Laboratory results on pre and post bleach symbiont density in Porites divaricata collected from the Florida Keys, Bahamas, Panama, and Mexico during 2010 (SymBioSys project)

Website: https://www.bco-dmo.org/dataset/546131
Version: 2015-01-29

Project
» Ontogenic change in Cnidarian-algal symbioses: A genomic and ecologic perspective (SymBioSys)

Contributors	Affiliation	Role
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Dataset Description

Cell counts of symbionts by treatment of pre-bleached, bleached and recovering corals (*Porites divaricata*).

Related Reference:

Coffroth MA, Poland DM, Petrou EL, Brazeau DA, Holmberg JC (2010) Environmental Symbiont Acquisition May Not Be the Solution to Warming Seas for Reef-Building Corals. PLoS ONE 5(10): e13258. doi:10.1371/journal.pone.0013258. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0013258

Methods & Sampling

Collections were made in the vicinity of Long Key, FL, oceanside (N24o 49.791' W80o 45.743') and experimentation at the Keys Marine Laboratory, Long Key, FL.

Symbiont density within coral tissues was determined three times over the course of the experiment; (1) before exposure to elevated temperature, (2) when the heat treatment was terminated and (3) 5 weeks into the recovery period. Coral tissue was scraped from the colony surface and placed in 1.0 ml of 5% formalin. The length and width of the scar were measured and these dimensions (length x width) were used to estimate the surface of tissue removed. Subsequently, each tissue sample was homogenized and 9 µL aliquots were counted using a hemacytometer. A total of four replicate counts were conducted per tissue sample and mean symbiont density per mm^2 was calculated.

Data Processing Description

Cell counts between times (within a treatment) were compared using (repeated measures ANOVA using Greenhouse-Geisser correction for violation of assumption of sphericity, $F(1.088,88.144)=137.119$, $p<0.001$; within-subject contrasts, $F(1,81)=153.654$, $p<0.001$).

BCO-DMO Processing:

- original file: Coffroth et al 2010_ Data Summary_cell counts.xlsx
- added conventional header with dataset name, PI name, version date, reference information
- changed parameter names to be BCO-DMO compatible
- replaced spaces with underscores - replaced Pur pflex -> Plexaura_flexuosa; BLcntrl -> bleached_control; UBLcntrl -> unbleached control
- combined data from all 3 dates and reformatted to flat file.

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Data Files

File
cell_counts.csv (Comma Separated Values (.csv), 39.72 KB) MD5:e36062c67da4d026bfdfe5813ed49710 Primary data file for dataset ID 546131

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Parameters

Parameter	Description	Units
lab	laboratory identification; for mapping puposes	unitless
lat	latitude of lab; north is positive	decimal degrees
lon	londitude of lab; east is positive	decimal degrees
description	timing of sample collection: pre- or post-bleaching	unitless
date	date of sample collection	yyyy-mm-dd
sample	sample identification	unitless
culture_inoculant	Cultures 311, 702, A001 and *Plexaura flexuosa* (Pur Pflex) were obtained from the BURR Culture Collection and used to inoculate bleached colonies of *Porites divaricata* (Pd).	unitless
symbiont_type	The symbiont type of the culture used to inoculate bleached colonies of Porites divaricata. Symbiont type based on sequence variation in the chloroplast 23S rDNA (cp-type). Notations based on symbiont clade (Letter) and fragment size (number in bp). For example, A188 is a symbiont within clade A where the 23S rDNA fragment is 188bp in length.	unitless
count_1	symbiont cells in first subsample	cells

count_2	symbiont cells in second subsample	cells
count3	symbiont cells in third subsample	cells
count_4	symbiont cells in fourth subsample	cells
mean_count	average number of cells in sub samples	cells
mean_x10000	average number of cells in sub samples x 10^4	cells x 10^4
length	length of scar from tissue removal	millimeters
width	width of scar from tissue removal	millimeters
type	symbiont type: H=?; S=?; LIGHT=?; scar_toss=discarded??	unitless
surf_area	surface area of coral tissue removed	mm^2
cells_mm2	symbiont cell density	cells/mm2
cells_x10000_mm2	symbiont cell density x 10^4	cells x 10^4/mm2
std_dev	standard deviation of cell density	cells x 10^4/mm2

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Instruments

Dataset-specific Instrument Name	Hemocytometer
Generic Instrument Name	Hemocytometer
Generic Instrument Description	A hemocytometer is a small glass chamber, resembling a thick microscope slide, used for determining the number of cells per unit volume of a suspension. Originally used for performing blood cell counts, a hemocytometer can be used to count a variety of cell types in the laboratory. Also spelled as "haemocytometer". Description from: http://hlsweb.dmu.ac.uk/ahs/elearning/RITA/Haem1/Haem1.html.

