

Genetic Variability in *Acropora palmata* and *A.cervicornis*

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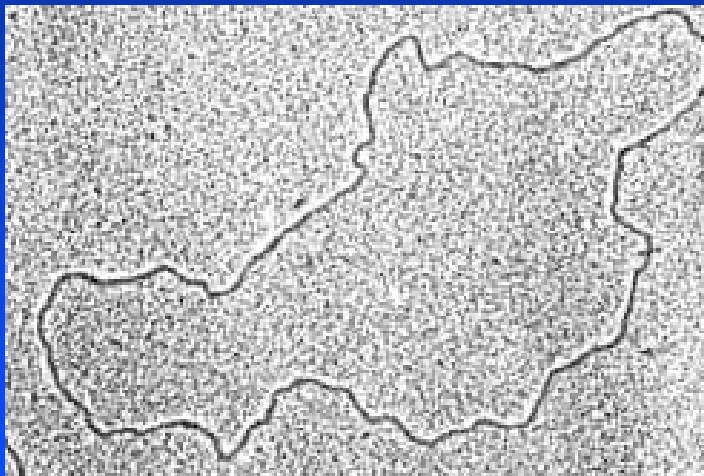
University of Puerto Rico, Mayagüez



Goal of this proposal

- Evaluate the genetic variability of *A. cervicornis* and *A. palmata* at different levels of tissue organization

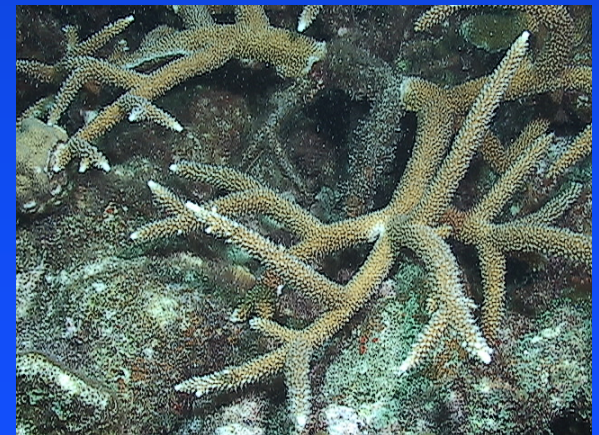
mtDNA



A. palmata



A. cervicornis



Hierarchical Design

We will evaluate levels of genetic diversity:

- 1) Within discrete patches of *Acropora***
- 2) Among discrete patches of *Acropora* within sampling locations**
- 3) Among sampling locations within islands**
- 4) Among different islands**

Proposed Sampling Locations of *Acropora*



Course of Action

- Develop a reliable DNA extraction technique in *Acropora*
- Optimize PCR amplification conditions for 4-6 genes per specimen
- Expand collection of *Acropora* to other locations
- Analyze data

Proposed Schedule

■ January 2005-Summer 2005

Training of graduate student

Primer ordering

Collection of fresh coral tissue (local)

DNA extraction

PCR optimization

■ Fall 2005-Summer 2006

Collection of *Acropora* from all locations

Collection of data

Data Analysis

Manuscript Preparation

Joselyd Garcia (MS student) collecting polyps of *Acropora cervicornis*



DNA work in the lab



Sequenced Regions from both *Acropora* species

Gene	Sequence Length
*Control Region	673 bp
ITS region	239 bp (<i>A. palmata</i>); 188 bp (<i>A. cervicornis</i>)
<i>Calmodulin</i> intron	357bp
<i>PaxC</i> intron	507 bp
In Total	1776 bp

* Mitochondrial DNA

Collection site: Cayo Laurel, La Parguera

3 individuals of *A. palmata* and 1 individual of *A. cervicornis*

Control Region (673 bp)

Polymorphism (*A. palmata*, n=3)

0

Divergence (palm vs cerv)

15.76% (106 mutations)

Calmodulin Intron (357 bp)

Polymorphism (*A. palmata*, n=3)

0

Divergence (palm vs cerv)

