Behavior of *Porites astreoides* larvae exposed to waterborne chemicals

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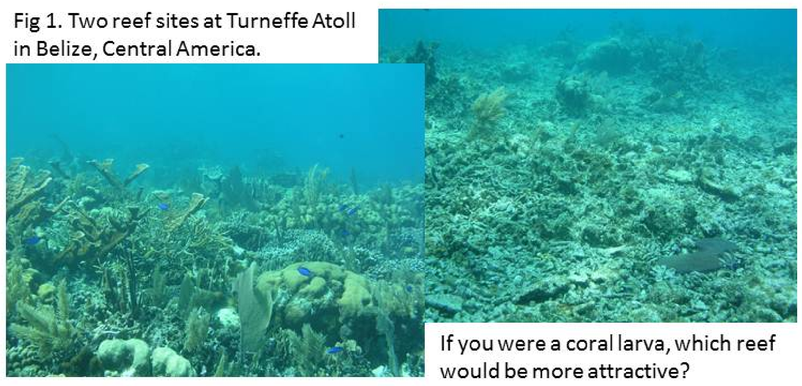
Introduction

It is unclear whether the lack of coral recovery observed on many degraded reefs in the Caribbean is due to increased mortality of coral juveniles or changes in the inherent properties of reefs that have decreased their attractiveness to dispersing larvae (Fig. 1). In previous studies (Gleason et al. 2009), we showed that waterborne chemicals may contribute to "reef attractiveness" by signaling coral larvae to navigate downward and begin benthic probing. The goal of the project outlined here was to more clearly define which reef components release these chemicals.

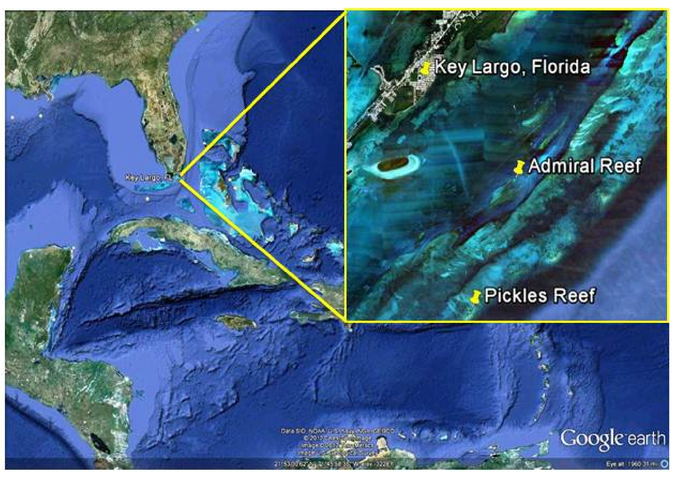
Fig 1. Two reef sites at Turneffe Atoll in Belize, Central America.



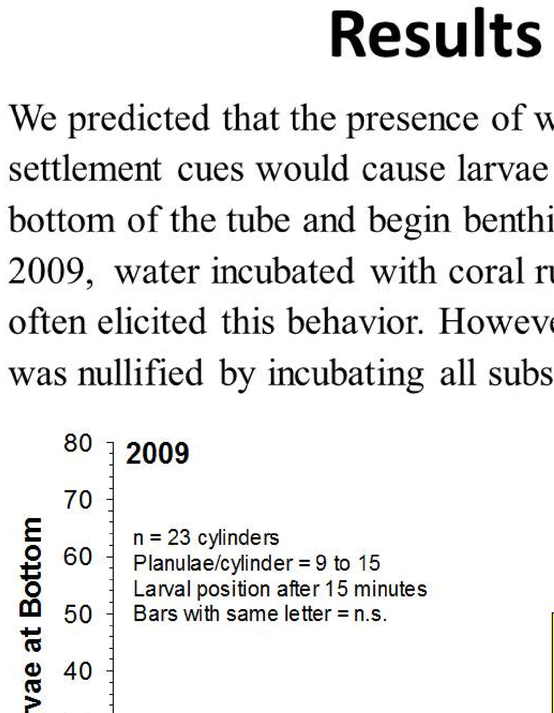
If you were a coral larva, which reef would be more attractive?

Methods

Planulae were obtained from the brooding Caribbean coral, *Porites astreoides*. In 2009, colonies were collected from both Admiral and Pickles Reefs off Key Largo, FL, U.S.A. In 2010, colonies were only collected from Pickles Reef.



