Microsatellite loci for Breviolum antillogorgium cultures isolated from the octocoral Antillogorgia bipinnata and used in 2018 growth experiments to compare growth at 26 and 30 degrees C

Website: https://www.bco-dmo.org/dataset/756404
Data Type: experimental
Version: 1
Version Date: 2019-03-04

Project
» RUI: Collaborative Research: Genetic variation as a driver of host and symbiont response to increased temperature on coral reefs (Host Symbiont Temp Response)

Contributors	Affiliation	Role
Coffroth, Mary Alice	State University of New York at Buffalo (SUNY Buffalo)	Principal Investigator
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Abstract
Microsatellite loci for Breviolum antillogorgium cultures isolated from the octocoral Antillogorgia bipinnata and used in 2018 growth experiments to compare growth at 26 and 30 degrees C

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Coverage

Spatial Extent: **Lat**:25.1326 **Lon**:-80.2635
Temporal Extent: 2016 - 2016

Dataset Description

This dataset includes the microsatellite locus allele size for *Breviolum antillogorgium* cultures isolated from the octocoral *Antillogorgia bipinnata* and used in 2018 growth experiments to compare growth at 26 and 30 degrees C.;

Methods & Sampling

Breviolum antillogorgium cultures were initially isolated from *Antillogorgia bipinnata* colonies collected at in the upper Florida Reef tract at Elbow Reef (N 25 07.956 W 80 15.810) in September 2016. Culture isolations and cell growth experimentation occurred in the Coffroth lab, University at Buffalo.

DNA was extracted from symbiont cells following Coffroth et al. (1992) and re-suspended in TE buffer (5-15µl, diluted to a concentration of 5ng/µl). Symbionts were characterized using six polymorphic microsatellite loci,

B7SYM4, B7SYM8, B7Sym34, B7Sym36, CA6.38 and GV-1C following the protocols of Pettay and LaJeunesse (2007), Andras et al (2009) and Santos et al (2003b).

Data Processing Description

BCO-DMO Processing notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- converted latitude and longitude to decimal degrees

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Data Files

File
microsat_Bant.csv (Comma Separated Values (.csv), 1.21 KB) MD5:91e7fb33fb38c5c1f5dae6074f505afc Primary data file for dataset ID 756404

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Related Publications

Andras, J. P., Kirk, N. L., Coffroth, M. A., & Harvell, C. D. (2009). Isolation and characterization of microsatellite loci in Symbiodinium B1/B184, the dinoflagellate symbiont of the Caribbean sea fan coral, Gorgonia ventalina. Molecular Ecology Resources, 9(3), 989–993. doi:10.1111/j.1755-0998.2009.02549.x
Methods

Coffroth, M. A., Lasker, H. R., Diamond, M. E., Bruenn, J. A., & Bermingham, E. (1992). DNA fingerprints of a gorgonian coral: a method for detecting clonal structure in a vegetative species. Marine Biology, 114(2), 317–325. doi:10.1007/bf00349534 https://doi.org/10.1007/BF00349534
Methods

Lajeunesse, T. C., Parkinson, J. E., & Reimer, J. D. (2012). A genetics-based description of Symbiodinium minutum sp. nov. and S. psygmophilum sp. nov. (Dinophyceae), two dinoflagellates symbiotic with cnidaria. Journal of Phycology, 48(6), 1380–1391. doi:10.1111/j.1529-8817.2012.01217.x
Methods

Parkinson, J. E., Coffroth, M. A., & LaJeunesse, T. C. (2015). New species of Clade B Symbiodinium (Dinophyceae) from the greater Caribbean belong to different functional guilds: S. aenigmaticum sp. nov., S. antillogorgium sp. nov., S. endomadracis sp. nov., and S. pseudominutum sp. nov. Journal of Phycology, 51(5), 850–858. doi:10.1111/jpy.12340
Methods

Pettay, D. T., & Lajeunesse, T. C. (2007). Microsatellites from clade B Symbiodinium spp. specialized for Caribbean corals in the genus Madracis. Molecular Ecology Notes, 7(6), 1271–1274. doi:10.1111/j.1471-8286.2007.01852.x
Methods

Santos, S. R., Gutierrez-Rodriguez, C., & Coffroth, M. A. (2003). Phylogenetic identification of symbiotic dinoflagellates via length heteroplasmy in Domain V of chloroplast Large Subunit (cp23S)-Ribosomal DNA Sequences. Marine Biotechnology, 5(2), 130–140. doi:10.1007/s10126-002-0076-z
Methods

Santos, S. R., Gutierrez-Rodriguez, C., Lasker, H. R., & Coffroth, M. A. (2003). Symbiodinium sp. associations in the gorgonian Pseudopterogorgia elisabethae in the Bahamas: high levels of genetic variability and population structure in symbiotic dinoflagellates. Marine Biology, 143(1), 111–120. doi:10.1007/s00227-003-1065-0
Methods

