Symbiodinium genotypes derived from microsatellite markers collected from multiple reefs in the Florida Keys National Marine Sanctuary from 2005-2014 (Surviving Climate Change project)

Website: https://www.bco-dmo.org/dataset/636908
Data Type: experimental
Version: 2016.01.26
Version Date: 2016-01-26

Project
» RAPID: surviving climate change - the role of acclimatization in reef-building corals (Surviving Climate Change)

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Dataset Description

Symbiodinium ‘fitti’ (ITS2 clade A3) symbiont genotypes from Acropora palmata

Methods & Sampling

Adult Acropora palmata colonies were sampled (1 cm^2) with hammer and chisel and tissues were preserved in 96% non-denature Ethanol. DNA was extracted using the DNEasy tissue kit (Qiagen) following manufacturer’s instructions. Thirteen singleplex Polymerase Chain Reactions (PCR) were performed per sample using fluorescently labeled primers to assay 13 loci containing tri repeats and one di repeat. PCR products were visualized with an automated sequencer (ABI 3730). An internal size standard (Gene Scan 500-Liz, Applied Biosystems CA) ensured accurate sizing. Electropherograms were analyzed with GeneMapper Software 5.0 (Applied Biosystems, CA). Alleles were scored as PCR product size in basepairs.

For quality detailed protocol and quality control please see Pinzon et al 2010 and Baums et al. 2014.

Data Processing Description

Electropherograms of microsatellite alleles were scored for allele sizes (basepairs) in Genemapper vers. 5.0 (Applied Biosystems) and transferred to a Filemaker Database.

BCO-DMO Processing Notes:

- Added PI-provided lat/lon for each "Reef" location.

- Edited primer column where two alleles were present in one column to split into separate columns (i.e., allele size 1 was the first 3 digits, and allele size 2 were the second consecutive digits of a six digit column. These were separated into
separate columns per allele size at each locus).

- Edited entire header to BCO-DMO format (e.g., lowercase names, underscores where needed)

- Edited lat/lon values to four decimal precision consistently.

- Edited spaces in reef names to underscores.

- Edited zero value allele sizes to 'nd' as per PI.

- Split date into year, month, day fromat.

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Data Files

File
symbiont_genotype.csv (Comma Separated Values (.csv), 10.10 KB) MD5:a3c73a4279a8a21a56f9dd54e7c06107 Primary data file for dataset ID 636908

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Related Publications

Baums, I. B., Devlin-Durante, M. K., & LaJeunesse, T. C. (2014). New insights into the dynamics between reef corals and their associated dinoflagellate endosymbionts from population genetic studies. Molecular Ecology, 23(17), 4203–4215. doi:10.1111/mec.12788
General

Pinzón, J. H., Devlin-Durante, M. K., Weber, M. X., Baums, I. B., & LaJeunesse, T. C. (2010). Microsatellite loci for Symbiodinium A3 (S. fitti) a common algal symbiont among Caribbean Acropora (stony corals) and Indo-Pacific giant clams (Tridacna). Conservation Genetics Resources, 3(1), 45–47. doi:10.1007/s12686-010-9283-5
Methods

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Parameters

Parameter	Description	Units
region	Region where coral colony was sampled.	dimensionless
reef	Reef where coral colony was sampled.	dimensionless
lat	Latitude component of geographic sampling location; where positive is North.	decimal degrees
lon	Longitude component of geographic sampling location; where positive is East.	decimal degrees
colony	Colony identification number	dimensionless
sample	Sample identification number consisting of colony identification number and replicate character (A-Z)	dimensionless
ID_database	Baums Database access number	dimensionless
primer_1	Allele size 1 for locus 1.	base pairs
primer_3	Allele size 1 for locus 3.	base pairs
primer_7	Allele size 1 for locus 7.	base pairs
primer_9	Allele size 1 for locus 9.	base pairs
primer_18	Allele size 1 for locus 18.	base pairs
primer_27	Allele size 1 for locus 27.	base pairs
primer_28	Allele size 1 for locus 28.	base pairs
primer_31	Allele size 1 for locus 31.	base pairs
primer_32	Allele size 1 for locus 32.	base pairs
primer_41	Allele size 1 for locus 41.	base pairs
primer_41_allele2	Allele size 2 for locus 41.	base pairs
primer_2	Allele size 1 for locus 2.	base pairs
primer_2_allele2	Allele size 2 for locus 2.	base pairs
primer_8	Allele size 1 for locus 8.	base pairs
primer_48	Allele size 1 for locus 48.	base pairs
primer_48_allele2	Allele size 2 for locus 48.	base pairs
year	year of sample collection.	YYYY
day_local	day of sample collection.	DD
month_local	month of sample collection.	MM

