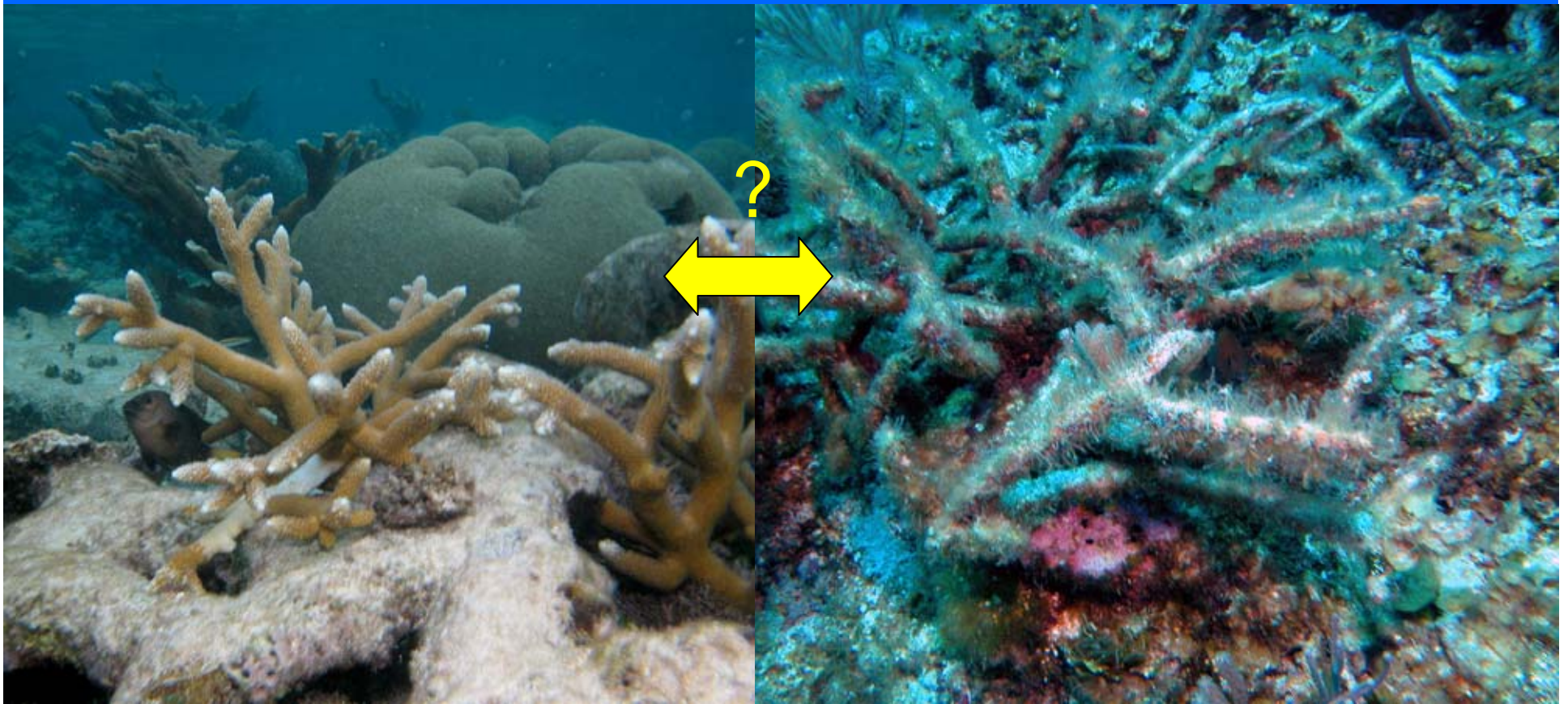
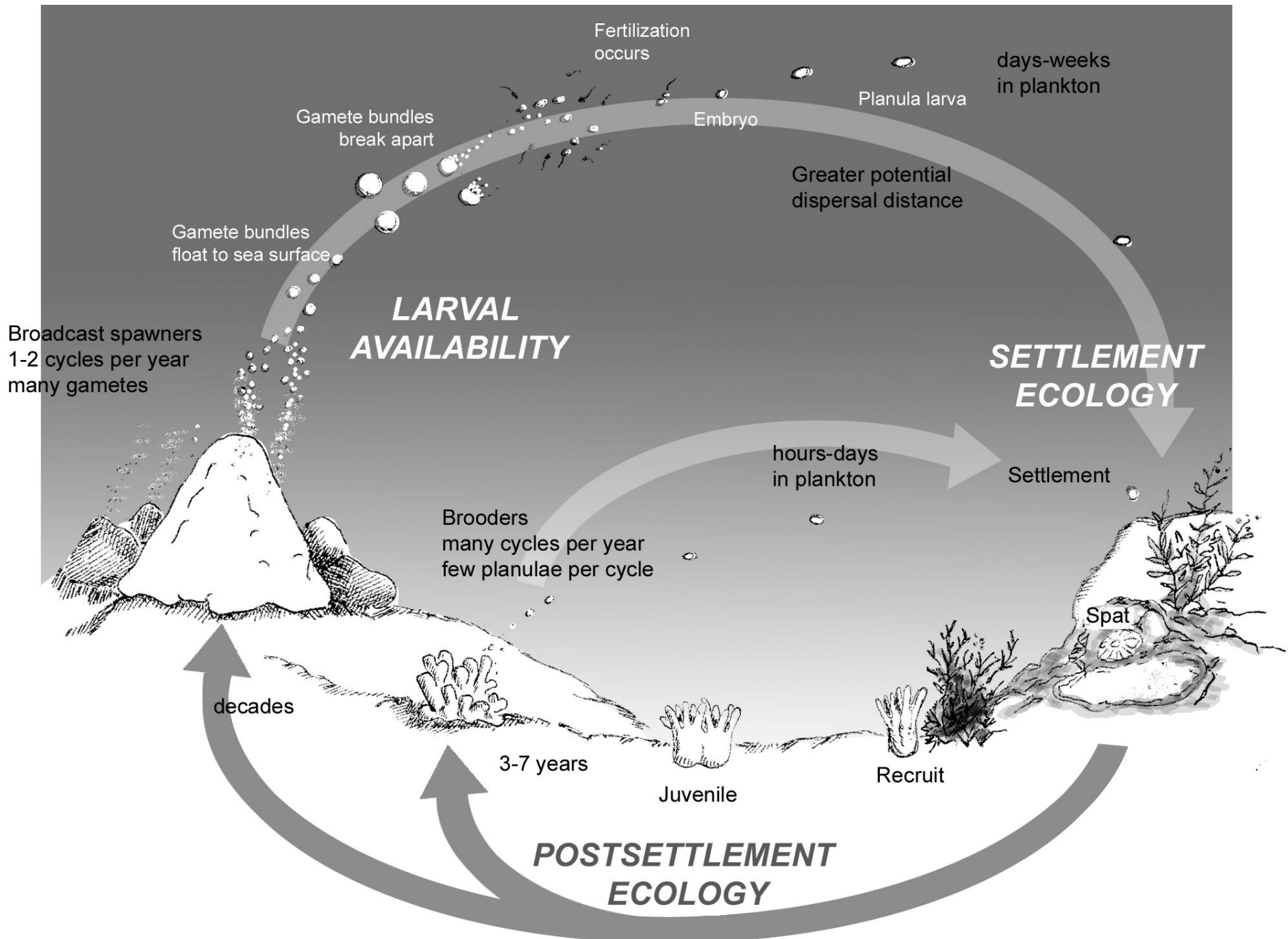


Towards a Better Understanding of Coral Recruitment

Raphael Ritson-Williams and Valerie J. Paul
Smithsonian Marine Station at Fort Pierce
Suzanne Arnold and Robert Steneck
Darling Marine Center, University of Maine

What habitat is necessary for coral recruitment?





