Coral settlement and early post-settlement survivorship: Experimental studies of factors that affect recruitment success

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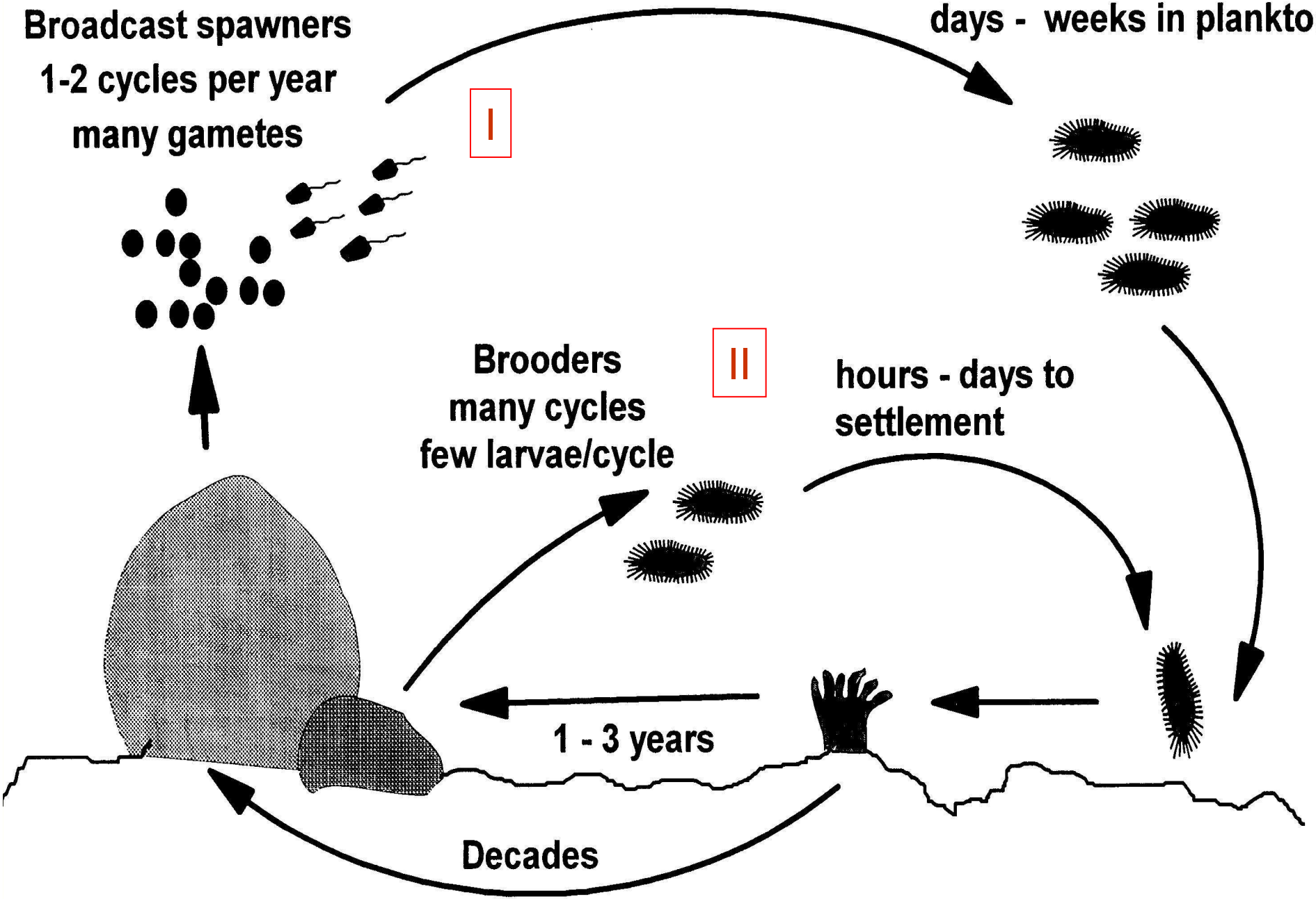
Coral Life Cycles




THE IDEAL SITUATION
19 colonies from 8 species

CARIBBEAN CORAL REEFS HAVE LOST MUCH OF THEIR LIVE CORAL COVER, BUT RECRUITMENT RATES HAVE BEEN LOW AND CORAL POPULATIONS ARE NOT RECOVERING VERY QUICKLY OR AT ALL.

