

NCBI links to BioProjects of total RNA isolated from *Trematomus bernacchii* gill tissues acclimated to elevated temperature and pCO₂, July 2015

Website: <https://www.bco-dmo.org/dataset/665853>

Data Type: experimental

Version:

Version Date: 2016-11-22

Project

» [Identifying Adaptive Responses of Polar Fishes in a Vulnerable Ecosystem](#) (polar_fish_adapt)

Program

» [Science, Engineering and Education for Sustainability NSF-Wide Investment \(SEES\): Ocean Acidification \(formerly CRI-OA\)](#) (SEES-OA)

Contributors	Affiliation	Role
Place, Sean	Sonoma State University	Principal Investigator
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Methods & Sampling

Specimens of *Trematomus bernacchii*, *Pagothenia borchgrevinki*, and *Trematomus newnesi* were collected by hook and line near the Delbridge Islands in McMurdo Sound (77°40'S 166°25'E) from October through December, 2011 and September through December, 2012. Once collected, fish were transported back to McMurdo Station in aerated coolers where they were acclimated for one week in a flow-through aquarium (2400-L) in ambient seawater (-1.5°C and ~430µatm CO₂). After the initial acclimation period, fish were randomly placed into one of four flow-through experimental treatment tanks (1240-L each) in order to assess the response to increased temperature (4°C), increased pCO₂ (1000µatm) or a combination of increased temperature and increased pCO₂. The treatment tanks consisted of a tank held at ambient conditions (control treatment; -1°C and 430µatm), a low temperature + high pCO₂ tank (-1°C and 1000µatm), a high temperature + low pCO₂ tank (4°C and 430µatm), and a high temperature + high pCO₂ tank (4°C and 1000µatm). *Trematomus bernacchii*, *Pagothenia borchgrevinki* were sampled after t= 7, 28, and 56 days of acclimation to the experimental conditions. *Trematomus newnesi* were sampled after t= 7, 28, and 42 days of acclimation. Four biological replicates from each treatment and time point were selected for cluster generation using the Illumina® TruSeq RNA Sample Prep v2 Hs Protocol and sequencing via an Illumina® HiSeq 2500 Rapid Run initialized for both paired-end 150bp reads and single-end 100bp reads.

Data Processing Description

BCO-DMO Processing Notes: A flat file table of the accession numbers with associated metadata and links

to NCBI was created and served.

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Data Files

File
RNA_seq.csv (Comma Separated Values (.csv), 605 bytes) MD5:07d572ffc9e911488a79762adcd24dc
Primary data file for dataset ID 665853

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Parameters

Parameter	Description	Units
project	internal project identifier	unitless
location	specimen collection site	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
species	species name	unitless
NCBI_accession	NCBI Bioproject accession number	unitless
accession_link	link to NCBI BioProject page	unitless

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Instruments

Dataset-specific Instrument Name	Illumina® HiSeq 2500
Generic Instrument Name	Automated DNA Sequencer
Dataset-specific Description	For genetic sequencing
Generic Instrument Description	General term for a laboratory instrument used for deciphering the order of bases in a strand of DNA. Sanger sequencers detect fluorescence from different dyes that are used to identify the A, C, G, and T extension reactions. Contemporary or Pyrosequencer methods are based on detecting the activity of DNA polymerase (a DNA synthesizing enzyme) with another chemoluminescent enzyme. Essentially, the method allows sequencing of a single strand of DNA by synthesizing the complementary strand along it, one base pair at a time, and detecting which base was actually added at each step.

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Deployments

McMurdo Place

Website	https://www.bco-dmo.org/deployment/665869
Platform	McMurdo Station
Start Date	2014-08-14
End Date	2016-04-20
Description	Polar fish studies

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Project Information

Identifying Adaptive Responses of Polar Fishes in a Vulnerable Ecosystem (polar_fish_adapt)

Coverage: McMurdo Sound: Cape Evans, Cape Armitage, Delbridge Islands and Turks Head Bay

Extracted from the NSF award abstract:

The proposed research will investigate the interacting and potentially synergistic influence of two oceanographic features - ocean acidification and the projected rise in mean sea surface temperature - on the performance of Notothenioids, the dominant fish of the Antarctic marine ecosystem. Understanding the joint effects of acidification and temperature rise on these fish is a vital component of predicting the resilience of coastal marine ecosystems. Notothenioids have repeatedly displayed a narrow window of physiological tolerances when subjected to abiotic stresses. Given that evolutionary adaptation may have led to finely-tuned traits with narrow physiological limits in these organisms, this system provides a unique opportunity to examine physiological trade-offs associated with acclimation to the multi-stressor environment expected from future atmospheric CO2 projections. Understanding these trade-offs will provide valuable insight into the capacity species have for responses to climate change via phenotypic plasticity. As an extension to functional measurements, this study will use evolutionary approaches to map variation in physiological responses onto the phylogeny of these fishes and the genetic diversity within species. These approaches offer insight into the historical constraints and future potential for evolutionary optimization.

Note: Funding for this project has transferred from award PLR-1040945 to PLR-1447291, coincident with Principal Investigator's affiliation change. Dr. Jeff Dudycha is a former project Co-PI associated with original award PLR-1040945.

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Program Information

Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)

Website: https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503477

Coverage: global

NSF Climate Research Investment (CRI) activities that were initiated in 2010 are now included under Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES). SEES is a portfolio of activities that highlights NSF's unique role in helping society address the challenge(s) of achieving sustainability. Detailed information about the SEES program is available from NSF (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504707).

In recognition of the need for basic research concerning the nature, extent and impact of ocean acidification on oceanic environments in the past, present and future, the goal of the SEES: OA program is to understand (a) the chemistry and physical chemistry of ocean acidification; (b) how ocean acidification interacts with processes at the organismal level; and (c) how the earth system history informs our understanding of the effects of ocean acidification on the present day and future ocean.

Solicitations issued under this program:

[NSF 10-530](#), FY 2010-FY2011

[NSF 12-500](#), FY 2012

[NSF 12-600](#), FY 2013

[NSF 13-586](#), FY 2014

NSF 13-586 was the final solicitation that will be released for this program.

PI Meetings:

[1st U.S. Ocean Acidification PI Meeting](#) (March 22-24, 2011, Woods Hole, MA)

[2nd U.S. Ocean Acidification PI Meeting](#) (Sept. 18-20, 2013, Washington, DC)

3rd U.S. Ocean Acidification PI Meeting (June 9-11, 2015, Woods Hole, MA - Tentative)

NSF media releases for the Ocean Acidification Program:

[Press Release 10-186 NSF Awards Grants to Study Effects of Ocean Acidification](#)

[Discovery Blue Mussels "Hang On" Along Rocky Shores: For How Long?](#)

[Discovery nsf.gov - National Science Foundation \(NSF\) Discoveries - Trouble in Paradise: Ocean Acidification This Way Comes - US National Science Foundation \(NSF\)](#)

[Press Release 12-179 nsf.gov - National Science Foundation \(NSF\) News - Ocean Acidification: Finding New Answers Through National Science Foundation Research Grants - US National Science Foundation \(NSF\)](#)

[Press Release 13-102 World Oceans Month Brings Mixed News for Oysters](#)

[Press Release 13-108 nsf.gov - National Science Foundation \(NSF\) News - Natural Underwater Springs Show How Coral Reefs Respond to Ocean Acidification - US National Science Foundation \(NSF\)](#)

[Press Release 13-148 Ocean acidification: Making new discoveries through National Science Foundation research grants](#)

[Press Release 13-148 - Video nsf.gov - News - Video - NSF Ocean Sciences Division Director David Conover answers questions about ocean acidification. - US National Science Foundation \(NSF\)](#)

[Press Release 14-010 nsf.gov - National Science Foundation \(NSF\) News - Palau's coral reefs surprisingly resistant to ocean acidification - US National Science Foundation \(NSF\)](#)

[Press Release 14-116 nsf.gov - National Science Foundation \(NSF\) News - Ocean Acidification: NSF awards \\$11.4 million in new grants to study effects on marine ecosystems - US National Science Foundation \(NSF\)](#)

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Funding

Funding Source	Award
NSF Antarctic Sciences (NSF ANT)	PLR-1447291

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