Ritson-Williams et al., 2009, *Smithsonian Contrib. to Marine Sci*; 38: 437-457

Spawners vs. Brooders

Acropora palmata



Favia fragum



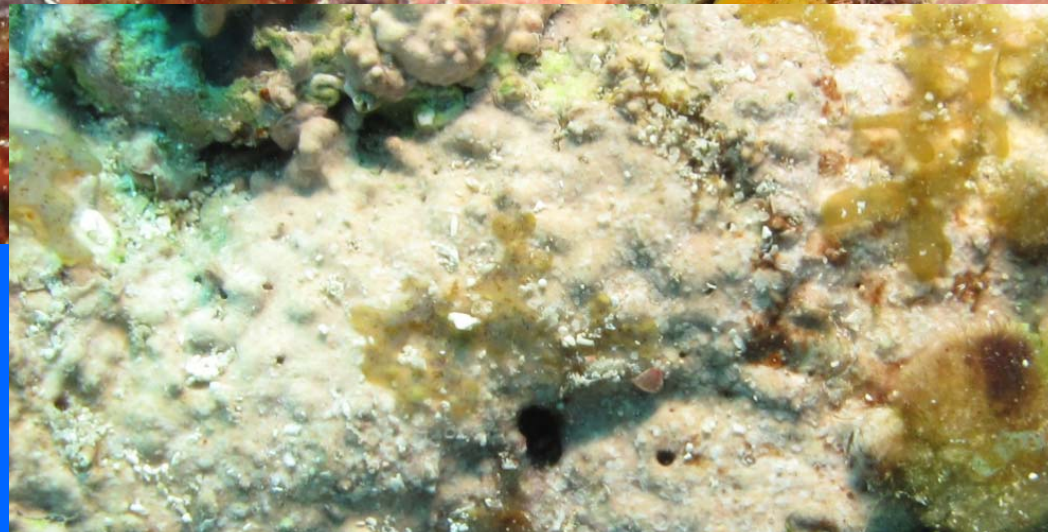
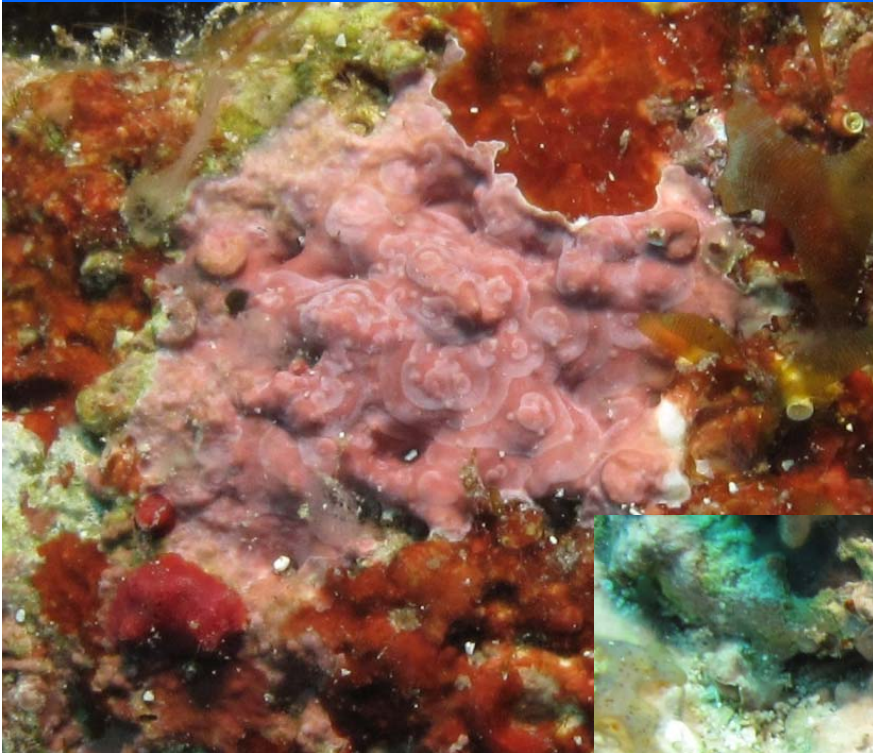
Diploria strigosa

Porites astreoides

The Coralline Algae

Titanoderma prototypum

Hydrolithon boergesenii

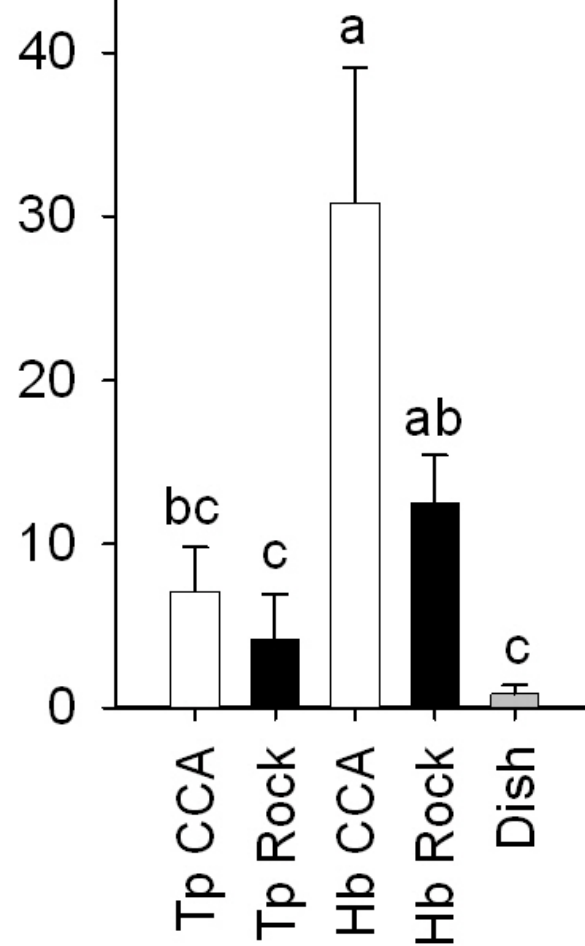
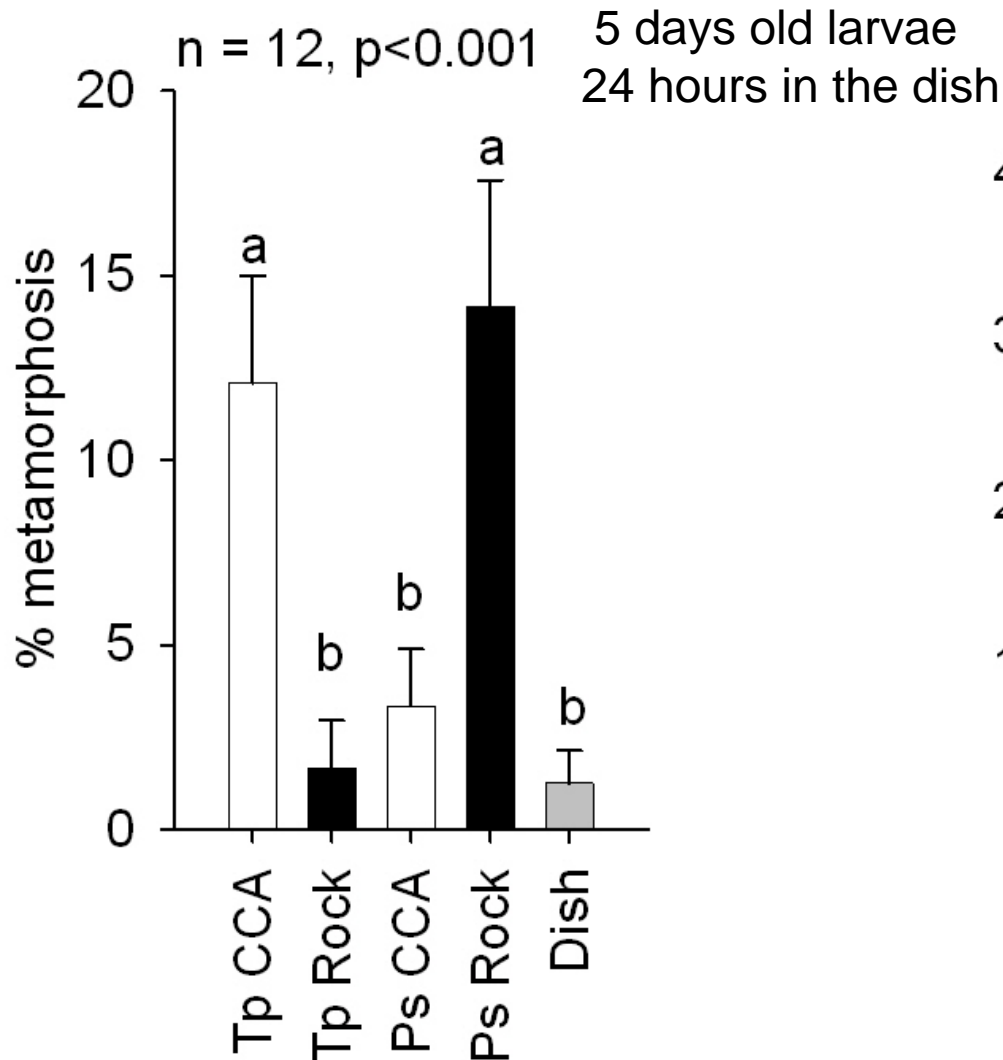


