Inhibition data for 3 peptidases at Bogue Sound NC and Tennessee River at Knoxville (SEDpep project)

Website: https://www.bco-dmo.org/dataset/640505
Data Type: Other Field Results
Version: 1
Version Date: 2016-03-14

Project
» Novel peptidases in subsurface sediments: Activities and substrate specificities (SEDpep)

Program
» Center for Dark Energy Biosphere Investigations (C-DEBI)

Contributors	Affiliation	Role
Steen, Andrew	University of Tennessee Knoxville (UTK)	Principal Investigator
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Abstract
This dataset includes inhibition data for 3 peptidases at Bogue Sound, NC and Tennessee River at Knoxville.

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Dataset Description

Inhibition data for 3 peptidases at Bogue Sound NC and Tennessee River at Knoxville.

Methods & Sampling

Inhibition parameters were measured from vo of Arg-AMC, Leu-AMC, and Pro-AMC, as a function of the concentration of various pNA inhibitors, as described in Steen et al (2015) (doi:10.3354/ame01755)

Data Processing Description

Data processing is described in more detail in the Steen et al. (2015) paper (doi:10.3354/ame01755). Full R code and all raw data is given at http://github.com/adsteen/subspec.

BCO-DMO Curation Notes

This section documents curation actions performed prior to publication review with the submitter, and

additional information relevant to understanding and reusing this dataset. It distinguishes changes made to the submitted (meta)data from unresolved issues and/or enhancements that improve future reuse and interoperability.

CURATION ACTIONS PERFORMED ON DATA

- modified parameter names to conform with BCO-DMO naming conventions;
- replaced "NA" with "nd" (no data).

CURATION ACTIONS PERFORMED ON METADATA

- BCO-DMO's standard metadata entry and text formatting steps were performed. See: https://www.bco-dmo.org/how-to/standard-curation-edits

ISSUES POTENTIALLY IMPACTING REUSE

- Parameter information, including descriptions and/or units of measurement, is incomplete.
- This dataset has been published "as is". Final review by the data submitter was not received after the data were imported into the BCO-DMO data system.

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Data Files

File
TN-BS_water_inhibition.csv (Comma Separated Values (.csv), 13.64 KB) MD5:d3e0af3502c061f1f5e4625f47bf5bf7 Primary data file for dataset ID 640505

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Related Publications

Steen, A., Vazin, J., Hagen, S., Mulligan, K., & Wilhelm, S. (2015). Substrate specificity of aquatic extracellular peptidases assessed by competitive inhibition assays using synthetic substrates. Aquatic Microbial Ecology, 75(3), 271–281. https://doi.org/10.3354/ame01755
Methods

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Parameters

Parameter	Description	Units
amino_acid	Amino acid.	dimensionless
AA_abbrev	Single-letter amino acid abbreviation.	dimensionless
delta_Gr	? (unknown)	? (unknown)
pNA_subs	? (unknown)	? (unknown)

polarity	Description of polarity.	dimensionless
hydrophobicity	Hydrophobicity.	? (unknown)
MW	Molecular weight of the amino acid.	grams per mole
Dauwe_score1	? (unknown)	? (unknown)
Dauwe_score2	? (unknown)	? (unknown)
location	Sampling location.	dimensionless
substrate	Substrate.	dimensionless
inhib_slope	Inhibition slope.	? (unknown)
inhib_slope_SE	Standard error of inhibition slope.	? (unknown)
rsq	? (unknown)	? (unknown)
pval	? (unknown)	? (unknown)
is_homologous	? (unknown)	dimensionless
rel_Ki	Inhibition binding constant, Ki. Given relative to the homologous pNA substrate, as described in Steen et al. (2015).	? (unknown)
rel_Ki_SE	Standard error of inhibition binding constant, Ki. Given relative to the homologous pNA substrate, as described in Steen et al. (2015).	? (unknown)
low_err	? (unknown)	? (unknown)
high_err	? (unknown)	? (unknown)

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Project Information

Novel peptidases in subsurface sediments: Activities and substrate specificities (SEDpep)

Coverage: White Oak River Station H, (34 44.490'N, 77 07.44W); Tennessee River at Knoxville TN (Volunteer Landing Dock), and Bogue Sound at the Institute of Marine Sciences dock, Morehead City, NC.

