TITLE: CORAL PROBIOTICS: LOCALIZATION AND INTERACTION MECHANISMS IN *POCILLOPORA DAMICORNIS*

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ABSTRACT:

Algae from the family Symbiodiniaceae live in symbiosis with corals, providing photosynthates that are the host's primary source of energy. This symbiosis can be affected by environmental stressors, such as climate change and the increase of ocean's surface temperatures, which induce the expulsion of the algae from the host's cells, and, consequently, coral bleaching. Besides the association with the algae, corals present symbiosis with diverse microorganisms, which can also be destabilized in stressful conditions, impacting the host's homeostasis. This relationship, as well as the microbes' roles in the host's health, lead to the proposal of the term BMC (Beneficial Microorganisms for Corals), and the inoculation of such organisms was suggested to promote coral resistance and resilience. As a proof of concept, an experiment using a BMC consortium was tested aiming to protect *Pocillopora damicornis* corals from the pathogen *Vibrio coralliilyticus* under increasing temperatures. The manipulation resulted in the reduction of bleaching rates when corals were inoculated with BMCs. Even though the beneficial functions of the selected bacteria were hypothesized, their mechanisms of action have not been thoroughly tested, and their distribution in corals has not been evaluated. Therefore, alternative methods of evaluating the host's health, as well as the localization of the BMC in the coral tissues are essential for the understanding of the influence of the consortium in coral health. In this context, we exposed *P. damicornis* fragments to the conditions previously tested in order to measure complementary health proxies, such as respiration and calcification rates, and also to determine the localization of BMCs in their tissues. The calcification ratio will be estimated by the total alkalinity variance method; the respiration ratio will be measured by the variations in oxygen levels in water containing dark-adapted corals, and the location of the microbes will be traced through fluorescence in situ hybridization, using probes targeting the pathogen and the bacteria from the consortium. The expected results include the localization of the manipulated species in the corals' tissues and the maintenance or increase of the calcification ratios of the animals treated with the consortium. These results can help the comprehension of the roles of the probiotics in coral health, which can be of value for the survival of reefs through global environmental impacts.

Keywords: marine probiotics, microbial ecology, coral bleaching, *Pocillopora damicornis*

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