Paragoniolithon solubile

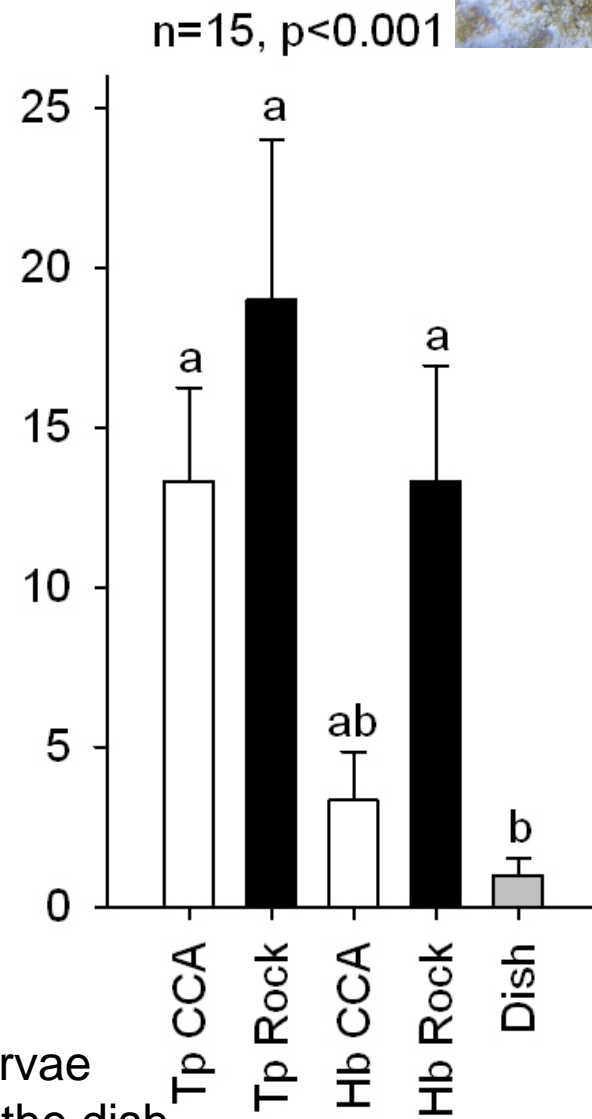
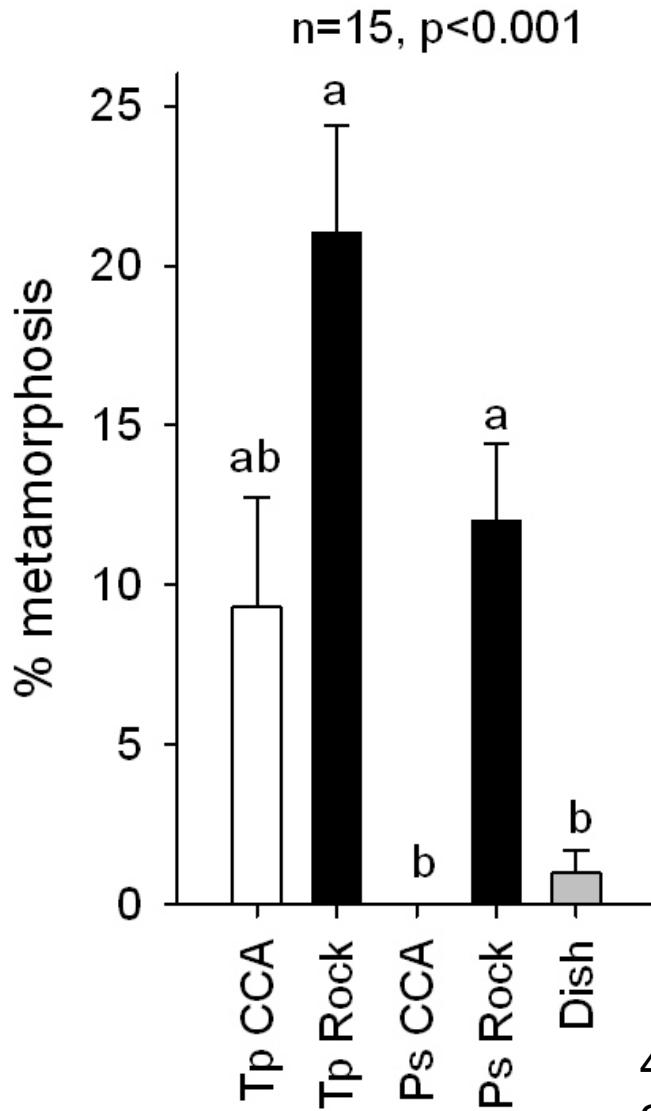
Larval Settlement Substrates