Description from C-DEBI:
The goal of this project was to explore the mechanisms of subsurface organoheterotrophy by identifying the range of extracellular peptidases present in sediments of the White Oak River, NC, consistent with C-DEBI Research Theme 1, Activity in the Deep Subseafloor Biosphere: function & rates of global biogeochemical processes. This grant funded two sampling expeditions to the White Oak River as well as extensive laboratory work with a purified peptidase that was supplied by collaborators Andrzej Joachimiak and Karolina Michalska of Argonne National Laboratory and preparatory work on peptidases of the Tennessee River. So far this dataset has led to the submission of two manuscripts, with one more manuscript in preparation. The White Oak River work showed that a wide range of peptidases are present in depths up to 80 cm in the White Oak River, which is deeper than the zone of methanogenesis. Although absolute peptidase activities declined with depth, activities normalized to cell abundance were roughly constant, and activities normalized to organic carbon oxidation rates increased nearly two orders of magnitude relative to the surface, indicating that extracellular peptidases were important to the subsurface ecosystem. Biochemical analysis of a purified peptidase that was expressed by the Argonne group showed it to be a novel aminopeptidase with specificity for N-terminal cysteine, a function not previously observed in peptidses. In summary, *in situ* and *in vitro* studies of subsurface peptidases revealed that they are ecologically important and may contain novel properties.

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Program Information

Center for Dark Energy Biosphere Investigations (C-DEBI)

Website: http://www.darkenergybiosphere.org

Coverage: Global

The mission of the Center for Dark Energy Biosphere Investigations (C-DEBI) is to explore life beneath the seafloor and make transformative discoveries that advance science, benefit society, and inspire people of all ages and origins.

C-DEBI provides a framework for a large, multi-disciplinary group of scientists to pursue fundamental questions about life deep in the sub-surface environment of Earth. The fundamental science questions of C-DEBI involve exploration and discovery, uncovering the processes that constrain the sub-surface biosphere below the oceans, and implications to the Earth system. What type of life exists in this deep biosphere, how much, and how is it distributed and dispersed? What are the physical-chemical conditions that promote or limit life? What are the important oxidation-reduction processes and are they unique or important to humankind? How does this biosphere influence global energy and material cycles, particularly the carbon cycle? Finally, can we discern how such life evolved in geological settings beneath the ocean floor, and how this might relate to ideas about the origin of life on our planet?

C-DEBI's scientific goals are pursued with a combination of approaches:
(1) coordinate, integrate, support, and extend the research associated with four major programs—Juan de Fuca Ridge flank (JdF), South Pacific Gyre (SPG), North Pond (NP), and Dorado Outcrop (DO)—and other field sites;
(2) make substantial investments of resources to support field, laboratory, analytical, and modeling studies of the deep subseafloor ecosystems;
(3) facilitate and encourage synthesis and thematic understanding of submarine microbiological processes, through funding of scientific and technical activities, coordination and hosting of meetings and workshops, and support of (mostly junior) researchers and graduate students; and
(4) entrain, educate, inspire, and mentor an interdisciplinary community of researchers and educators, with an emphasis on undergraduate and graduate students and early-career scientists.

Note: Katrina Edwards was a former PI of C-DEBI; James Cowen is a former co-PI.

Data Management:

C-DEBI is committed to ensuring all the data generated are publically available and deposited in a data repository for long-term storage as stated in their Data Management Plan (PDF) and in compliance with the NSF Ocean Sciences Sample and Data Policy. The data types and products resulting from C-DEBI-supported research include a wide variety of geophysical, geological, geochemical, and biological information, in addition to education and outreach materials, technical documents, and samples. All data and information generated by C-DEBI-supported research projects are required to be made publically available either following publication of research results or within two (2) years of data generation.

To ensure preservation and dissemination of the diverse data-types generated, C-DEBI researchers are working with BCO-DMO Data Managers make data publicly available online. The partnership with BCO-DMO helps ensure that the C-DEBI data are discoverable and available for reuse. Some C-DEBI data is better served by specialized repositories (NCBI's GenBank for sequence data, for example) and, in those cases, BCO-DMO provides dataset documentation (metadata) that includes links to those external repositories.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0939564

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