A Novel Approach to Challenge the Mutualistic Symbiosis between Algae and Sea Anemones

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Coral reefs, which contribute to maintaining marine biodiversity, continue to suffer the adverse consequences of our technological advancements. Currently, human activities threaten 58 percent of coral reefs. For example, nutrient pollution upsets the symbiotic relationship between coral hosts and algae symbioses which in turn deteriorates the health and function of coral reefs. The latest nitrogen pathway proposed by Douglas and Wang (1998), termed the nitrogen conservation pathway, suggests that corals and algae actually compete for the same nitrogen source. When corals assimilate glucose they also assimilate ammonium limiting algae's access to it. Based on this notion, it was proposed in this research that the addition of ammonium chloride would result in greater algae growth and the addition of dextrose would limit algae's growth. In this research, 61 Aiptasia pallida (sea anemone) were bleached then infected with the SSB01 strain of Symbiodinium (algae). The coral-algae cultures were then treated with different concentrations of ammonium chloride and dextrose and the concentrations of Symbiodinium in each A. pallida were analyzed. The data collected from these experiments confirm the complex nature of coral-algae symbiosis. As the concentration of ammonium chloride increased (from 62.5μM up to 500μM) the concentration of algae per microgram of protein also increased. Moreover, the dextrose treatments (10mM, 25mM, and 50mM) showed a remarkable overall decrease in Symbiodinium concentrations. This suggests that the symbiosis between coral and algae is not completely mutualistic, and highlights the need for further studies to understand their relationship.

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