Acropora palmata Settlement Behavior

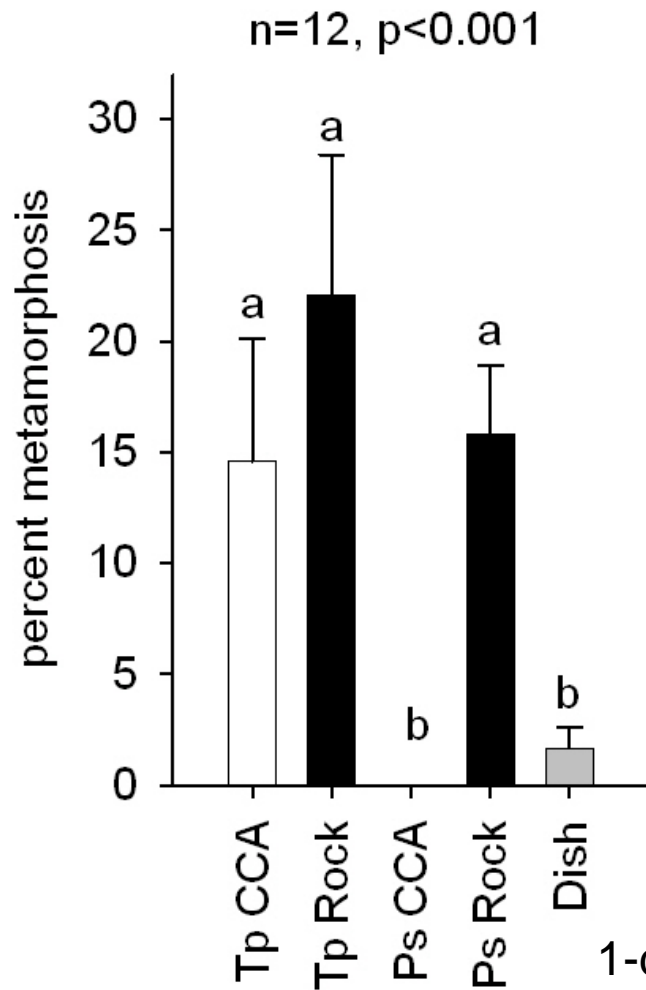


Diploria strigosa Settlement Behavior

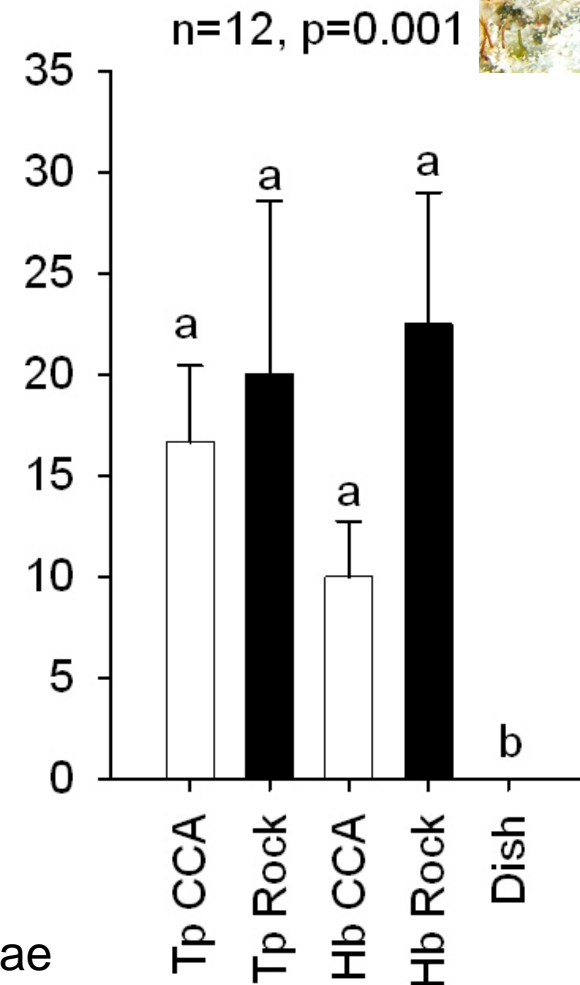


4-day old larvae
24 hours in the dish

Favia fragum Settlement Behavior



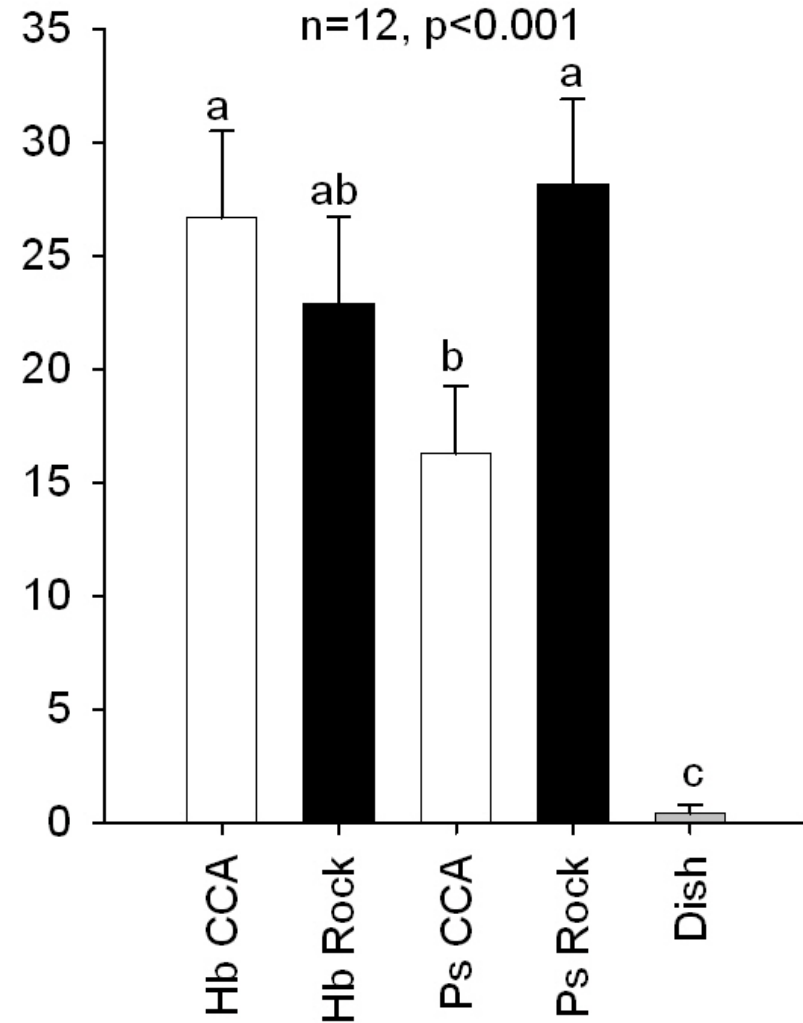
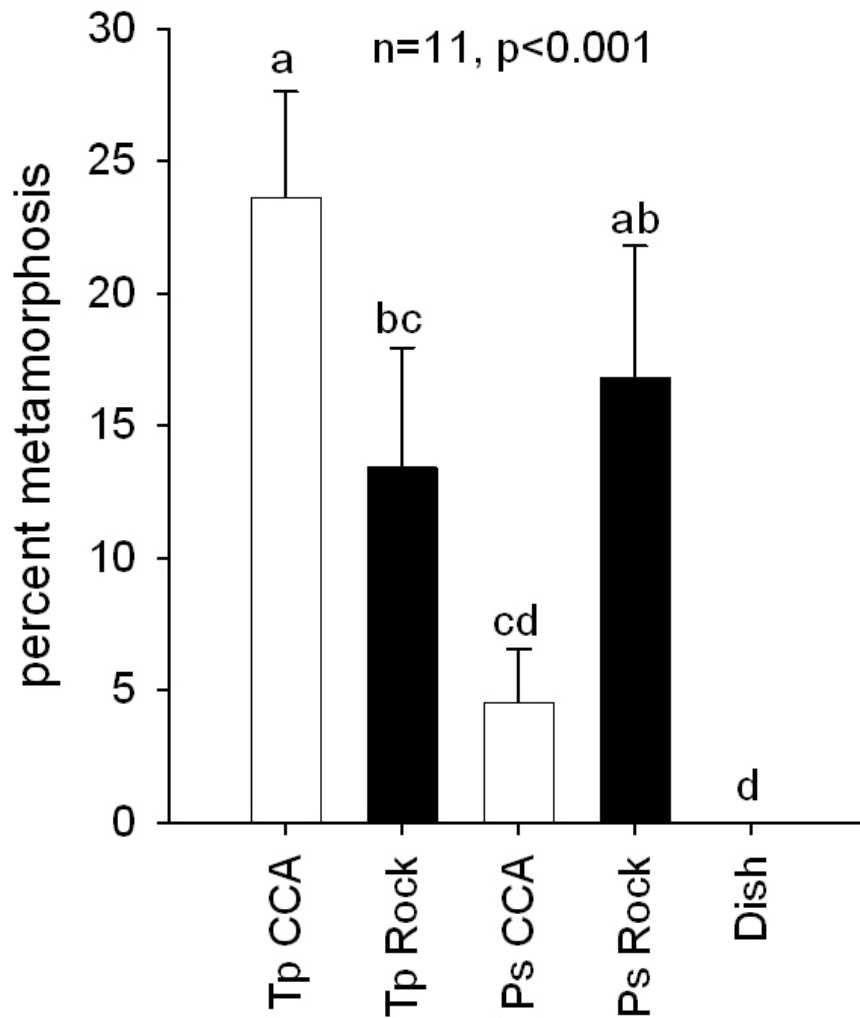
1-day old larvae
24 hours in the dish



