Title: MICROBIOME OF A BLEACHING RESISTANT CORAL *Mussismilia hispida* EXPOSED TO HIGH TEMPERATURES

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Abstract:

Coral reef bleaching is a common stress response to environmental changes. Although bleached corals can reestablish their symbiotic relationships with the *Symbiodinium* algae, long-term bleaching events may cause irreparable damage to corals. This occurs because environmental stresses can lead to shifts within the microbial communities, which may increase their susceptibility to diseases. Since the occurrence of El-Niño (1990s), massive events of coral bleaching associated with temperature increases along the Brazilian coast have been reported. The emergence of resilient corals, colonies that remain healthy while all the others are bleached have also been observed. We believe that beneficial coral-associated microbial communities (BMC, Beneficial Microorganisms for Corals) can be responsible for conferring that resistance and resilience to their host. The genetic plasticity of microorganisms consist a rapid and versatile way to modulate the host responses to climates changes. Studies on the symbiotic relationships between resilient corals and their microbial community are of great importance to understand the roles of the microorganisms in this process. Fragments of *Mussismilia hispida* that did not bleach while others did were sampled from Maraú, Brazil. Under microcosm conditions, the fragments were exposed to increases in temperature to 32°C (1°C/day). The microcosm tanks were maintained in a closed system with constant circulation of air and water (10L - 30% renovated each 2 days). The tanks received 400 µmoles.m^{-2}.s^{-1} of light (photoperiod of 12/12 hours). The evaluation for maximum quantum yield of the Photosystem II (Fv/Fm) of the symbiotic algae and the tissue integrity were used as parameters of coral health. The fragments demonstrated resistance even in extreme temperatures (32°C). The four replicates did not show any significant difference for Fv/Fm analysis considering the sample times, suggesting that the colonies were thermally resistant. In addition, coral tissues did not show visible damage corroborating our hypothesis. Analyses of the microbiome at 27°C and 32°C sampling times of the experiment and the ones collected in the field are being performed by the next generation sequencing of the 16S rRNA gene. The differences in the composition and total abundance of these symbiotic microbial communities will help us to better understand which groups of microorganisms are selected or involved in the process of resistance and resilience of corals.

Keywords: Coral reef, climate change, bleaching, resilient coral, beneficial microorganisms for corals, *Mussismilia hispida*.

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