17.65% (63 mutations)

PaxC Intron (507 bp)

Polymorphism (*A. palmata*, n=3)

0

Divergence (palm vs cerv)

0.39% (2 mutations)

ITS region (239 bp)

Polymorphism (*A. palmata*, n=2)

1

Divergence (palm vs cerv)

5.9% (11 mutations out of 188)

4 putative sequence gaps in the ITS alignment

A_palmata1ITS

A_palmata2ITS

A_cerv1ITS

TGATCACACATCTTTGTTACTTAGTCAGTCGGACCTCGGCT

TGATCACACATCTTTGTTACTTAGTCAGTCGGACCTCGGCT

T-----TTG--AATCAGTCAGTCGGACCTCGGTT

*

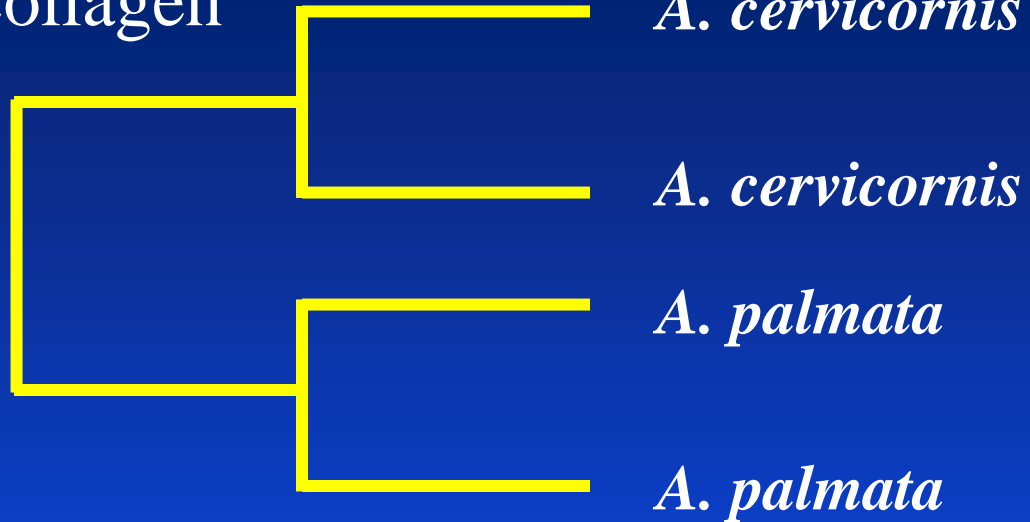
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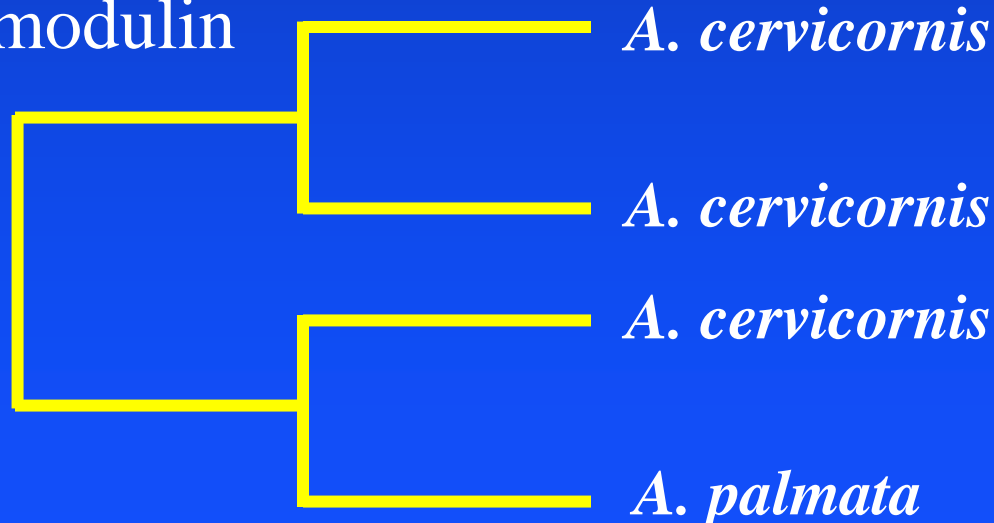
*

Sequence divergence in minicollagen,
calmodulin, and PaxC (0.6%-2.1%).
In ITS-1 is up to 13.2%.

