Metagenetic amplicon sequence data for multiple coral species from Curacao, Australia and Hawaii

Website: https://www.bco-dmo.org/dataset/749665
Data Type: Other Field Results
Version: 1
Version Date: 2018-11-19

Project
» Nitrogen Fixing Prokaryotes in Corals: Is Nitrogen Fixation a Core Function of the Coral Microbiome? (NitroFixCorals)

Contributors	Affiliation	Role
Lesser, Michael P.	University of New Hampshire (UNH)	Principal Investigator
Biddle, Mathew	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Table of Contents

- Coverage
- Dataset Description
  - Methods & Sampling
  - Data Processing Description
- Related Publications
- Parameters
- Instruments
- Project Information
- Funding

Coverage

Spatial Extent: **N**:21.4433 **E**:151.9148 **S**:-23.4423 **W**:-157.749

Dataset Description

These data can be found by accessing the NCBI Sequence Read Archive BioProject ID: PRJNA498285 (http://www.ncbi.nlm.nih.gov/bioproject/498285, last accessed 2018-11-14).

Metagenetic amplicon sequence FASTA file for multiple coral species from Heron Island, Great Barrier Reef, Australia (23.4423° S, 151.9148° E), Hawaii (21.4433° N, 157.7490° W), and Curacao (12.1696° N, 68.9900° W).

Methods & Sampling

Samples of corals were collected on shallow reefs in Australia, Hawaii and Curacao and preserved in DNA /RNA preservation buffer, Genomic DNA and RNA were extracted and sequenced. Sequences were assembled and annotated as required for each dataset.

Data Processing Description

fastq base calling and quality control

[table of contents | back to top]

Related Publications

Morrow, K. M., Pankey, M. S., & Lesser, M. P. (2022). Community structure of coral microbiomes is dependent on host morphology. Microbiome, 10(1). https://doi.org/10.1186/s40168-022-01308-w
General

[table of contents | back to top]

Parameters

Parameters for this dataset have not yet been identified

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Illumina MySeq
Generic Instrument Name	Automated DNA Sequencer
Dataset-specific Description	Genomic DNA and RNA were extracted and sequenced using Illumina MySeq
Generic Instrument Description	A DNA sequencer is an instrument that determines the order of deoxynucleotides in deoxyribonucleic acid sequences.

[table of contents | back to top]

Project Information

Nitrogen Fixing Prokaryotes in Corals: Is Nitrogen Fixation a Core Function of the Coral Microbiome? (NitroFixCorals)

Coverage: Heron Island, Australia; Kaneohe Bay, Hawaii; Curacao

Description from NSF award abstract:
Coral reefs provide crucial services for people and are becoming increasingly threatened by climate change. But many important questions about coral reefs remain unanswered, such as how their incredibly high biodiversity has developed and is maintained. It is well known that reef-forming corals consist of many different groups of bacteria and algae that live in the tissues of corals, but the function of most of these microbes remain unknown. One of the reported microbial functions is the process called nitrogen fixation. Nitrogen fixation is better known as a very important process on land. For example, alfalfa in agricultural fields has microbes associated with its roots that can capture nitrogen from the air and replace nitrogen lost from soils in water. The nitrogen cycle in the oceans is less well known, especially in tropical waters where nitrogen levels are low, although nitrogen in coral reef systems is known to derive mainly from nitrogen fixation. Recently nitrogen-fixing bacteria have been discovered in the tissues of corals, which begs the overarching question of this project: how important is the contribution of this fixed nitrogen to corals and to the surrounding environment? This research will integrate with an educational program that fosters critical thinking and cooperative learning among participants by involving undergraduate students who will work closely with the scientists. Students from underrepresented backgrounds will be recruited; the undergraduates will become part of an existing undergraduate research opportunities program where they receive mentoring, financial support, and intensive writing support while conducting original research projects of their own. Also a new program will be developed with the university's veterans office to attract and transition veterans into science fields across campus. Finally, outreach activities will be organized at local public high schools, and some public environmental education lectures about the ecology and biology of coral reefs are planned.

Significant gaps in understanding exist about the role of prokaryotes in the physiology, biochemistry and ecology of reef-forming corals. This project will assess how different prokaryotic communities affect the biogeochemistry of nitrogen, specifically nitrogen fixation, within the coral holobiont and how nitrogen fixation contributes to the dissolved organic nitrogen (DON) content of excreted mucus. The introduction of "new nitrogen" though nitrogen fixation and release of DON could have significant impacts on the biogeochemistry of nitrogen in the adjacent benthic communities surrounding corals. High throughput sequencing tools will be used to quantify the taxonomic and functional diversity of these symbioses in corals from the Pacific and Caribbean, as well as the taxonomic diversity of nifH genes in the tissues of corals. Rates of nitrogen fixation on several coral species from Australia, Hawaii and Curacao will be measured, along with the translocation of fixed nitrogen to all compartments of the coral holobiont, and the contribution of "new nitrogen" to the DON of mucus released to the environment determined. The results will increase our understanding of the taxonomic and functional biodiversity of symbiotic prokaryotes in corals. This project will also help guide future studies on the biogeochemical cycling of coral-derived nitrogen on coral reefs.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1437054

[table of contents | back to top]