A Destructive Invader: How Rising Atmospheric CO2 Is Aiding Noctiluca scintillans in Taking Over Tropical Oceans

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Noctiluca scintillans, a dinoflagellate species, has a unique capability as a mixotroph to both photosynthesize and feed on organic nutrients. This behavior has allowed it to persist in the Arabian Sea (AS) for the past two decades. In the AS, outbreaks of Noctiluca blooms have become more intense and widespread. These blooms have caused the decline of fisheries along the coast, and in species in different trophic levels. Similarly, there are many repercussions on the surrounding waters, such as excess ammonia content released by this species. The purpose of this study was to determine the effects of varying CO2 concentrations on Noctiluca's physiology and growth. CO2 was used in concentrations that reflected the pre-industrial atmospheric levels (150 ppm), current atmospheric levels (400 ppm), and predicted atmospheric levels for the year 2100 (800 ppm). It was found that Noctiluca grows better in high CO2 and more acidic environments. Cells in the 400 and 800 ppm bottles were bigger in size and showed higher traces of chlorophyll a and variable fluorescence. These results provide support that as tropical bodies of water continue to become more acidic, Noctiluca will overtake these ecosystems as the dominant bloom-forming organism leading to the detriment of fisheries.

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