WHY NOT?

Poor settlement ?

Poor post-settlement survivorship?

We need to understand factors that affect coral recruitment success in order to understand coral reef resilience,

and to be able to develop management interventions to help with coral restoration and recovery

Factors that Affect Post-Settlement Survivorship

- competition with surrounding encrusting organisms
- species composition of encrusting community
- predation
- nutritional resources/access to light

Affected by...

- grazer community composition
- weather, tides, storms
- water quality conditions
- *plain ol' LUCK???*

PROPOSED 'Post-Settlement' RESEARCH:

1. **Settlement plates Pre-settled (in lab) with cultured larvae, mapped and then examined monthly after deployment**

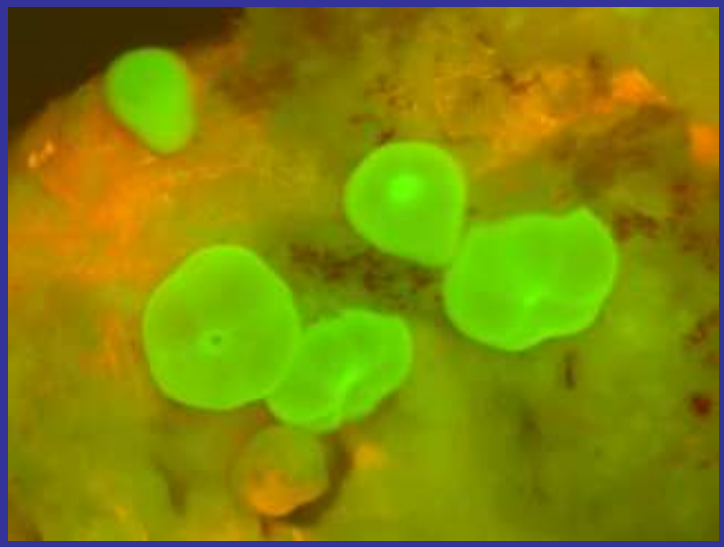
2. **Deploy plates along environmental gradients of interest using subset of CRES recruitment sites**

3. **Settle plates with 3 different coral species with different sizes and recruitment dynamics (*M. faveolata, A. palmata and D. strigosa*)**

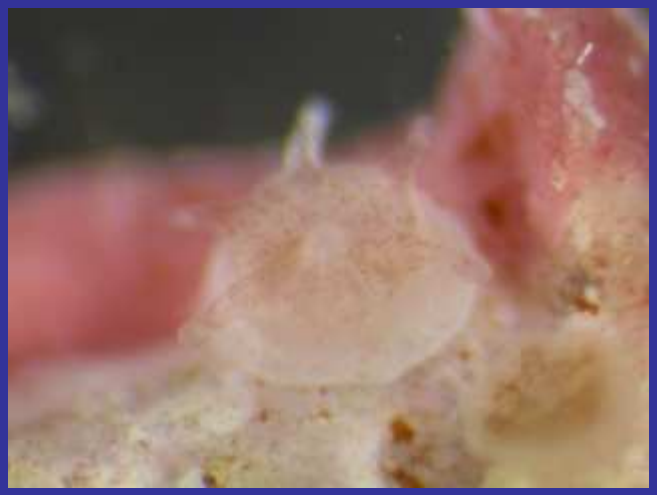
METHODS

- These methods have been used in Florida to study survivorship of *M. faveolata, M. cavernosa and* and *A. palmata* settlers.
- Similar approach to be used in Parguera to:
  - Compare sites
  - Examine natural settlement rates
  - Post-settlement survivorship rates

