Sequence accession numbers from microbialite mats sampled from R/V F.G. Walton Smith cruise WS1005 in the Bahamas and from Hamelin Pool, Australia from 2010-2011 (Protists_Stromatolites project)

Website: https://www.bco-dmo.org/dataset/4004
Version: 25 July 2013
Version Date: 2013-07-25

Project
» Were Protists the Beginning of the End for Stromatolites? (Protists_Stromatolites)

Contributors	Affiliation	Role
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Dataset Description

This dataset contains GenBank and GenBank Short Read Archive (SRA) sequence accession numbers for samples from microbialite mats at Hamelin Pool, Australia and Highborne Cay, Bahamas.

References:

Bernhard et al. 2013. Insights into foraminiferal influences on microfabrics of microbialites at Highborne Cay, Bahamas. *PNAS* 110(24); published ahead of print May 28, 2013. doi: 10.1073/pnas.1221721110.
Edgcomb et al. 2013. Active eukaryotes in microbialites from Highborne Cay, Bahamas and Hamelin Pool (Shark Bay), Australia. In press, *ISME Journal*.
Edgcomb et al. 2013. Molecular indicators of microbial diversity in oolitic sands of Highborne Cay, Bahamas. *Geobiology* 11: 234-251. doi: 10.1111/gbi.12029.

Methods & Sampling

See the publications above (in the dataset description) for detailed methodology.

For accession numbers JX873274 - JX873955, refer to Bernhard et al. 2013 and Edgcomb et al. 2013, ISME Journal.
For accession number KC790540, refer to Bernhard et al. 2013.
For accession numbers JX872558 - JX873273, SRA061992 and SRA061825, refer to Edgcomb et al. 2013, ISME Journal.
For accession numbers JX255738 - JX255917 and JX504252 - JX504530, refer to Edgcomb et al. 2013, Geobiology.

Brief summary of methods:
Samples were collected from Highborne Cay, Bahamas in March 2010 and from Hamelin Pool, Australia in June 2011. Microbialite mat types at Highborne Cay were designated according to Reid et al. (2000) and Myshrall et al. (2010). Microbialites at Hamelin Pool were classified following Jahnert and Collins (2011) and Logan (1961). The water column in the vicinity of the microbialite mats was also sampled. Water column measurments included temperature, salinity, and ligh intensity. Microbialite samples were obtained using syringe cores (refer to publications for sizes and depths).

RNA was extracted from preserved samples, reverse transcribed, and PCR amplified. PCR products were purified and foraminiferal PCR products were cloned for Sanger sequencing. Sequences were clustered into operational taxonomic units (OTUs). JAguc (Nebel et al. 2011) was used to assign taxonomy of OTU representatives. Again, **refer to publications above for detailed methodology, statistical analyses, and results**.

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Data Files

File
sequences.csv (Comma Separated Values (.csv), 1.81 KB) MD5:b8ad69e2d85ce74fd4165fbf9da55c30 Primary data file for dataset ID 4004

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Parameters

Parameter	Description	Units
location	General location of sampling.	text
site	Name of specific site sampled.	text
lat	Latitude of sampling site.	decimal degrees
lon	Longitude of sampling site.	decimal degrees
subject	Name/description of the organism.	text
description	Brief description of the type of sequence.	text
accession_number_range	Accession number (or accession number range) at GenBank or the GenBank Short Read Archive (SRA).	alphanumeric
link	Link to the accession number (or range) at GenBank.	alphanumeric

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Instruments

Dataset-specific Instrument Name	Light Meter
Generic Instrument Name	Light Meter
Dataset-specific Description	Light was measured using a LI-COR LI-250 meter equipped with a SA190A quantum sensor.
Generic Instrument Description	Light meters are instruments that measure light intensity. Common units of measure for light intensity are umol/m2/s or uE/m2/s (micromoles per meter squared per second or microEinsteins per meter squared per second). (example: LI-COR 250A)

Dataset-specific Instrument Name	salinity sensor
Generic Instrument Name	Salinity Sensor
Dataset-specific Description	Temperature and salinity were measured using an Accumet AP75 temperature/conductivity meter.
Generic Instrument Description	Category of instrument that simultaneously measures electrical conductivity and temperature in the water column to provide temperature and salinity data.