Minicollagen



Calmodulin



Proposed Schedule

■ ~~January 2005-Summer 2005~~

~~Training of graduate student~~

~~Primer ordering~~

~~Collection of fresh coral tissue (local)~~

~~DNA extraction~~

~~PCR optimization~~

■ Fall 2005-Summer 2006

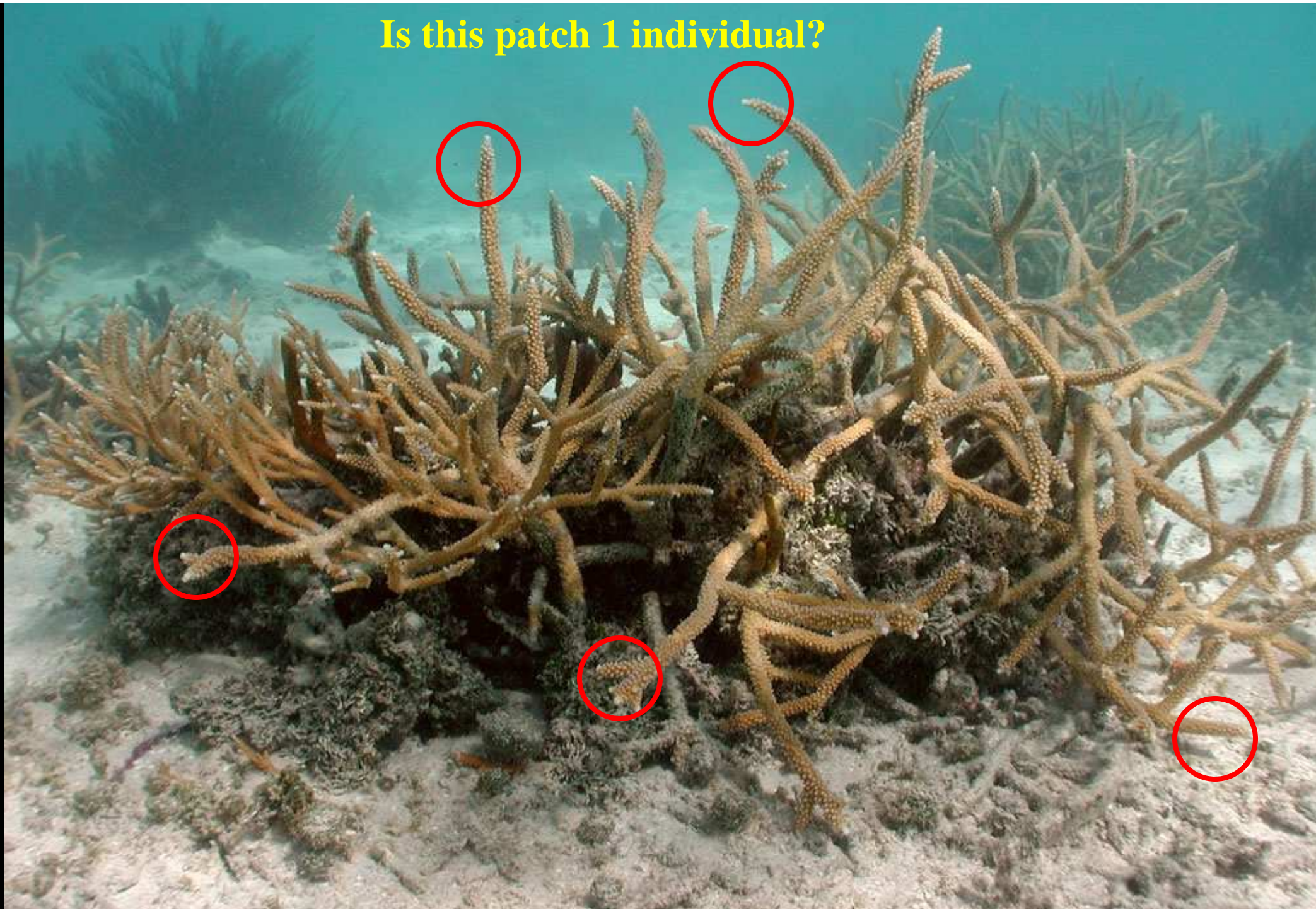
Collection of *Acropora* from all locations