Coral larvae usually settle next to but not on CCA; often cryptic and difficult to locate

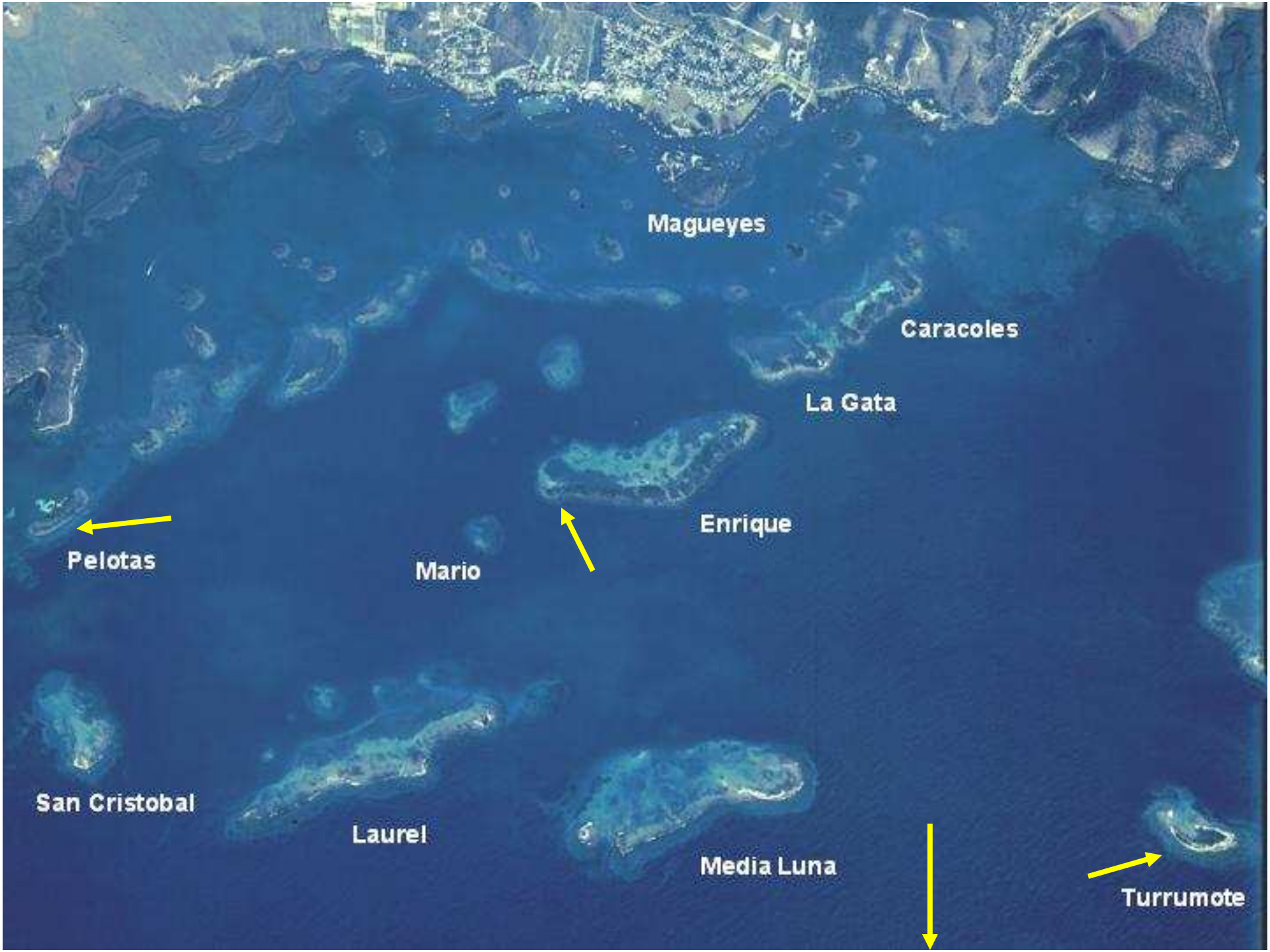


Fluorescent microscope helps quickly find the newly settled corals



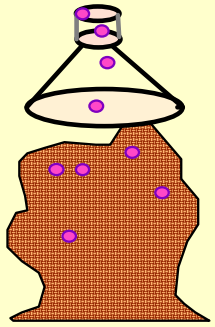
M. faveolata **two weeks old**

A. palmata **two weeks old**

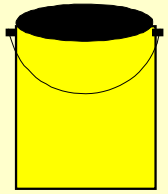

Magueyes
Caracoles
La Gata
Enrique
Pelotas
Mario