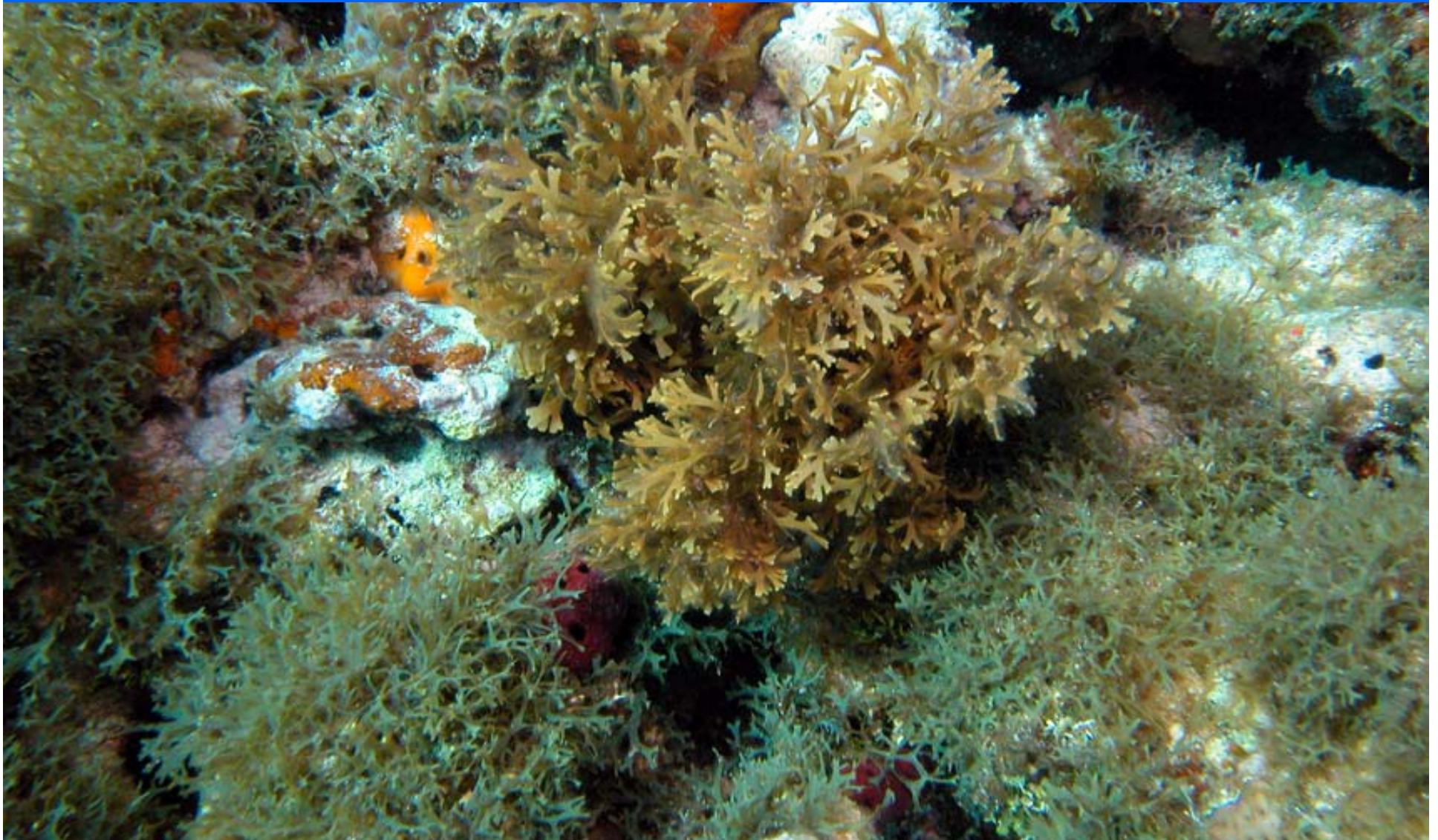
Porites astreoides

Settlement Behavior

4-day old larvae
24 hours in the dish



Live macroalgae and cyanobacteria can deter coral settlement



Kuffner et al., 2006. *Marine Ecology Progress Series*; 323; 107-117

Effects of *Dictyota* spp. on *Porites astreoides*



- 1) Live *Dictyota pinnatifida*, *Dictyota pulchella* and both crude extracts reduced larval survival.

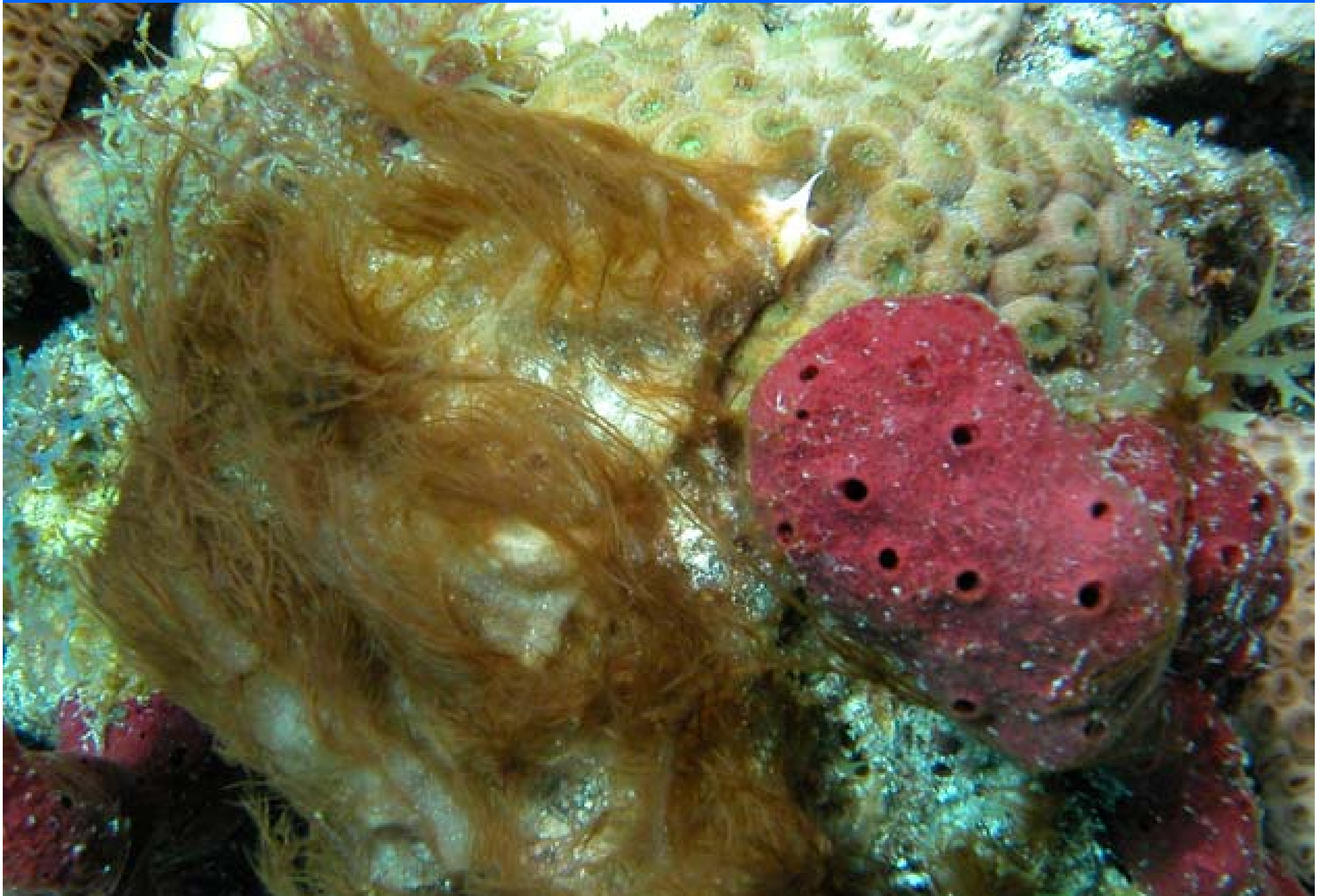
- 2) Recruits were killed by *Dictyota pulchella* extract.



- 3) In adult colonies, PAM measurements indicated that *Dictyota pinnatifida*, *Dictyota pulchella* and their extracts did not cause physiological stress.



