The Burning Effects of Sunscreen on Coral Algae (Zooxanthellae)

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Coral reef cover has declined due to climate and anthropogenic stressors. While climate stressors have a larger impact, anthropogenic stressors have a more direct impact and can be controlled. One of the most direct ways humans damage coral is through sunscreen use. Traditional sunscreens contain chemicals, like oxybenzone, which promote viral infections in coral and its algae/zooxanthellae. Traditional sunscreens cause complete, rapid bleaching of coral, even at low concentrations. Coral has a symbiotic relationship with zooxanthellae. When either becomes damaged, coral expels zooxanthellae and loses color (bleaching). Coral then becomes susceptible to disease and death. This experiment analyzed whether advertised coral-safe sunscreens are actually safer to zooxanthellae than traditional sunscreens by comparing algae mortality rates and O2 levels. The experiment predicted that zooxanthellae exposed to coral-safe sunscreens would have higher survival and oxygen levels than zooxanthellae exposed to traditional sunscreens. Samples were mixed with 1 of 4 sunscreens (2 coral-safe/2 traditional) and tested at various intervals against a control, zooxanthellae. Using Erythrosin-b, algae was analyzed via microscope and counted using a hemocytometer. Viable cells remained white; nonviable cells turned red (dye permeated cell walls). An O2 sensor measured dissolved oxygen. Algae was monitored for up to 1 week. Results showed sunscreens containing oxybenzone killed algae significantly faster than those which did not contain oxybenzone. Additionally, dissolved O2 levels for the sunscreens with oxybenzone decreased while those not exposed to oxybenzone increased. Using coral-safe sunscreens when interacting with coral can help eliminate a detrimental anthropogenic coral stressor.