Growth rate of Pleurochrysis carterae CCMP645 cells as measured by flow cytometry in laboratory experiments

Website: https://www.bco-dmo.org/dataset/670431
Data Type: experimental
Version:
Version Date: 2016-12-15

Project
» Persistent Virus Infections in Marine Phytoplankton (Marine Chronic Viruses)

Contributors	Affiliation	Role
Martínez Martínez, Joaquín	Bigelow Laboratory for Ocean Sciences	Principal Investigator, Contact
York, Amber D.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Dataset Description

Laboratory-based experiment using flow cytometry of coccolithophorid alga clonal culture isolates (Pleurochrysis carterae). All work was carried out at Bigelow Laboratory for Ocean Sciences, Maine.

Related datasets:
* Pleurochrysis carterae virus production
* Virus dPCR assay primers
* Accession numbers (P. carterae viruses and field samples)
* TEM Pleurochrysis carterae thin section images
* TEM Pleurochrysis carterae virion images

Methods & Sampling

Pleurochrysis carterae CCMP645 cells in mid-exponential growth phase were transferred (10% v/v) into flasks containing either F/2 (Guillard, 1975) or L1 (Guillard and Hargraves, 1993) media, in duplicate. Host abundance in each flask was monitored by flow cytometry (FCM) on a BD FACScan(TM) System for a 106-day period. The frequency of sampling varied throughout the period of the study as indicated in the excel data file. At each sampling time point 1 ml volume sample was collected from each flask and preserved in 0.5% paraformaldehyde, then snap frozen in liquid nitrogen and stored at -80C until ready for FCM analysis. Flow cytometry sample acquisition time was one minute for all samples. FCM analysis was carried out as described in Marie et al. 2005.

References

Guillard, Robert RL. "Culture of phytoplankton for feeding marine invertebrates." *Culture of marine invertebrate animals*. Springer US, 1975. 29-60.

Guillard, R. R. L., and P. E. Hargraves. "Stichochrysis immobilis is a diatom, not a chrysophyte." *Phycologia* 32.3 (1993): 234-236. https://doi.org/10.2216/i0031-8884-32-3-234.1

Marie, Dominique, Nathalie Simon, and Daniel Vaulot. "Phytoplankton cell counting by flow cytometry." *Algal culturing techniques* (2005): 253-267.

Data Processing Description

FCM data were analyzed with BD Cell QuestTM Pro, v. 5.2.1.

BCO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date
* modified parameter names to conform with BCO-DMO naming conventions
* blank values replaced with no data value 'nd'
* Date format converted to ISO Date format

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Data Files

File
PleuroGrowth.csv (Comma Separated Values (.csv), 3.41 KB) MD5:ca6a7c9d72de28cea9b76cd726af6941 Primary data file for dataset ID 670431

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Parameters

Parameter	Description	Units
date	sample date in format yyyy-mm-dd	unitless
sample_id	sample identifier made up of day the experiment; media used; and replicate (A or B)	unitless
counts	flow cytometry cell count for 1ml volume sample	count
flow_rate	flow cytometry flow rate	microliters per minute (ul/min)
cell_conc	cell concentration	cells per milliliter
acquisition_time	flow cytometry sample acquisition time in minutes	unitless

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Instruments

Dataset-specific Instrument Name	BD FACScan(TM) System
Generic Instrument Name	Flow Cytometer
Dataset-specific Description	Host abundance in each flask was monitored by flow cytometry (FCM) on a BD FACScan(TM) System for a 106-day period.
Generic Instrument Description	Flow cytometers (FC or FCM) are automated instruments that quantitate properties of single cells, one cell at a time. They can measure cell size, cell granularity, the amounts of cell components such as total DNA, newly synthesized DNA, gene expression as the amount messenger RNA for a particular gene, amounts of specific surface receptors, amounts of intracellular proteins, or transient signalling events in living cells. (from: http://www.bio.umass.edu/micro/immunology/facs542/facswhat.htm)

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Deployments

Bigelow_Martinez_2015-2016

Website	https://www.bco-dmo.org/deployment/670437
Platform	lab Bigelow
Start Date	2015-01-01
End Date	2016-12-30
Description	Bigelow Laboratory for Ocean Sciences **Methods & Sampling** laboratory experiment

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Project Information

Persistent Virus Infections in Marine Phytoplankton (Marine Chronic Viruses)

Description from NSF award abstract:
Viruses are prevalent in every part of the environment of our living planet, and yet our understanding of type, distribution, and function is the least well-known aspect of biodiversity. In recent years we have developed an increased appreciation for the role viruses play in driving host evolution in the environment, but fundamental knowledge about the mechanisms involved remain lacking. Additionally, viruses may influence diversity indirectly through "kill the winner" scenarios, as well as through cell lysis and subsequent release of dissolved nutrients, which facilitate restructuring of microbial communities. The majority of research on marine viruses to date has focused on combinations of acutely susceptible host strains with highly virulent virus isolates. However, it is likely that marine viruses also employ a persistent infection life strategy, arguably preferring it to the more widely recognized lytic cycle. The objective of this project is to demonstrate that persistent virus infections occur in marine phytoplankton, and that these are a crucial component of ocean ecosystem function and a key evolutionary driver in primary producers. Using a range of persistent virus:host systems, this project will investigate:
1) how pervasive persistent virus infections are in marine systems; and
2) the role of non-coding RNAs in maintaining host:virus symbiosis.

This is a high risk-high pay research as it involves a radically different approach to the analysis of viruses in marine systems. The investigators plan to apply a suite of molecular (transcriptomics, genomics and development of novel diagnostic markers) techniques to include the analysis of microRNAs to determine the functional importance of persistent viruses in the ocean. The results of this project will be potentially transformative for our understanding of virus-driven phytoplankton evolution and its potential impact on biodiversity in marine phytoplankton, a vital component of the global carbon cycle.

Note: William Wilson (Bigelow Laboratory) was the Former Principal Investigator on this project award.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1346272

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