# Coral metagenome accessions archived at NCBI from a coral-seaweed competition experiment in the Fiji Islands, Dec. 2014

**Website**: https://www.bco-dmo.org/dataset/818503
**Data Type**: experimental
**Version**: 0
**Version Date**: 2020-07-15

**Project**
» Killer Seaweeds: Allelopathy against Fijian Corals (Killer Seaweeds)

| Contributors | Affiliation | Role |
|---|---|---|
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**Abstract**
A number of tropical reefs have transitioned from coral to macroalgal dominance, but the role of macroalgal competition in coral decline is debated. There is a need to understand the relative roles of direct coral-algal effects versus indirect, microbially mediated, effects shaping these interactions, as well as the relevant scales at which interactions operate under natural field, as opposed to laboratory, conditions. We conducted a manipulative field experiment investigating how direct contact versus close proximity (approx. 1.5 cm) macroalgae (Galaxaura rugosa, Sargassum polycystum) impacted the growth, photosynthetic efficiency and prokaryotic microbiome of the common Indo-Pacific coral Acropora millepora. [From NCBI BioProject description, https://www.ncbi.nlm.nih.gov/bioproject/630766]

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## Coverage

**Spatial Extent**: **Lat**:-18.2164722 **Lon**:177.7173056
**Temporal Extent**: 2014-12

## Dataset Description

Coral Acropora millepora metagenome BioSamples archived at NCBI from a coral-seaweed competition experiment in the Fiji Islands, Dec. 2014. See 'Master ID Sheet.xlsx' in Supplemental Files for the treatment descriptions.

See BioProject PRJNA630766 https://www.ncbi.nlm.nih.gov/bioproject/PRJNA630766 for further details.

### Methods & Sampling

A number of tropical reefs have transitioned from coral to macroalgal dominance, but the role of macroalgal

competition in coral decline is debated. There is a need to understand the relative roles of direct coral-algal effects versus indirect, microbially mediated, effects shaping these interactions, as well as the relevant scales at which interactions operate under natural field, as opposed to laboratory, conditions. We conducted a manipulative field experiment investigating how direct contact versus close proximity (approx. 1.5 cm) macroalgae (Galaxaura rugosa, Sargassum polycystum) impacted the growth, photosynthetic efficiency and prokaryotic microbiome of the common Indo-Pacific coral Acropora millepora. [From NCBI BioProject description, https://www.ncbi.nlm.nih.gov/bioproject/630766]

### Data Processing Description

BCO-DMO Processing Notes:
- data submitted in Excel file "Coral Sample Microbiome Data.xlsx" sheet "Sheet1" extracted to csv
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions

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## Supplemental Files

| File |
| --- |
| **Master list of sample id's, coral colony genotype, treatment, and treatment description**<br>filename: Master_ID_Sheet.xlsx (Microsoft Excel, 14.13 KB)<br>MD5:62b3f2cb3afc25e8b36aae12af3261b2 |

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## Related Publications

Clements, C. S., Burns, A. S., Stewart, F. J., & Hay, M. E. (2020). Seaweed-coral competition in the field: effects on coral growth, photosynthesis and microbiomes require direct contact. Proceedings of the Royal Society B: Biological Sciences, 287(1927), 20200366. doi:10.1098/rspb.2020.0366
*Results*

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## Parameters

| Parameter | Description | Units |
|---|---|---|
| Accession | NCBI Accession number | unitless |
| Sample_Name | The ID for each sample; see Supplemental file for details | unitless |
| ID | identifier | unitless |
| BioProject | NCBI BioProject number | unitless |
| Object_ID | BioSample number (SAMN#) | unitless |
| URL_NCBI | url to the BioSample page | unitless |

