



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Melissa K. Vinluan	Project Number S2317
Project Title The Illustration of Mutualistic Relations in Marine Biology: The Continuation	
Abstract Objectives/Goals The objective of this experiment is to attempt to cultivate a symbiotic relationship between goldfish and an elodea plant, and observe which kind it is. Determine how such symbiosis can be utilized to impact and help improve society. Methods/Materials Four one gallon fish bowls, nine comet goldfish, four elodea plants, fish flakes, a ruler, a weighing scale, colored gravel, water conditioner, and water. I used the weighing scale and ruler to measure the growth of the elodea plants. Results The growth percentage of bowl D's elodea was 16.96% higher than bowl A's elodea growth percentage. As the number of fish progressively rose, the growth the elodea also grew efficaciously. While Bowl D's elodea was longer than Bowl C's, bowl C's was dramatically longer than Bowl B's, while B's was longer than A's Conclusions/Discussion The 70 day experiment illustrated that there is in fact a presence of a symbiotic relationship between elodea plants and comet goldfish. The relationship was determined to be mutualistic, as the goldfish provide the plant with a fertilizer of nitrites and nitrates in its feces and the plant provides the fish with food and oxygenated water. Such a mutualistic relationship can be utilized in aquaculture and aquaponics to help increase the production of agriculture.	
Summary Statement As illustrated in the 70 day experimentation, I discovered a mutualistic symbiotic relationship in a fishbowl between elodea plants and comet goldfish, and proved how such a relationship could help increase agricultural production.	
Help Received My parents helped purchase the vertebrates and other materials, and my AP Biology teacher provided a scale. Other than that, I worked alone.	