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Deployments

WS1005

Website	https://www.bco-dmo.org/deployment/59051
Platform	R/V F.G. Walton Smith
Start Date	2010-03-18
End Date	2010-03-24
Description	Sampling of stromatolites and thrombolites for the project, "Were protists the beginning of the end for stromatolites?" Cruise information and original data are available from the NSF R2R data catalog.

Hamelin_Pool_Edgcomb

Website	https://www.bco-dmo.org/deployment/59054
Platform	WHOI
Start Date	2011-06-01
End Date	2011-06-01
Description	Microbialite samples were collected from shore at Hamelin Pool in June 2011 for the project, "Were Protists the Beginning of the End for Stromatolites".

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Project Information

Were Protists the Beginning of the End for Stromatolites? (Protists_Stromatolites)

Coverage: Highborne Cay, Bahamas and Carbla Station (Shark Bay), Western Australia

Collaborative Research: Were Protists the Beginning of the End for Stromatolites?

This award is funded under the American Recovery and Reinvestment Act of 2009 (Public Law 111-5).

Microbial mats are conspicuous components of many benthic marine and aquatic settings. A subset of these microbial mats binds sediments to form potentially fossilizable structures, often called stromatolites or microbialites. While much is known about microbialite autotrophs, little is known about their heterotrophic eukaryotes. The lack of understanding is surprising given that stromatolites have an extensive geologic record spanning most of Earth's history. Stromatolites are layered sedimentary structures formed by a combination of microbial activities, abiotic carbonate precipitation, and sedimentary processes. Details of stromatolite formation and preservation are poorly understood, and a drastic decline in stromatolite occurrence and diversity in the late Precambrian has long been a conundrum. A popular hypothesis to explain this decline at ~1 billion years ago is that eukaryotic organisms evolved to become predators on stromatolites. To date, the most commonly proposed predatory culprit is an unidentified metazoan, although evidence of such an organism is lacking from the fossil record. Protists, most of which are not expected to leave an obvious fossil record, are additional possible stromatolitic predators, but they have been largely ignored in this context. The hypotheses of this project are: (1) Heterotrophic protist activity caused the textural change from stromatolites (layered sediment fabric) to thrombolites (clotted sediment fabric) and (2) Heterotrophic protists caused the decimation of Neoproterozoic stromatolites. Since it is impossible to recreate the Neoproterozoic, studies of modern analogs serve to indirectly test these hypotheses. The overall goal of this project is to describe the eukaryotic communities associated with modern stromatolites and thrombolites from the Bahamas and Australia, compare the communities from the two sites, and to relate the communities to stromatolitic / thrombolitic sediment fabric and biomarker signatures.

The overall goal will be achieved by addressing the following specific aims: (1) Identify, via morphologic and molecular approaches, the eukaryotic community of modern stromatolites and thrombolites; (2) Analyze modern and fossil stromatolites and thrombolites for their eukaryotic lipid biomarkers using solvent extraction, chromatographic and mass spectrometric methods; (3) Using the Fluorescently Labeled Embedded Core (FLEC) method, document the sub-millimeter distributions of the heterotrophic eukaryotic community inhabiting modern stromatolites and thrombolites in conjunction with fine-scale sediment fabric; (4) Using solvent extraction, chromatographic and mass spectrometric methods, analyze cultures of allogromiid foraminifers to survey for lipid biomarkers unique to them; (5) After incubation of modern stromatolites with heterotrophic protists, use FLEC methodology to determine how their activity affects sediment fabric and conduct preliminary comparisons of these modern fabrics to those of stromatolite fossils.

Intellectual Merit: The oldest fossil stromatolites are >3.4 billion years old and are the most visible manifestations of pervasive microbial life on the early Earth. The changes in stromatolite abundance and morphology document complex interplays between biological and geological processes. This project addresses multiple aspects of stromatolite genesis and pre-fossilization alteration but at its core, focuses on one of the greatest geological enigmas: the possible connection between stromatolite decline and the rise of complex life.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0926421
NSF Division of Ocean Sciences (NSF OCE)	OCE-0926372

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