Bacterial isolates from marine diatom Psuedo-nitzschia collected from the Santa Cruz Warf in 2011 (bacteria, virus, diatom interactions project)

Website: https://www.bco-dmo.org/dataset/564366
Version: 2015-08-05

Project
» Interactions of bacteria, viruses and bloom-forming diatom genus Pseudo-nitzschia (bacteria, virus, diatom interactions)

Contributors	Affiliation	Role
Jiang, Sunny	University of California-Irvine (UC Irvine)	Principal Investigator
Kinkade, Danie	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Methods & Sampling

Single Pseudo-nitzschia cell isolates were obtained from bloom seawater samples collected from Santa Cruz Wharf, California. Bacteria associated with the single pseudo-nizschia cell was isoalted on marine agar. Sequences were analyzed using Seqman II. Bacterial taxon for each sequence was identified and named by the homologous 16S sequence in Genbank using BLAST.

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Data Files

File
bacterial_isolates.csv (Comma Separated Values (.csv), 1.90 KB) MD5:c1ea1e56b4d7728e38b9bbc55c4e187f Primary data file for dataset ID 564366

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Parameters

Parameter	Description	Units
taxon	Bacterial taxon.	dimensionless
strain	Bacterial strain.	dimensionless
GenBank_accession	Genbank accession number.	dimensionless

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Deployments

SantaCruz_Plankton_Jiang

Website	https://www.bco-dmo.org/deployment/614791
Platform	Santa Cruz Warf
Start Date	2011-06-15
End Date	2011-06-15
Description	Sampling location for the project 'Diatom Microbiome' (PI: Sunny Jiang). A 20um mesh plankton net was used to collect sample.

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Project Information

Interactions of bacteria, viruses and bloom-forming diatom genus Pseudo-nitzschia (bacteria, virus, diatom interactions)

Coverage: Santa Cruz Warf 36.96023 N, -122.01996 W

This project seeks to elucidate the interactions between viruses, bacteria and toxic bloom-forming marine diatom genus Pseudo-nitzschia in the coastal marine environment. The cosmopolitan Pseudo-nitzschia sp. (Bacillariophyceae) causes harmful algal blooms in various parts of the world. Recent genome sequences of two marine diatoms revealed that bacterial genes contribute up to 5% of their genome make-up, highlighting the close association of marine diatoms with bacteria in evolutionary history. So far, few have looked at the interactions of diatoms with their epibiotic bacteria and none have studied the interactions of virus, bacteria and phytoplankton using direct experimental approach.

This project investigates the physiological, biochemical, genetic and ecological interactions of algae-microbe associations in order to decipher the influences of microbes on algal bloom dynamics and toxigenesis. By incorporating methods in phylogeny, physiology, biochemistry, comparative genomics and metagenomics, the research seeks answers to the following questions: 1) What are the epiphytic bacteria associating with different species of Pseudo-nitzschia and how do they change at different stages of the bloom? 2) How do these bacteria affect the physiology of the Pseudo- nitzschia hosts and how does the algal host regulate these microbial interactions? 3) Can viruses promote a bloom by selectively lysing algicidal bacteria, while creating opportunities for growth- promoting bacteria or vice versa? This project is guided by the preliminary research on microbe- algae interaction, where significantly different epibiotic bacterial communities were found to associate with two Pseudo-nitzschia species. Bacterial associates of one Pseudo-nitzschia sp. stimulated the growth of the algal-host but acted as a pathogen on another Pseudo-nitzschia sp. This project will expand the work on epibiotic bacterial community diversity and dynamics by sampling additional species of Pseudo-nitzschia and investigating the changes in epibiotic and planktonic bacterial community structure following the initiation, peak and decline phases of Pseudo-nitzschia blooms in coastal oceans. Algal host responses to

epibionts association will be investigated using physiological experiments of binary and multi-culture experimental approaches. The chemical communication between algal host and epibiont bacteria will be addressed by looking at the algal exudate excretions and bacterial enzyme secretions using established LC-MS and enzyme assays. To illustrate the influences of viruses on bacterial-algal interaction, bacteriophages specific to epibiotic bacteria will be isolated and included in the physiological experiments.

Related Publications:

Sison-Mangus, M., Jiang, S., Tran, K. N., Kudela, R. M. Host-specific adaptation governs the interaction of the marine diatom, Pseudo-nitzschia and their microbiota. *ISME Journal* 8, 63-76 doi:10.1038/ismej.2013.138

Rowe, J.; Jiang, S. Interactions of bacterial microbiome with bloom forming marine diatom *pseudo-nitzchia*. Ocean Science Meeting. Honolulu, Hawaii. 2014. (http://www.sgmeet.com/osm2014/viewabstract.asp?AbstractID=17958)

Sison-Mangus, M.; Jiang, S.; Tran, K.; Kudela, R. Factors that influence the association between marine diatom *pseudo-nitzschia* and their bacterial associates. Ocean Science Meeting. Honolulu, Hawaii. 2014. (http://www.sgmeet.com/osm2014/viewabstract.asp?AbstractID=17910)

Sison-Mangus, M., S. C. Jiang. The microbiota of marine diatoms: is it influenced by algal host phylogeny? American Society for Liminology and Oceanography, Ocean Science Meeting, Salt Lake City, Utah, Feb. 20-24, 2012 (http://www.sgmeet.com/osm2012/viewabstract2.asp?AbstractID=12577)

Sison-Mangus, M. P., Tran, K., Jiang, S. Growth stimulation and killing of *pseudo-nitzschia* by non-native epibiotic bacteria. American Society for Liminology and Oceanography, Aquatic Science Meeting, San Juan, Pureto Rico, Feb. 13-18, 2011 (https://www.sgmeet.com/aslo/sanjuan2011/viewabstract2.asp?AbstractID=8790)

Tran, K., M., Sison-Mangus, S. C. Jiang. Bacterial diversity associated with toxic and non-toxic *pseudo-nitzschia* species. American Society for Liminology and Oceanography, Aquatic Science Meeting, San Juan, Pureto Rico, Feb. 13-18, 2011 (http://www.sgmeet.com/aslo/sanjuan2011/viewabstract2.asp?AbstractID=9063)

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1131770

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