Transmission electron micrographs of virions from Pleurochrysis carterae CCMP645 culture supernatant from laboratory experiments at the Bigelow Laboratory for Ocean Sciences, Maine from 2015-2016

Website: https://www.bco-dmo.org/dataset/670706
Data Type: experimental
Version:
Version Date: 2016-12-20

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

Contributors	Affiliation	Role
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Dataset Description

This dataset contains images of coccolithophorid algae (*Pleurochrysis carterae*) virions using a Transmission Electron Microscope (TEM). Image metadata such as magnification and cell_id are also included.

The supernatant images were taken on 19 June 2015.
The following zip files contain the supernatant images in TIF and JPG format. Metadata for these images are available by clicking the "Get Data" on this page.
TIF format(78MB) JPG format(24MB)

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

Methods & Sampling

A one-liter culture of *P. carterae* CCMP 645 in late exponential growth phase, grown in F/2 medium, was filtered through a 0.2 um PES membrane under sterile conditions. The filtrate was then initially concentrated down to approximately 25 ml by tangential flow filtration using a Vivaflow 50 cartridge (Sartorius) and further concentrated down to approximately 2 ml using a 30 kDa MWCO AmiconUltra-15 column (Millipore). Aliquots of the concentrate (2-20 ul) were spotted onto 200-mesh formvar/ carbon coated copper electron microscopy

grids (Polysciences) and allowed to dry. Grids were then positively stained with filtered (0.2 um) 2% (wt/ vol) uranyl acetate (SPI) in de-ionized water (> 18 milliohm cm-2) for 2 min followed by removal of excess liquid via filter paper and a de-ionized water rinse. Grids were allowed to air-dry and were stored at room temperature prior to analysis. Imaging analysis was performed at the Applied Medical Sciences department at the University of Southern Maine, Portland, ME, USA using an FEI Technai TEM at magnifications 6,000x – 250,000x at 100 kV. Photographs were taken at magnifications between 11,000x and 180,000x.

Data Processing Description

BCO-DMO processing notes:
* metadata information was extracted from information displayed in the image. Extracted information checked by the data manager and the principal investigator.
* original TIF images served along with JPG versions created with IrfanView batch process.
* thumbnails of reduced resolution created with IrfanView batch process for display on the data page.

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Data Files

File
TEM_super.csv (Comma Separated Values (.csv), 11.63 KB) MD5:8f3a76248af772d1b32c2175a51658e0 Primary data file for dataset ID 670706

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Parameters

Parameter	Description	Units
imagename	Name of the image; format is PhotoDate_ExperimentLocation_SequentialNumber.tif	unitless
print_mag	Magnification of image	unitless
direct_mag	Direct magnification of instrument at time of imaging	unitless
date	Date in format yyyy-mm-dd	unitless
time	Time in format HH:MM	unitless
sample_type	Two types of samples; 1) "concentrate 5-19-15" - concentrated culture supernatant and the date the sample was concentrated; 2) "concentrate optiprep band" - the band extracted from an Optiprep density gradient loaded with an aliquot of the previous concentrated sample.	unitltess
comment	Comment	unitless
thumbnail	thumbnail of the image formatted as html with a link to the original tif image	unitless

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Instruments

Dataset-specific Instrument Name	Transmission Electron Microscope (TEM)
Generic Instrument Name	Electron Microscope
Dataset-specific Description	FEI Technai TEM at magnifications 6,000x – 250,000x at 100 kV
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of electrons behaving as waves.

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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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