Optimal Circadian Rhythms of Pyrocystis Dinoflagellate Algae for Maximizing Bioluminescence

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The objective of this research project is to define the optimal circadian rhythm, or length of night and day periods, of bioluminescent, or glowing, dinoflagellate algae for lengthening the amount of time the algae will emit light when agitated. Lengthening the duration of time for which the algae are able to emit light will increase the possibility of using these bioluminescent microorganisms in medical bioluminescent imaging for in vivo study of certain biological processes in organisms because the enzyme used in this imaging can only be extracted when activated. In order to determine the ideal light/dark cycle for the microorganisms, three algae samples were placed in three different habitats with three different light conditions: standard 12 hours light/12 hours dark cycle, complete darkness, and a varied light/dark cycle. Light intensity and temperature conditions were constant across all three samples. Because the data was slightly skewed because of an issue with viability of the algae due to uncontrollable weather conditions during shipping, the algae did not demonstrate the desired intensity of bioluminescence, but the experiment did show that algae with lengthened night cycles exhibited light for a longer period of time. The sample in habitat 3 with the varied cycle glowed for a maximum of 79 minutes when exposed to 10 hours of light and 14 hours of darkness, whereas the sample in the standard 12 hours light/12 hours dark cycle only glowed for a maximum of 75 minutes.