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## Project Information

**Killer Seaweeds: Allelopathy against Fijian Corals (Killer Seaweeds)**

**Coverage**: Viti Levu, Fiji (18º13.049'S, 177º42.968'E)

*Extracted from the NSF award abstract:*

Coral reefs are in dramatic global decline, with reefs commonly converting from species-rich and topographically-complex communities dominated by corals to species- poor and topographically-simplified communities dominated by seaweeds. These phase-shifts result in fundamental loss of ecosystem function. Despite debate about whether coral-to-algal transitions are commonly a primary cause, or simply a consequence, of coral mortality, rigorous field investigation of seaweed-coral competition has received limited attention. There is limited information on how the outcome of seaweed-coral competition varies among species or the relative importance of different competitive mechanisms in facilitating seaweed dominance. In an effort to address this topic, the PI will conduct field experiments in the tropical South Pacific (Fiji) to determine the effects of seaweeds on corals when in direct contact, which seaweeds are most damaging to corals, the role allelopathic lipids that are transferred via contact in producing these effects, the identity and surface concentrations of these metabolites, and the dynamic nature of seaweed metabolite production and coral response following contact. The herbivorous fishes most responsible for controlling allelopathic seaweeds will be identified, the roles of seaweed metabolites in allelopathy vs herbivore deterrence will be studied, and the potential for better managing and conserving critical reef herbivores so as to slow or reverse conversion of coral reef to seaweed meadows will be examined.

Preliminary results indicate that seaweeds may commonly damage corals via lipid- soluble allelochemicals. Such chemically-mediated interactions could kill or damage adult corals and produce the suppression of coral fecundity and recruitment noted by previous investigators and could precipitate positive feedback mechanisms making reef recovery increasingly unlikely as seaweed abundance increases. Chemically-mediated seaweed-coral competition may play a critical role in the degradation of present-day coral reefs. Increasing information on which seaweeds are most aggressive to corals and which herbivores best limit these seaweeds may prove useful in better managing reefs to facilitate resilience and possible recovery despite threats of global-scale stresses. Fiji is well positioned to rapidly use findings from this project for better management of reef resources because it has already erected >260 MPAs, Fijian villagers have already bought-in to the value of MPAs, and the Fiji Locally-Managed Marine Area (FLMMA) Network is well organized to get information to villagers in a culturally sensitive and useful manner.

The broader impacts of this project are far reaching. The project provides training opportunities for 2-2.5 Ph.D

students and 1 undergraduate student each year in the interdisciplinary areas of marine ecology, marine conservation, and marine chemical ecology. Findings from this project will be immediately integrated into classes at Ga Tech and made available throughout Fiji via a foundation and web site that have already set-up to support marine conservation efforts in Fiji and marine education efforts both within Fiji and internationally. Business and community leaders from Atlanta (via Rotary International Service efforts) have been recruited to help organize and fund community service and outreach projects in Fiji -- several of which are likely to involve marine conservation and education based in part on these efforts there. Media outlets (National Geographic, NPR, Animal Planet, Audubon Magazine, etc.) and local Rotary clubs will be used to better disseminate these discoveries to the public.

PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH

Rasher DB, Stout EP, Engel S, Kubanek J, and ME Hay. "Macroalgal terpenes function as allelopathic agents against reef corals", Proceedings of the National Academy of Sciences, v. 108, 2011, p. 17726.

Beattie AJ, ME Hay, B Magnusson, R de Nys, J Smeathers, JFV Vincent. "Ecology and bioprospecting," Austral Ecology, v.36, 2011, p. 341.

Rasher DB and ME Hay. "Seaweed allelopathy degrades the resilience and function of coral reefs," Communicative and Integrative Biology, v.3, 2010.

Hay ME, Rasher DB. "Corals in crisis," The Scientist, v.24, 2010, p. 42.

Hay ME and DB Rasher. "Coral reefs in crisis: reversing the biotic death spiral," Faculty 1000 Biology Reports 2010, v.2, 2010.

Rasher DB and ME Hay. "Chemically rich seaweeds poison corals when not controlled by herbivores", Proceedings of the National Academy of Sciences, v.107, 2010, p. 9683.

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## Funding


| Funding Source | Award |
|---|---|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-0929119 |


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