Collection of data

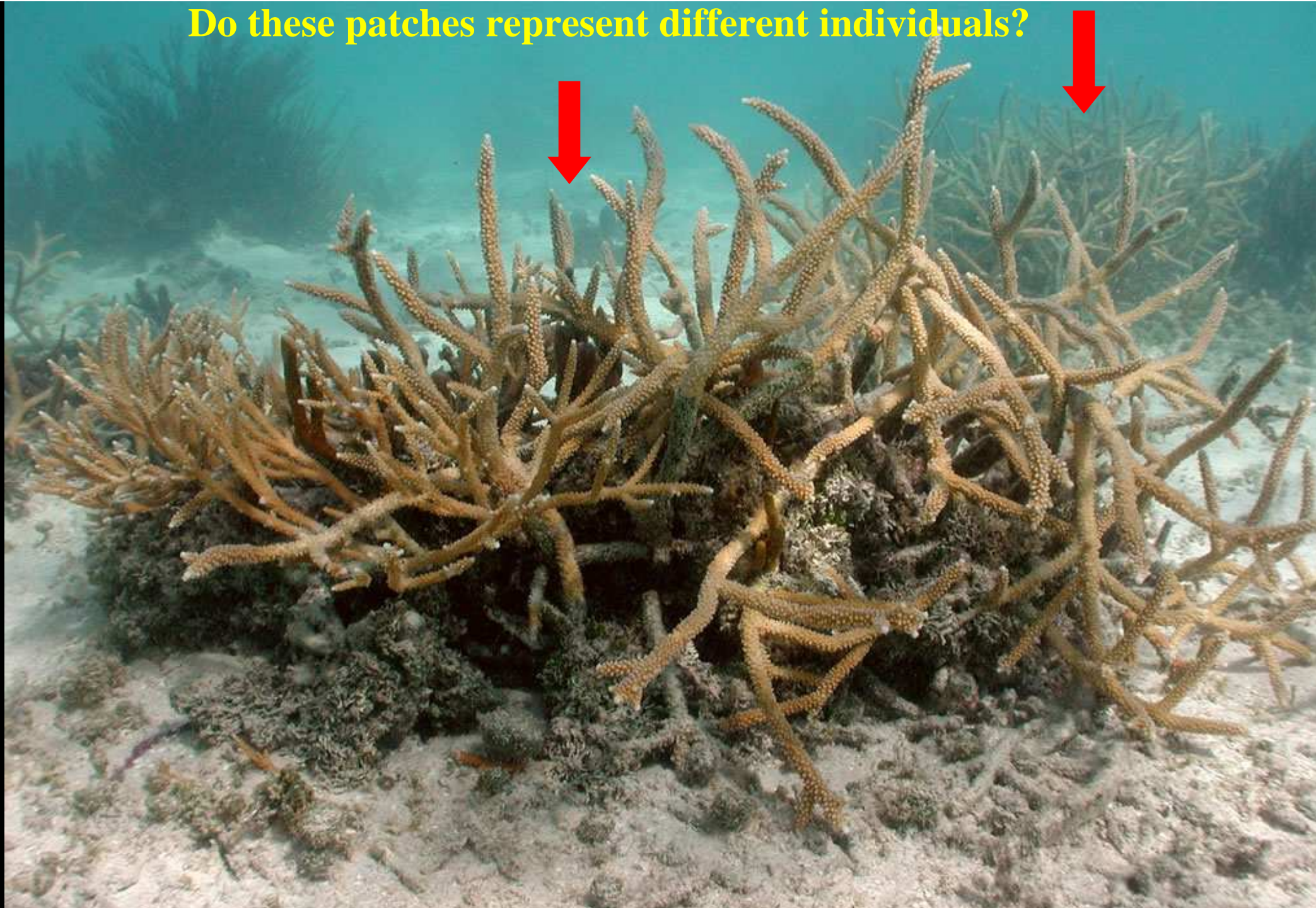
Data Analysis

Manuscript Preparation

Is this patch 1 individual?

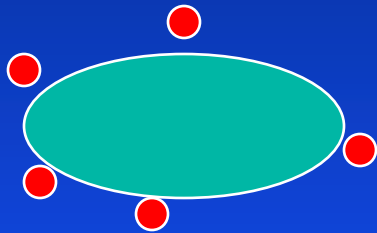


Do these patches represent different individuals?

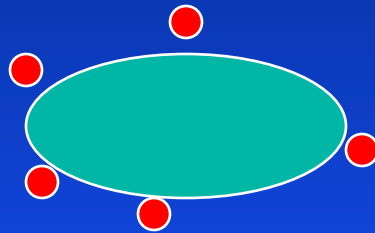


Genetic diversity of *Acropora* between sampling locations

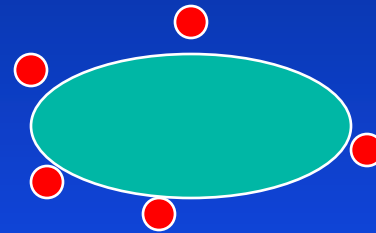
Enrique



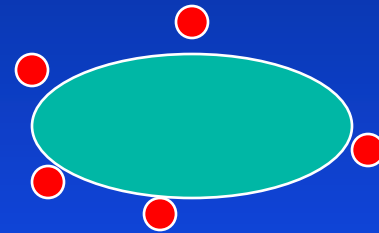
Collado



Laurel



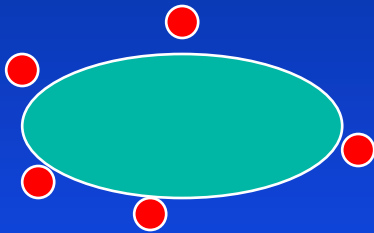
Ponce



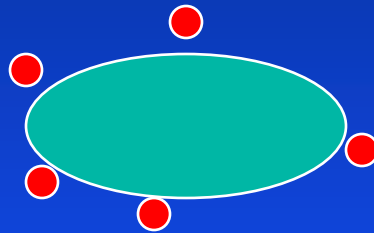
 *Acropora* patch

Genetic diversity of *Acropora* between islands

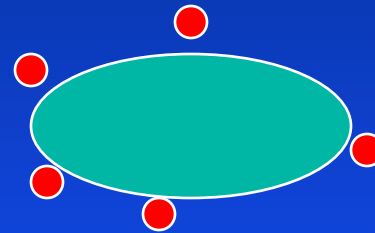
Mona Is.



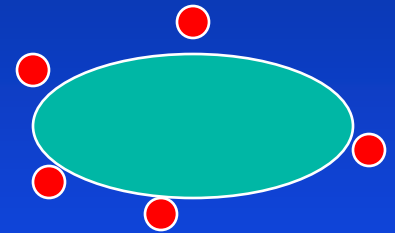
Desecheo Is.



Puerto Rico



Culebra Is.



 *Acropora* patch

Sampling Locations

Disturbed: Media Luna, Turrumote, Laurel, Enrique, Margarita, Collado, Guanica, Ponce, Rincon.

Non-disturbed: Desecheo Is., Mona Is., Culebra Is.

Materials and Methods

Candidate Genes:

MtDNA: Cytochrome b, putative control region.

Nuclear DNA: ITS-1, and introns from *Pax-C*, calmodulin, and minicollagen