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Deployments

Coffroth_2010

Website	https://www.bco-dmo.org/deployment/546058
Platform	SUNY-Buffalo
Start Date	2010-01-01
End Date	2015-12-31
Description	laboratory-based research on coral symbionts

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Project Information

Ontogenic change in Cnidarian-algal symbioses: A genomic and ecologic perspective (SymBioSys)

Coverage: Florida Keys, Bahamas, Panama, Mexico

PROJECT SUMMARY:
The symbiosis between corals (Cnidaria:Hexacorallia:Scleractinia) and photosynthetic dinoflagellate symbionts (Alveolata: Dinophycea: Symbiodinium) provides the foundation and structure of the coral reef ecosystem, as well as significant contributions to global carbon and biogeochemical cycles. Given the importance of this symbiosis to the coral-algal holobiont and the reef ecosystem, understanding the mechanisms governing the establishment and long term maintenance of this symbiosis is essential. The overall aim of this project is to identify the mechanisms and selective processes that lead to the final assemblage of symbionts harbored by adult hosts. This question will be approached from two perspectives, ecologic and genomic, with the specific aims of determining (1) if different Symbiodinium strains differentially affect fitness of corals as the adult settles into a mature symbiosis (2) if competition among symbionts or environmental conditions contribute to the final host-symbiont pairing and (3) how host/symbiont transcriptomes varying as the symbiont community within a host is winnowed to the final assemblage found in the adult host. Traits that directly affect coral fitness (i.e. growth, survivorship, energy production) will be measured under different environmental conditions over the ontogeny of coral recruits that are experimentally infected with different types of Symbiodinium. Concurrently, high throughput gene expression profiling will be used to follow changes in gene expression between host and symbiont. Together, these data will be used to validate or falsify the hypotheses that the final symbiont assemblage found in the adult host is determined by (a) host selection (b) competition among symbionts and/or (c) environmental condition.

This study pools the expertise of two labs that have focused on these aspects of the symbiosis. The Coffroth lab pioneered the studies on early ontogeny of the symbiosis and symbiont diversity and will continue to take the lead in the ecological studies. The Medina lab is at the forefront in the development and utilization of genomic technology to study transcriptomic changes during the establishment and breakdown of the symbiosis. Furthermore, the Medina lab has the coral microarrays to be used in this study and in 2009 will also have oligo arrays for two Symbiodinium species based on 454 EST data. Although several groups have initial studies of the host transcriptome, none have combined an approach that examines the host and the symbiont in a single experiment. This will be a powerful approach as it will allow the investigators to track complementary changes in gene expression between host and symbiont and relate those to turnover in the symbiont community as the final symbiont complement is established.

The data resulting form the study will bridge an important gap in our understanding of the establishment and maintenance of coral-Symbiodinium symbiosis. Understanding the mechanism(s) regulating the establishment of the symbiosis will broaden our knowledge and help to predict the response of this symbiosis to future climate conditions. As in the past, the genomic tools (arrays, ESTs) will be made readily available to researchers via array distribution at cost, microarray analysis training, or sequence data, providing valuable resources to continue exploring these systems.

In conjunction the Aquarium of Niagara, Coffroth will develop educational and outreach programs to train and disseminate information on coral reefs to local area teachers and the general public. The Medina lab will

continue to produce science and environment podcasts in multiple languages (English, Spanish and Hmong) with undergraduate students at UC Merced and will continue to collaborate with the California Academy of Sciences (CAS) in their coral reef outreach efforts. Additionally, this work will result in the training and mentoring of a postdoctoral fellow, at least one graduate student and at least 2 undergraduates. Through this project these students will have the opportunity to participate in research in both a lab and field setting, learning a range of ecological, molecular and algal culturing techniques. The extensive culture collection housed at the University at Buffalo is an important resource that is available to researchers worldwide which the proposed funding will help to maintain. Our EST annotations are publicly available through our EST database (http://montastraea.psu.edu/SymBioSys/).

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0926822
NSF Division of Ocean Sciences (NSF OCE)	OCE-0424996

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