Cyanobacteria inhibit recruitment



Global vs. Local Stressors

Global stressor

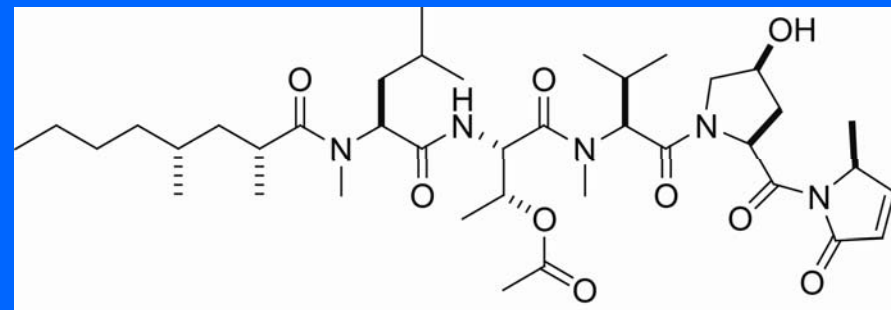
We compared 27° C to 30° C seawater temperature.

This ocean temperature was achieved in the Fl. Keys every year from 1998-2008.

<http://www.ndbc.noaa.gov/maps/Florida.shtml>

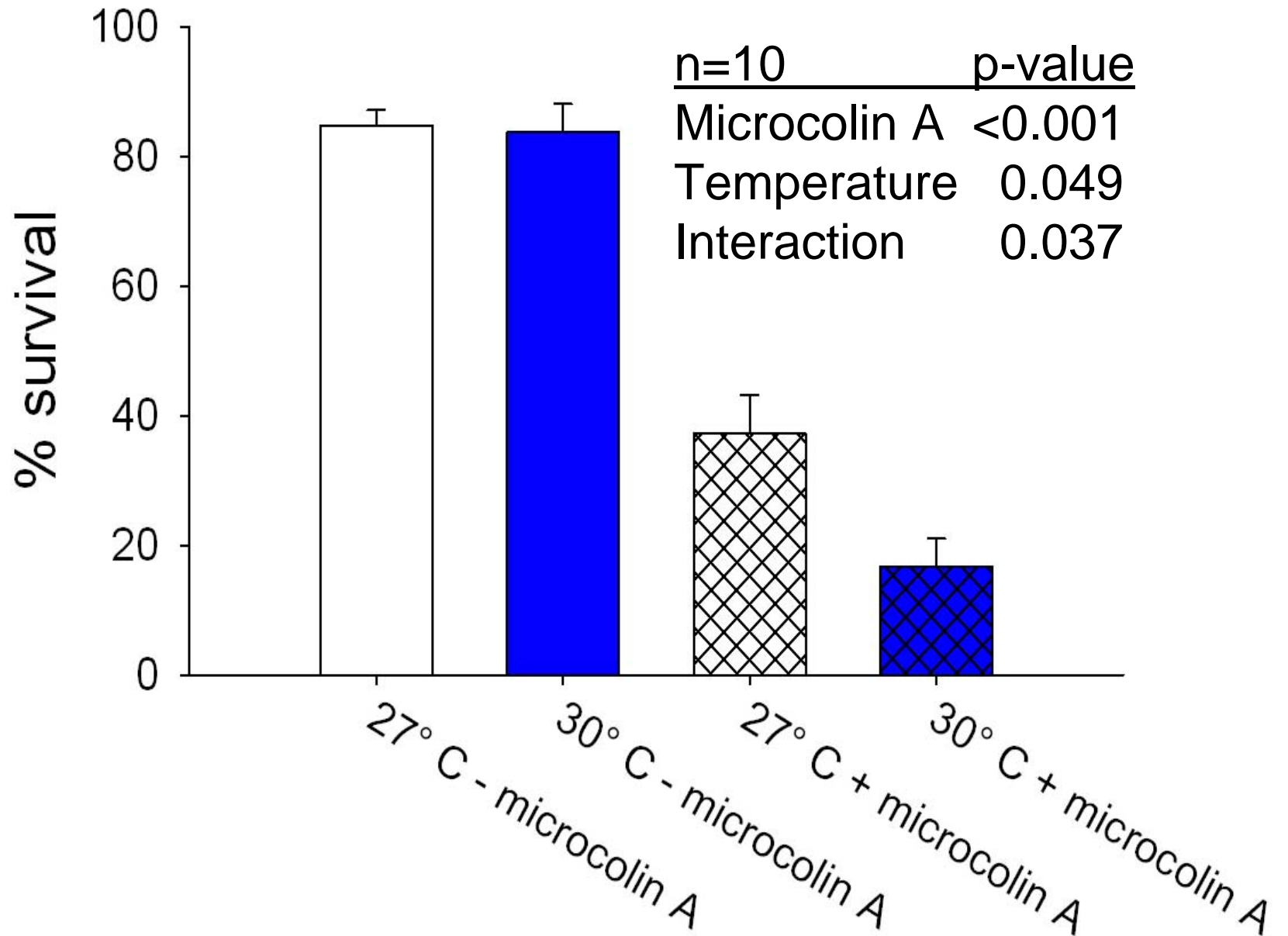
Local stressor

Microcolin A was isolated from the Florida cyanobacterium *Lyngbya polychroa*.

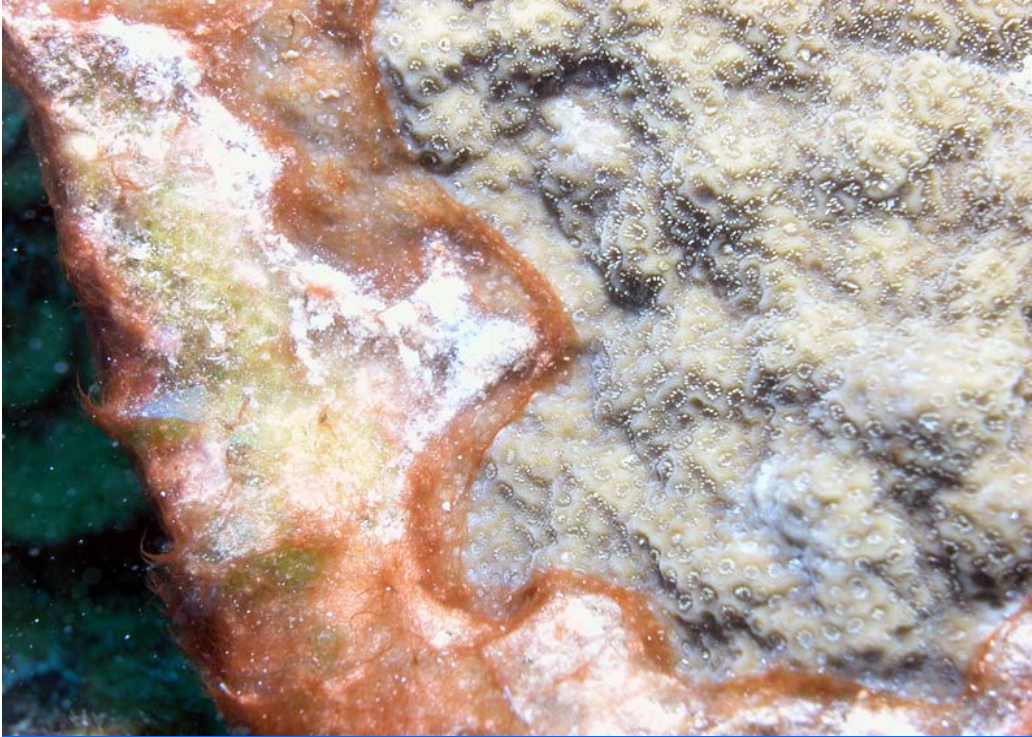


T. Meickle et al., (2009) *Planta Med.* **75**, 1427-

Larval Survival



Global and Local Stressors



Local stressors such as the presence of cyanobacteria can greatly reduce coral survival and settlement through allelopathy.

A global stressor such as increased seawater temperature interacted with local stressors to kill coral larvae.