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Instruments

Dataset-specific Instrument Name	automated sequencer
Generic Instrument Name	Automated DNA Sequencer
Dataset-specific Description	Applied Biosystems 3730 DNA Analyzer
Generic Instrument Description	General term for a laboratory instrument used for deciphering the order of bases in a strand of DNA. Sanger sequencers detect fluorescence from different dyes that are used to identify the A, C, G, and T extension reactions. Contemporary or Pyrosequencer methods are based on detecting the activity of DNA polymerase (a DNA synthesizing enzyme) with another chemoluminescent enzyme. Essentially, the method allows sequencing of a single strand of DNA by synthesizing the complementary strand along it, one base pair at a time, and detecting which base was actually added at each step.

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Deployments

Baums_FL_Keys_NMS

Website	https://www.bco-dmo.org/deployment/637478
Platform	Florida Keys National Marine Sanctuary
Start Date	2005-05-01
End Date	2014-12-28
Description	Long-term monitoring data of individual coral colonies .

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Project Information

RAPID: surviving climate change - the role of acclimatization in reef-building corals (Surviving Climate Change)

Coverage: Florida Keys National Marine Sanctuary, Key Largo area

Description from NSF award abstract:
August of 2014 was the warmest on record for the Florida Keys reef tract and by early September numerous corals species were severely stressed and looked bleached. This ongoing large-scale bleaching event provides an unprecedented opportunity to understand if prior stress exposure hardens individual coral colonies to future hot water events -- a process called acclimatization. This study combines long-term monitoring data of individual coral colonies with a stress experiment in the summer of 2015 to determine whether partially bleached colonies have acclimatized, to what extent, and by what means. The answers may fundamentally shape our understanding of how reefs might survive climate change. This is important because tropical coral reefs harbor more species then tropical rainforests and generate billions of dollars each year for local and national economies. The focal species of this project is the endangered elkhorn coral, Acropora palmata and results of the work can be used directly by managers when choosing coral colonies for conservation. The project will educate and train the public and public institutions on numerous levels. The scientists have partnered with the Coral Restoration Foundation, a non-for profit organization that delivers scientific knowledge and hands on experience in coral restoration to over 300 high school students per year.

Postdoctoral scholars, and students are an integral part of this project and will receive training in field and laboratory work and lecture courses.

Acclimatization is a non-genetic process by which an individual heightens its tolerance after exposure to a stressor, such as temperature anomalies. Recent work has shown that acclimatization may be an important process by which corals may survive climate change. However, because reef-building corals harbor endosymbiotic Symbiodinium, discerning the relative contribution of host and symbiont to acclimatization can be difficult. The endangered Caribbean elkhorn coral, Acropora palmata, has an uncomplicated symbiosis: it associates with just one symbiont species (Symbiodinium fitti) and most colonies also harbor only one strain of S. fitti over space and time. August of 2014 was the warmest on record for the Florida Keys reef tract and by early September numerous corals species were severely stressed and looked bleached. This event provides an unprecedented opportunity to understand the role of acclimatization in reef corals. Initial surveys of A. palmata documented a range of bleaching response. This response varied between reefs but also within single, monoclonal stands of A. palmata. Thus, coral clone mates were observed to exhibit different bleaching susceptibilities despite indications that they share identical (clonal) symbiont communities, begging the question as to what mechanisms account for such differences. The answers may fundamentally shape our understanding of how reefs might survive climate change. Immediate support is requested to sample coral colonies while they are still bleached and for which long term performance histories exist. Results from this initial assessment are essential to inform the centerpiece of the proposal: a stress experiment to determine whether partially bleached colonies have acclimatized, to what extent, and by what means.

This is an NSF Collaborative Research project.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1516763

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