

Gleason, Daniel F. and Gerard M. Wellington. 1993. "Ultraviolet radiation and coral bleaching." *Nature* 365: 836-839.

Pre-discussion report. Due by email attachment by 5 p.m., Wednesday, January 28.

1) Write thoughtful responses to *two* of the following questions. Responses should put ideas in your own words and should draw support both from the article and from your own knowledge and ideas.

a) This article describes an experiment that Gleason and Wellington used to test the effects of UV radiation on coral bleaching. Why did they transplant corals from 24m back to 24m? Why did they measure temperature in the different treatments? Why did they measure the level of UV radiation received by each treatment? How would their results have differed if increased visible light were responsible for coral bleaching?

b) Coral bleaching is often cited as a consequence of global warming. However, this article shows that increased UV radiation can also lead to coral bleaching. Describe an experiment that you could use to compare the relative contributions of temperature and UV radiation to coral bleaching. What are the controls in your experiment? Be sure to justify the levels of UV radiation and temperature that you use in your experiment. Graph a set of results that would support the hypothesis that increased temperature causes more severe coral bleaching than increased UV radiation. Graph a second set of results that would support the hypothesis that increased UV radiation causes more severe coral bleaching than increased temperature.

c) In the introduction to the article, the authors state that many corals found deeper than 20m were bleached during the 1987 and 1990 bleaching episodes. How does this observation compare with the results of their experiment for the different depth treatments (12m, 18m, and 24m)? Are they justified in concluding that increased UV may have contributed to coral bleaching at 20m and deeper during the 1987 and 1990 bleaching events? Why or why not? What additional information could make their conclusion more convincing?

d) Mycosporine-like amino acids (MAAs) are substances that help protect corals from UV damage. Figure 3 shows a measure of the concentration of MAAs in corals at different depths and in different experimental treatments. Based on the information in the article, explain why there was an effect of depth in Fig. 3 a, but not in Fig. 3 b. If Gleason and Wellington had included untransplanted corals at 12m (i.e., corals naturally growing at 12m) in their experiment, would these corals have bleached? Why or why not? Why can't corals at deeper depths deal with occasional bouts of high UV radiation? Suggest some explanations for why corals at all depths don't produce high levels of MAAs.

3) Write one thoughtful question that you have about the article. Begin with a sentence or two that describes the context for the question (e.g., what the writer said, what you know about biology). Then ask a question that relates to the content of the article. Good questions will try to deepen your understanding of concepts, or will try to relate the content of the article to other ideas. The most interesting questions will be used to fuel our in-class discussion!