San Cristobal
Laurel
Media Luna
Turrumote

CORAL CULTURING FROM SPAWN

(1) Collect spawned gamete bundles

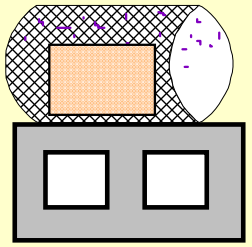


(2) Fertilize in bucket (on boat or in lab)

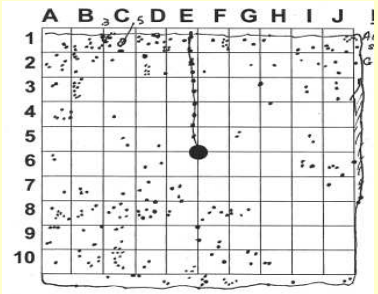


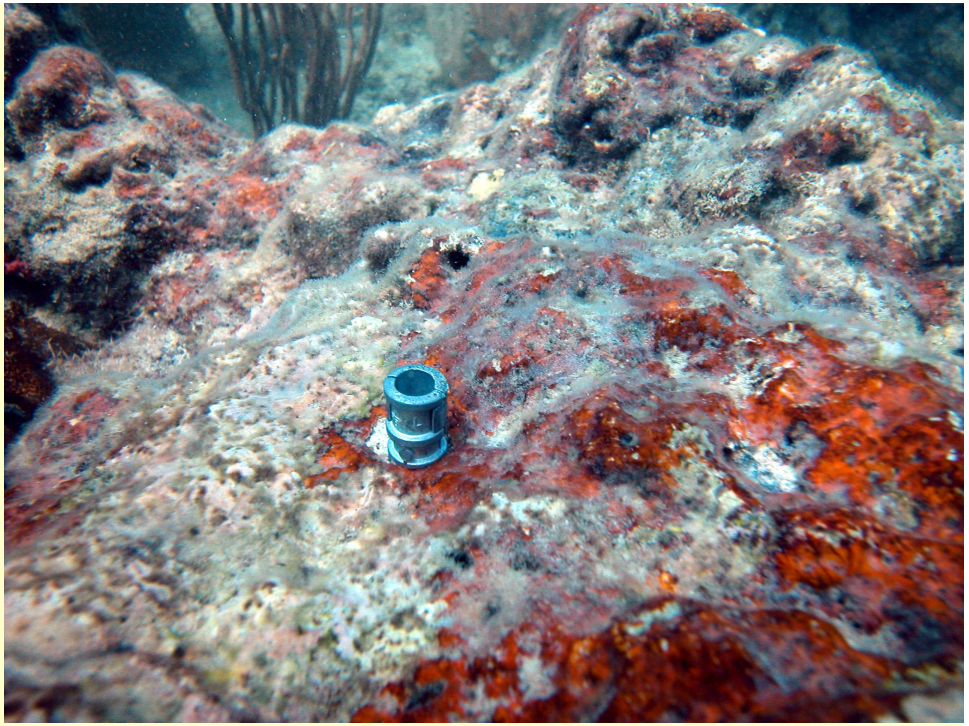
(3) Culture coral larvae in the laboratory until they are mature enough to settle (4 to 8 days depending on species