Special Thanks

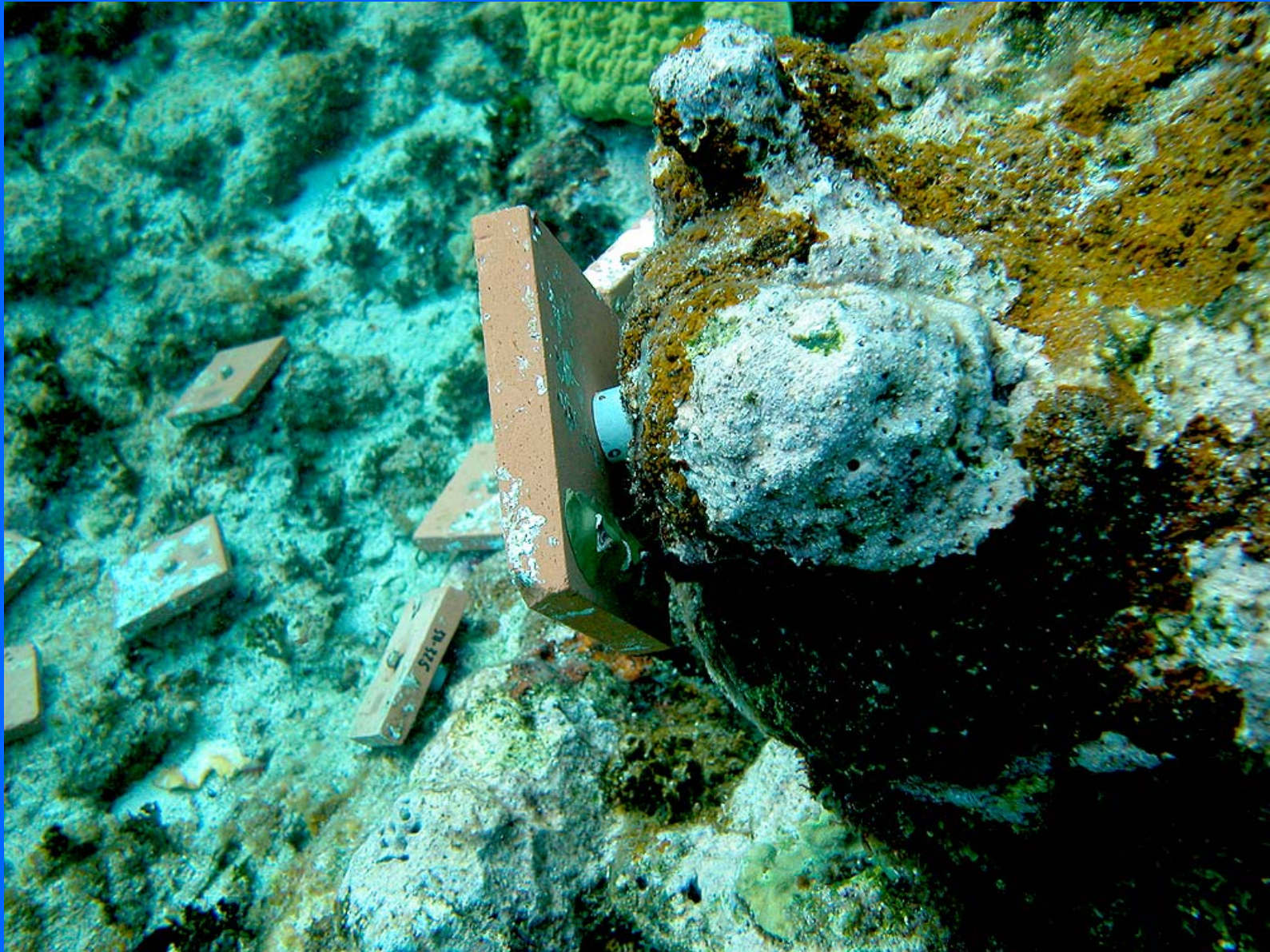
- Florida Keys Marine Sanctuary for permits
- The staff of Mote Tropical Research Laboratory
- Nikki Fogarty
- Angel Virgilio
- Rory Nicolaides
- Erin Hoover
- Lilibeth Salvador
- Vicky Pittman
- Theresa Meickle
- Koty Sharp
- Kathy Morrow
- Kim Ritchie
- Mikel Becerro

Funding

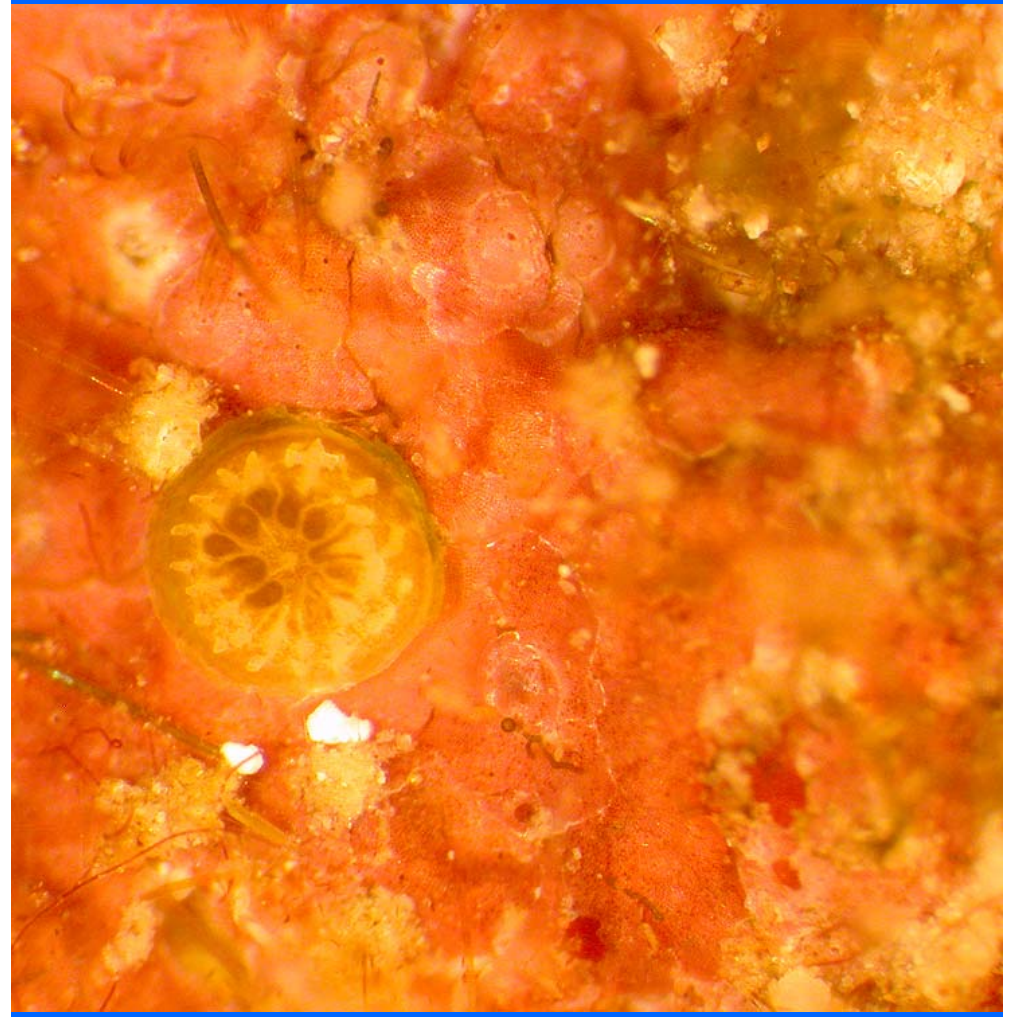
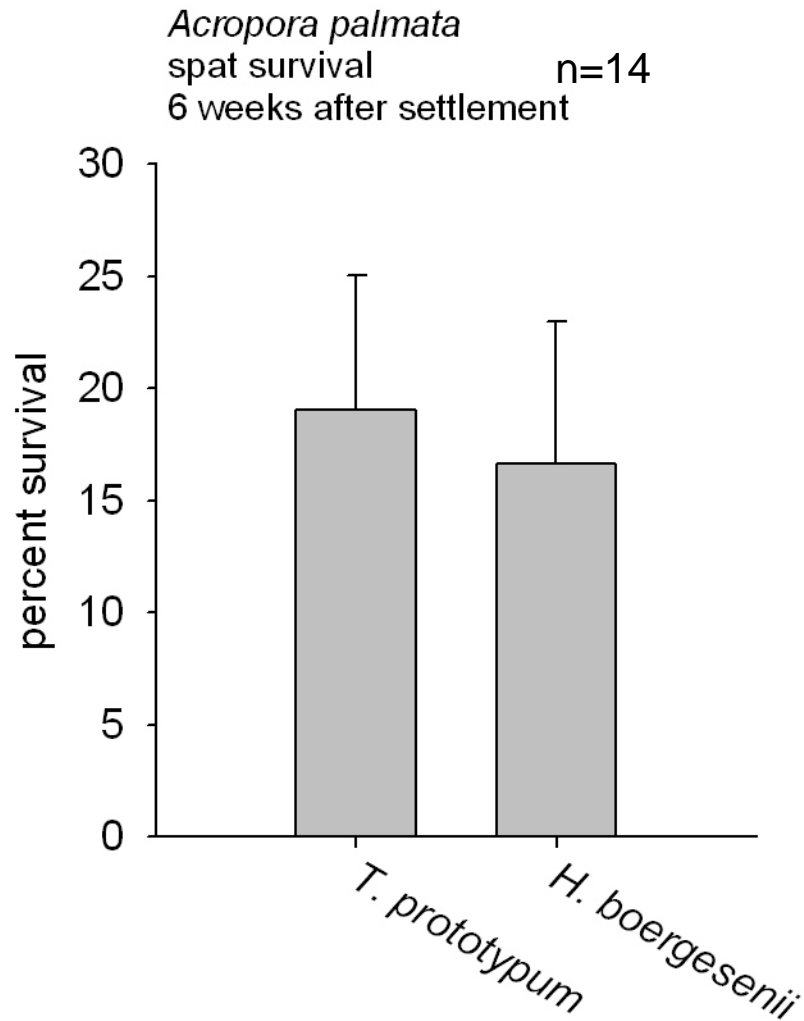
- Mote Protect Our Reefs Grants 2006-18 and 2007-30
- The Hunterdon Fund at the Smithsonian Institution
- USGS Eastern Region State Partnership Program



