statement

This project looks at how carbon dioxide dissolved in water affects the diversity and population of microorganisms living in that water.

Help Received

Mother helped tape-laminate board