Laboratory growth data for Orbicella faveolata recruits inoculated with either Symbiodinium microadriaticum or S. minutum (McIlroy,J. Phycology, 2016) (SymBioSys project)

Website: https://www.bco-dmo.org/dataset/714350
Data Type: experimental
Version:
Version Date: 2017-09-07

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

Contributors	Affiliation	Role
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Dataset Description

Growth data for *Orbicella faveolata* recruits inoculated with either *Symbiodinium microadriaticum* or *Symbiodinium minutum* and maintained in the laboratory for monitoring. These data were used in McIlroy et al (2016).

Methods, data processing, and results reported in:
McIlroy SE, Gillette P, Cunning R, Klueter A, Capo T, Baker AC, Coffroth MA (2016) The effects of Symbiodinium (Pyrrhophyta) identity on growth, survivorship, and thermal tolerance of newly settled coral recruits. Journal of Phycology 52:1114–1124. DOI: 10.1111/jpy.12471

Related Datasets:
McIlroy_2016: Effective quantum yield for Orbicella faveolata recruits
McIlroy_2016: Maximum quantum yield for Orbicella faveolata recruits
McIlroy_2016: Symbionts genotypes in Orbicella faveolata

Methods & Sampling

Collection of Orbicella faveolata larvae was made at Alligator Reef (24°48.7710 N, 80°40.1670 W) and Looe Key (24°32.6930 N, 81°24.5620 W) in 2011. Initial rearing was done at Keys Marine Laboratory (KML), Long Key, FL. Settled corals were then maintained at University of Miami Experimental Hatchery (Virginia Key, Miami, FL). *Symbiodinium* cultures originated from highly concentrated, isoclonal reference cultures maintained at the University at Buffalo – SUNY (BURR Culture Collection: http://www.nsm.buffalo.edu/Bio/burr/). The cultures used in the experiments were maintained at the Keys Marine Lab (Florida) in f/2 medium (Guillard 1975), at

~27°C, under a 14:10 h light:dark regime.

Growth of symbiotic O. faveolata recruits was recorded with monthly, high-resolution photographs of one designated tile from each tank (n = 4 per treatment) over the course of the 9-month experiment. Each of the selected tiles included 75-130 recruits at the start of the experiment. Recruits were considered as individual settlers beginning as single polyps with limited budding occurring throughout the duration of the experiment. For growth analysis, 20 individual recruits were initially randomly selected from the photographed tiles and the surface area (SA) of each recruit 'footprint' was measured by carefully tracing the base of the polyp using Adobe PhotoshopTM and then quantifying the area with ImageJ (http://imagej.net/). Bimonthly measures of these same recruits were averaged for each tank replicate (n = 4). Assumptions of normality were tested with a Shapiro-Wilk normality test, and the effects of time and symbiont treatment (and their interaction) on the log-transformed growth data were tested with a two-way repeated measures ANOVA.

Data Processing Description

BCO-DMO Processing:

- original file: DATASET_McIlroyetal2016_Orbicella Growth.xlsx
- modified conventional header with dataset name, PI name, version date, reference information
- changed parameter names to be BCO-DMO compatible

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Data Files

File	
McIlroy_2016_growth.csv	(Comma Separated Values (.csv), 39.92 KB) MD5:c353cacd5a3bcc99e693a1c8079a613c
Primary data file for dataset ID 714350	

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Related Publications

McIlroy, S. E., Gillette, P., Cunning, R., Klueter, A., Capo, T., Baker, A. C., & Coffroth, M. A. (2016). The effects ofSymbiodinium(Pyrrhophyta) identity on growth, survivorship, and thermal tolerance of newly settled coral recruits. Journal of Phycology, 52(6), 1114–1124. doi:10.1111/jpy.12471
Results

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Parameters

Parameter	Description	Units
Tile	Coral larvae were settled onto ceramic tiles (the unit of replication) which were assigned to symbiont treatments	unitless
Symbiodinium	Species of Symbiodinium used for larval inoculation	unitless
Month	Month of data collection	unitless
Year	Year of data collection	unitless
RecruitReplicate	The coral recruit measured	unitless
Perim	The perimeter of a single recruit footprint	centimeters
Area_mm2	The area of a single recruit footprint	millimeters^2
Radius	The radius of a single recruit footprint	centimeters

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Camera
Dataset-specific Description	Used to take photographs of coral recruits.
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

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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

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