Post-settlement survival

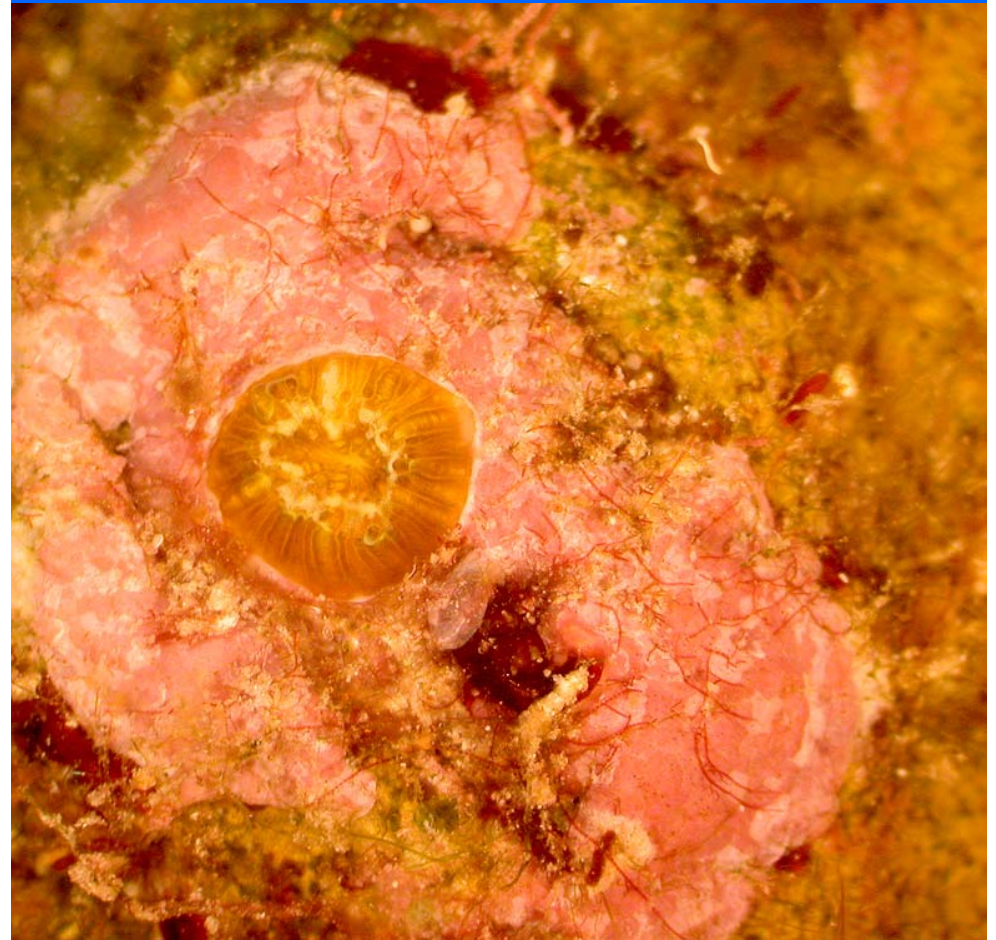
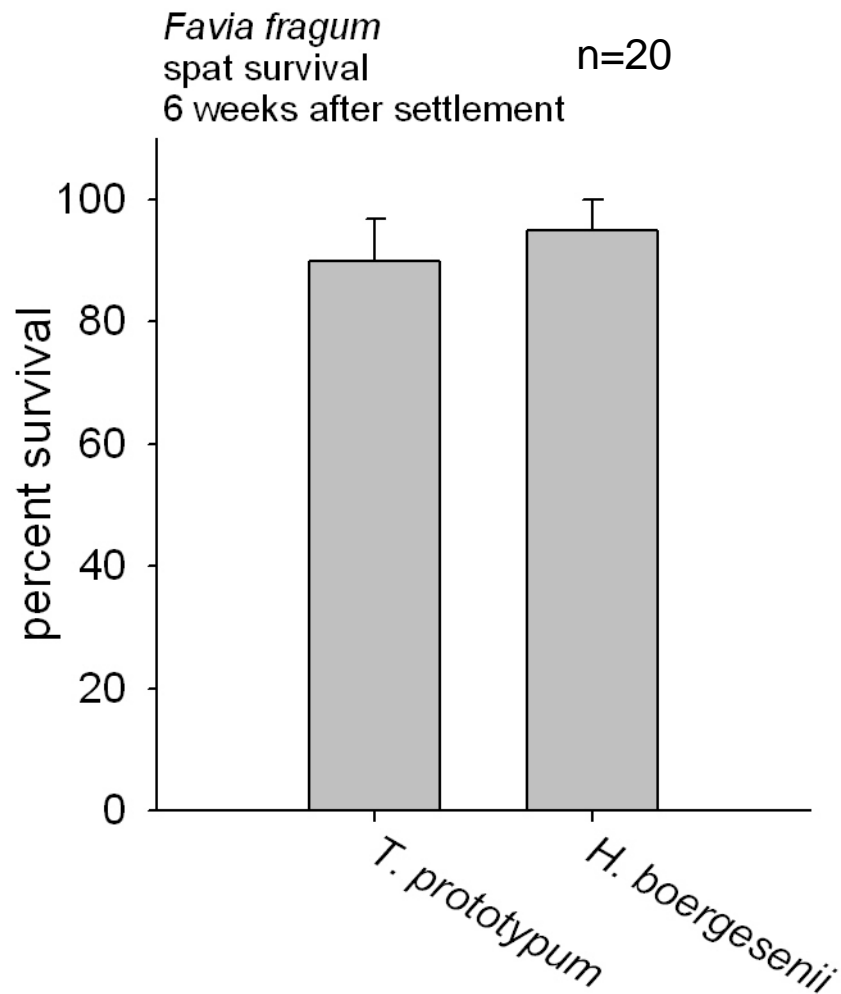


A. palmata post-settlement survival



Wilcoxon Signed Rank Test $p=0.490$

Favia fragum post-settlement survival



Wilcoxon Signed Rank Test $p=0.50$

Spawners vs. Brooders post-settlement survival

25 days on the reef. Aug 2010

