

Nutrient DNA sample log from coral recovery experiments performed in Florida during 2015 (Reef coral symbioses project)

Website: <https://www.bco-dmo.org/dataset/616028>

Data Type: experimental

Version: 2016-02-03

Project

» [New insights into the response of reef corals to climate change using the symbiont to host cell ratio as a metric of bleaching susceptibility](#) (Reef coral symbioses)

Contributors	Affiliation	Role
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Dataset Description

This dataset includes the coral reef sample id's and their treatments with additional iron, nitrates, phosphorous and food. Coral species used were *Montastraea cavernosa* and *Siderastrea siderea*. This experimental study is being undertaken in tanks at the University of Miami.

Access to the DNA sample data themselves will be restricted until analysis is completed, typically within 2 years of collection.

Methods & Sampling

Coral tissue biopsies were taken from replicate, one-inch cores of *Montastraea cavernosa* as small scrapings along a polyp's calyx wall using a razor blade. The samples were immediately placed into 300uL of 1% SDS in DNA Buffer in 1.5mL Eppendorf tubes and heated to 65°C for one hour, where they are now stable at room temperature. Small aliquots of this lysate are then removed for DNA extraction on as as-needed basis.

We retain archived lysates (consisting of SDS-lysed tissue and a small piece of skeleton) that are stable long-term (>18 years) at room temperature.

Data for this project will ultimately include symbiont:host cell ratios for these samples using a variety of Symbiodinium clade-specific probes. In addition, data may also include the results of ITS2 genotyping using Denaturing Gradient Gel Electrophoresis (DGGE). Additional data, such as environmental data collected by dataloggers during experiments or field deployments, may also be contributed.

Data Processing Description

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO standard
- reformatted dates from m/d/yy to yyyy-mm-dd
- replaced spaces with underscores

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Data Files

File
nuts_meta.csv (Comma Separated Values (.csv), 68.05 KB) MD5:61907dfdd2e8819878080ec155e9d743 Primary data file for dataset ID 616028

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Parameters

Parameter	Description	Units
group	column added by BCO-DMO to enable structuring of the data	unitless
date	date of treatment application	yyyy-mm-dd
treatment	experimental treatment: Fe = addition of Iron; N = addition of Nitrates; P = addition of phosphates	unitless
tissue_sample	tissue sample identification code	unitless
species_core_id	sample id: species code + core code + specimen number	unitless

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Deployments

Baker_lab_2015

Website	https://www.bco-dmo.org/deployment/616016
Platform	UM-RSMAS
Start Date	2015-04-04
End Date	2015-09-01
Description	Coral studies

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Project Information

New insights into the response of reef corals to climate change using the symbiont to host cell ratio as a metric of bleaching susceptibility (Reef coral symbioses)

Coverage: Miami, Florida

Description from NSF award abstract:

The long-term future of reef ecosystems depends on the continued persistence of corals as essential habitat builders. Environmental threats facing coral reefs globally include chronic and acute thermal stress (which can result in "coral bleaching" as a result of the expulsion of their symbiotic algae), increasing CO₂, and nutrient pollution. This project will assess the independent and interactive effects of these stressors using a new molecular based technique showing that coral bleaching susceptibility depends on the symbiont:host (S:H) cell ratio in coral tissues. Corals with higher ratios (more symbionts) are predicted to be more susceptible to thermal stress, suggesting that abiotic factors that affect symbiont densities can directly influence thermal tolerance. This new metric of symbiont density is of physiological relevance and has already revealed patterns that differ from currently used metrics, thus providing new insights into the dynamics of these symbioses. This project will also continue the development and application of these methods to further our understanding of the ecology of coral-algal symbioses, while helping to elucidate the responses of these critical ecosystem engineers to complex changes in their environment. The proposed activities will help us understand how tradeoffs in the regulation of symbiotic partners respond to the environment and relate to the differential susceptibility of corals to environmental stress.

From project proposal:

In the laboratory, we will experimentally test the effects of light, temperature, nutrients, and CO₂ on the S:H cell ratio in five coral species from the Caribbean and Indo-Pacific. We will then expose these corals to thermal stress to test whether conditions which elevate the S:H ratio, such as elevated nutrients, also increase coral susceptibility to bleaching. We will also test whether conditions which decrease the ratio, such as elevated CO₂, decrease bleaching susceptibility. We further hypothesize that higher S:H cell ratios result in higher levels of oxidative stress when exposed to bleaching stressors, and will test this in collaboration with a leading scientist in coral immunity. Complementing these laboratory experiments, we will also assess the degree of spatial and temporal variability in S:H ratios in the field by monitoring seasonal changes at several sites in the northern Florida Keys, and in a new educational coral nursery at the University of Miami's field station on Broad Key. In addition, we will also apply our molecular assay to existing long-term datasets in order to further test these hypotheses in a collaborative, cost-effective way.

These combined activities will help us understand how tradeoffs in symbiosis are regulated in response to the environment. By identifying the links between environment, S:H cell ratios, and stress susceptibility, we will be better able to understand and predict coral bleaching and mortality in response to climate change, while addressing the critical question of why there is so much variability in bleaching susceptibility among corals in space and time. Testing the hypothesis that the S:H ratio drives bleaching susceptibility may help us properly interpret a large body of previous and ongoing work testing the interactive effects of multiple stressors on corals.

Project-related links:

[The Coral Reef Conservation Research Lab](#)
[Additional information about Dr. Andrew Baker](#)

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1358699

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