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Parameters

Parameter	Description	Units
Culture_ID	Identification of sample given as culture name (16-0587)	Unitless
Incubation_Temperature	Temperature at which the culture is maintained	Degree Celsius
Host	Octocoral from which the symbiont was isolated. Note - In the vast majority of cases the culture is NOT representative of the host symbiont population (Santos et al 2001)	Unitless
Putative_Species	Putative species based on sequence analysis of B7 SYM15 flanking region (LaJeunesse et al 2012; Parkinson et al 2015)	Unitless
Location	collection location	Unitless
Latitude	latitude; north is positive	decimal degrees
Longitude	longitude; east is positive	decimal degrees
State_Country	collection state and country	unitless
Ocean	ocean or sea of collection	unitless
Host_stage	growth stage of host	unitless
Axenic	culture is free from other living organisms	unitless
Isolated_by	person who isolated sample	unitless
Year_isolated	the year the culture was isolated	unitless
ITS2_type	Classification based on sequence of ITS2 following LaJeunesse et al (2012) and Parkinson et al (2015)	Unitless
cp_type	Fragment length of the hypervariable region of Domain V of symbiont 23S rDNA (Santos et al 2003a)	base pairs (bp)
GV_1C	Microsatellite locus allele size	base pairs (bp)
B7SYM34	Microsatellite locus allele size	base pairs (bp)
BYSYM36	Microsatellite locus allele size	base pairs (bp)
CA6_38	Microsatellite locus allele size	base pairs (bp)
B7SYM4	Microsatellite locus allele size	base pairs (bp)
B7SYM8	Microsatellite locus allele size	base pairs (bp)

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Instruments

Dataset-specific Instrument Name	I-COR 4200 NEN® Global IR2 DNA sequencing system (LI-COR Biosciences)
Generic Instrument Name	Automated DNA Sequencer
Dataset-specific Description	Fragment analysis of the PCR product of the microsatellite loci were run a on a 25 cm long, 0.25 mm thick, 6.5% non-denaturing polyacrylamide gel on an automated LI-COR 4200 NEN Global IR2 DNA sequencing system (LI-COR Biosciences).
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.

Dataset-specific Instrument Name	a PTC-100 MJ Research Inc. thermal cycler or a BioRad T100-Thermal Cycler
Generic Instrument Name	Thermal Cycler
Dataset-specific Description	Used to amplify microsatellite loci.
Generic Instrument Description	A thermal cycler or "thermocycler" is a general term for a type of laboratory apparatus, commonly used for performing polymerase chain reaction (PCR), that is capable of repeatedly altering and maintaining specific temperatures for defined periods of time. The device has a thermal block with holes where tubes with the PCR reaction mixtures can be inserted. The cycler then raises and lowers the temperature of the block in discrete, pre-programmed steps. They can also be used to facilitate other temperature-sensitive reactions, including restriction enzyme digestion or rapid diagnostics. (adapted from http://serc.carleton.edu/microbelife/research_methods/genomics/pcr.html)

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Project Information

RUI: Collaborative Research: Genetic variation as a driver of host and symbiont response to increased temperature on coral reefs (Host Symbiont Temp Response)

Coverage: Florida Keys, Caribbean

Description from NSF award abstract:
On coral reefs, mutualisms with single celled algae (Symbiodinium) and reef species literally and figuratively form the foundation of reef ecosystems. Coral reefs are among the most threatened ecosystems under a changing climate and are rapidly declining due to increasing levels of environmental stress, namely increased temperatures. Climate change is resulting in even warmer ocean temperatures that threaten associations between Symbiodinium and their hosts. In this project the investigators examine the genetic diversity of Symbiodinium and the potential for this important species to evolve in response to temperature. The project will

also address whether the ecological and evolutionary dynamics of the Symbiodinium population affect the performance of their host. If so, this suggests that the evolution of microscopic organisms with short generation times could confer adaptation to longer-lived host species on ecologically and economically vital coral reefs. Given that diversity is already being lost on many reefs, considering how evolutionary changes in Symbiodinium will affect reef species is crucial for predicting the responses of reefs to future climate change. This project provides training for two graduate students and several undergraduates at a Hispanic-serving institution. This work includes outreach to the students and the general public through the Aquarium of Niagara, local K-12 schools, and web-based education modules.

The effects of evolution on contemporary ecological processes are at the forefront of research in evolutionary ecology. This project will answer the call for experiments elucidating the effects of genetic variation in Symbiodinium performance and the effect on the response of the holobiont (host and symbiont) to increased temperature. These experiments examine the effects of temperature through both ecological and evolutionary mechanisms and will determine the relative importance of adaptation and acclimatization in replicated experimental populations. The investigators will examine how genetic variation within a species (Symbiodinium antillogorgium) affects symbiont performance in culture and in the host and how this affects the response of the holobiont to increased temperature. Further, the project examines whether holobiont response to increased temperature associated with climate change depends on particular GxG host-symbiont combinations. Moreover, the investigators will examine the effects of symbiont history on mutualist hosts, which have been largely ignored in eco-evolutionary studies. These experiments provide a first step in predicting whether invertebrate hosts on coral reefs will respond to global change via adaptation of their symbionts.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1559286

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