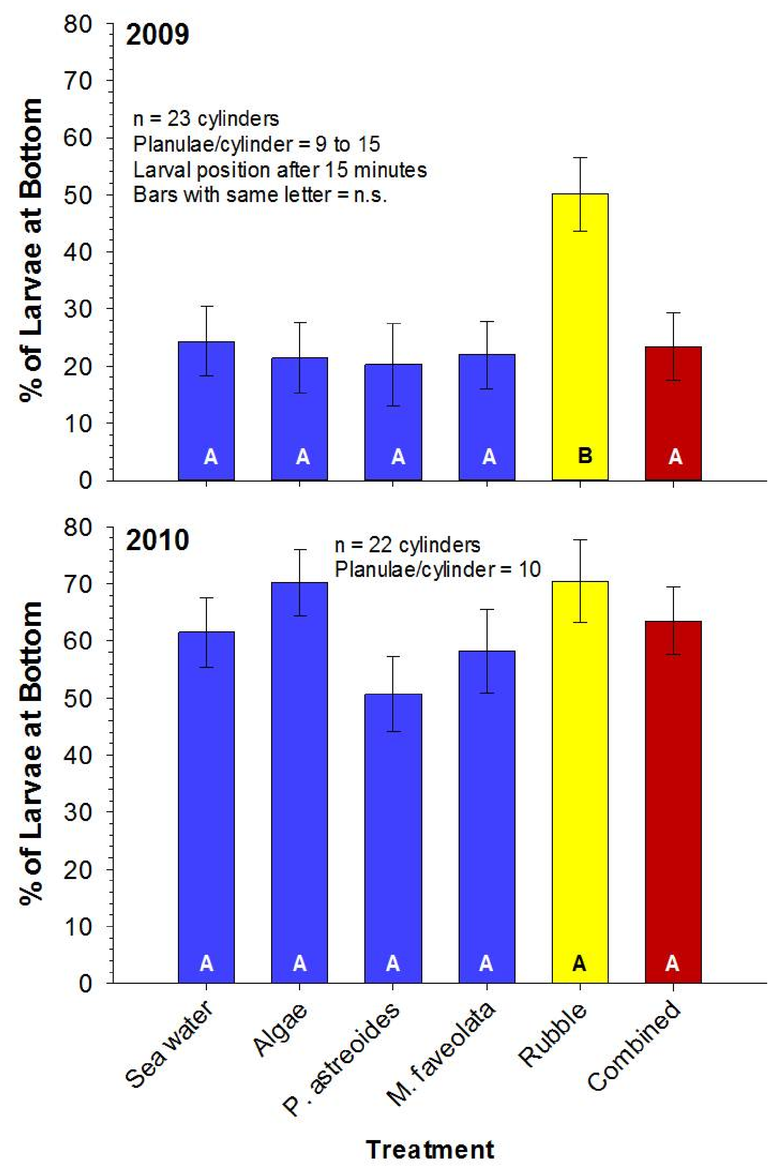
Colonies were held in buckets and overflow tubes directed larvae (~1 mm in diameter) into PVC cups where they were harvested.



Waterborne cues were obtained by incubating combinations of four substrates in artificial seawater for 1 h. The control was seawater with no substrate. The effects of released chemicals on larval behavior were tested in 500ml graduated cylinders containing the incubated sea water. Larvae were added to each cylinder and their vertical positions determined after 15 min.

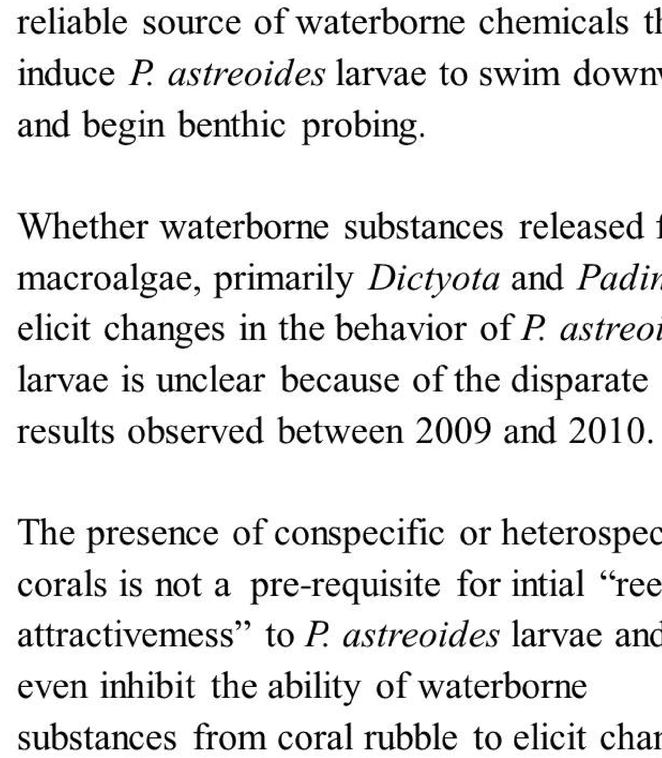
Results

We predicted that the presence of waterborne settlement cues would cause larvae to swim to the bottom of the tube and begin benthic probing. In 2009, water incubated with coral rubble most often elicited this behavior. However, the effect was nullified by incubating all substrates together.



In contrast to 2009, in 2010 a greater percentage of larvae swam to the bottom in all treatments and there were no differences among substrate types.

In 2010 we also considered the interactive effects of water soluble cues released from coral rubble with those from each other substrate.



Incubating sea water with a combination of rubble and macroalgae was significantly more effective at altering larval behavior than pairing rubble with a conspecific coral.

Summary and Conclusions

- Coral rubble and its resident biota provide a reliable source of waterborne chemicals that induce *P. astreoides* larvae to swim downward and begin benthic probing.
- Whether waterborne substances released from macroalgae, primarily *Dictyota* and *Padina*, elicit changes in the behavior of *P. astreoides* larvae is unclear because of the disparate results observed between 2009 and 2010.
- The presence of conspecific or heterospecific corals is not a pre-requisite for intial "reef attractivemess" to *P. astreoides* larvae and may even inhibit the ability of waterborne substances from coral rubble to elicit changes in larval swimming behavior.

Acknowledgements

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