Dynamic interactions between commensal bacteria and opportunistic pathogens of the coral holobiont

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Coral reefs are some of the most diverse ecosystems on Earth. Unfortunately, coral reefs are under increasing stress due to changes in their environment and with this increased stress their susceptibility to disease is increased. *Vibrio coralliilyticus* has been identified as the causative agent of temperature-induced bleaching and white syndrome in Indo-Pacific corals and *Serratia marcescens* is a causative agent of white pox disease in Caribbean corals. The mechanisms and pathways utilized by these opportunistic pathogens during onset of disease lesions have not been fully elucidated. Early infection usually involves attachment and colonization of mucosal surfaces of the host. During this time, the pathogen must interact and outcompete a native community of bacteria in order to mount an attack. We have demonstrated that this native microbial community can inhibit some of the known virulence mechanisms exhibited by opportunistic pathogens such as swarming surface motility, enzyme expression, and biofilm formation, while not affecting the overall growth of the pathogen. As the virulence of *V. coralliilyticus* is temperature dependent, we demonstrated that at ambient reef temperatures (25°C) coral commensal bacteria are able to co-exist with *V. coralliilyticus* but at elevated temperatures (30°C), the coral pathogen dominates the system and the commensal bacteria are virtually undetectable. To further characterize early coral infection and disease progression, a stable green fluorescent strain was constructed for visualization of the pathogen during various stages of coral infection. Elucidation of these important virulence behavior mechanisms is a vital step to understanding and managing marine diseases.