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MSc in Marine Ecology

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Summary

The overall aim of this PhD project is to investigate the ecological role of crustose coralline algae (CCA) as a substrate for early stages of seaweeds and corals in reef environments, and elucidate the mechanisms of these interactions, generating useful information for the conservation of coral reefs. Preliminary results from this study indicate that common CCA species in the Great Barrier Reef can naturally deter seaweed spore settlement by chemical, microbial and physical mechanisms. This output is crucial and timely, because many coral reefs worldwide are currently undergoing phase shifts from reef building organisms such as corals to dominance by seaweeds, as a result of global and local anthropogenic threats. CCA are also important in coral reefs as they induce the settlement of corals. Many coral species do not settle in the absence of CCA, making these algae fundamental to coral reef resilience. However, the specific mechanisms by which CCA induce coral settlement are not completely understood. I provided experimental evidence indicating that coral settlement is mainly driven by secondary metabolites produced by CCA, but CCA-associated bacteria play a complementary role in the settlement induction, which in turn is mediated by primary metabolites released by CCA. There is scarce information on the chemical characterization of CCA cues that act as natural inducers of coral settlement. I identified two novel coral settlement inducing compounds produced by the CCA *Titanoderma* sp. These compounds induce significant levels of settlement of several species of *Acropora* corals, from distant geographical areas. Therefore, these compounds can be potentially synthesized and used for coral reef restoration, by enhancing coral settlement rates on degraded reefs. Understanding the mechanisms by which CCA prevent seaweed proliferation and how CCA induce coral settlement contributes to the ecological knowledge of this important group of reef building organisms.

Research Expertise

- Marine benthic ecology
- Coral settlement
- Marine macroecology