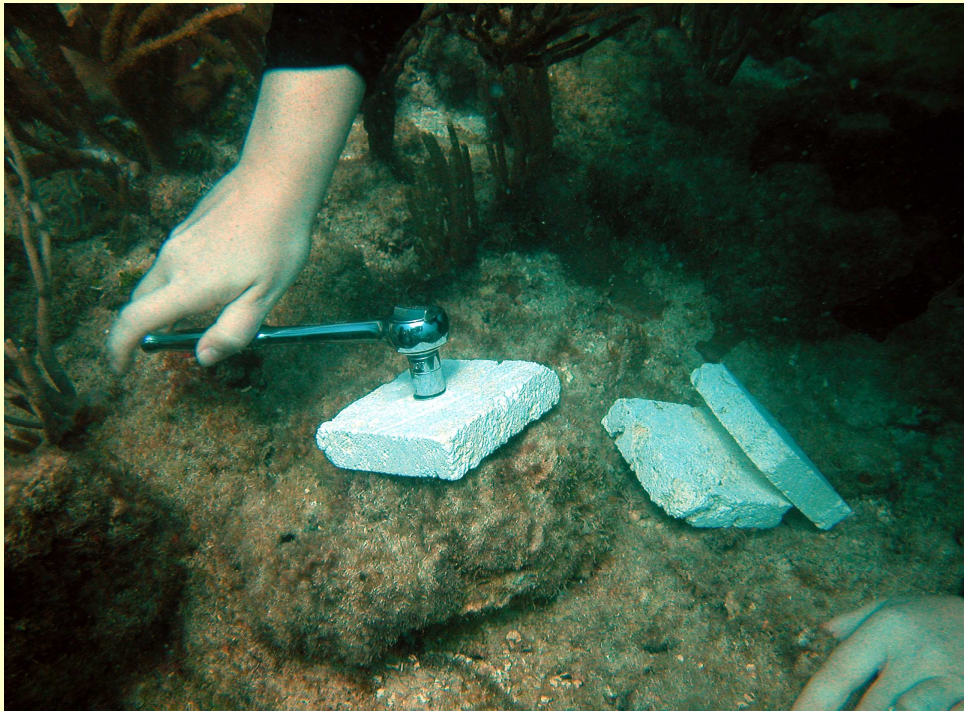
(4) Place larvae in mesh chambers or aquaria with aged settlement plates until larvae settle



(5) Settled spat mapped on plates under a micsroscope and then plates deployed on reef; plates are retrieved and re-examined to follow survivorship







PROGRESS

- **April 2005**
  - **250 limestone settlement plates shipped to PR for experiments**
- **June 1- 6, 2005**
  - **Deployment of settlement plates for "curation period"**
    - **Buoy site - 30 plates at 20 m**
    - **Turrumote – 30 plates at 5 m and 30 plates at 10-12 m**
    - **Pelotas – 15 plates at 5 m (to much bioerotion)**
    - **Enrique – 20 plates at 5 m and 20 plates at 10-12 m**
  - **Extraction from CCA (*Peissonellia sp*.) that has been found to induce coral larvae settlement to isolate fraction to be tested in August**
  - **Pre-proposal submitted to CCRI-CMRC rfp to expand this study so we can understand the process of early coral spat settlement.**

Near future

- **August 20–30**
  - **Bring colonies to Lab – place in tanks**
  - **Bring “cured” plates to lab**
  - **Allow corals to spawn and eggs to be fertilized – larvae development - settlement**
  - **Settlement in controlled environment**
  - **Count and map number of settlers in each plate.**
  - **Re-deploy to field**