Primeira Sessão: Ecologia e Fisiologia – Comunicações orais

Does higher nutrient concentration lead to biochemical and physiological effects on the coral Mussismilia hispida in a simulated global warming scenario?

Patrocinio, Guilherme T. A. (1); Ciotti, Áurea M. (2); Lopes, Fernanda C. (1); Faria, Samuel C. (2); Martins, Camila M. G. (1)

(1) Biological Sciences Institute, Federal University of Rio Grande, FURG, Rio Grande, Rio Grande do Sul, Brazil; (2) Marine Biology Center, University of São Paulo, USP, São Sebastião, São Paulo, Brazil.

Nutrient pollution, especially nitrate (NO3-) released by domestic effluent and plantations, is one of the local stressors that are affecting coral reef health. The effects of NO3- and other pollutants can be intensified by increased water temperature, which is the primary factor leading to coral bleaching and death. Oxidative stress, known as an imbalance between antioxidant capacity and reactive species favoring the latter, is the mechanism that leads to a symbiotic disruption between the coral and its endosymbionts, resulting in bleaching. In this view, we investigated whether a high and environmentally relevant NO3- concentration combined with elevated temperature can cause oxidative stress and further bleaching in the endemic Brazilian coral Mussismilia hispida. Colonies (N=8) from the Alcatrazes Archipelago, São Paulo state, were fragmented and acclimated in an open-water system for 14 days, at 26 oC and under 12 h light/12 h dark (180 PAR). Later, they were exposed to NO3- 30 µM enriched water at 26 oC or 29.5 ºC (IPCC 2023, + 3.5 ºC) for another 14 days in a closed-water system, with partial natural seawater changes (30%) to determine symbiont density (Sd), chlorophyll-a concentration (Chla), maximum photosynthetic quantum yield (Fv/Fm), total antioxidant capacity (TAC) and lipoperoxidation (LPO). In summary, our results showed that high NO3- concentrations did not significantly affect the oxidative status of coral M. hispida. However, animals exposed to heat stress, as well as heat stress with NO3-, exhibited increased TAC levels, followed by augmented LPO. Negative effects were higher in the presence of high NO3- concentration. Consequently, Sd, Chla and Fv/Fm were significantly reduced compared to the control condition (ambient NO3-, 26 oC). As expected, our results demonstrated that global warming is harmful to corals, and also show the importance of considering nutrient status to quantify coral bleaching.

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