Transmission electron micrographs of Pleurochrysis carterae CCMP645 cell thin sections from laboratory experiments at Bigelow Laboratory for Ocean Sciences, Maine from 2015-2016

Website: https://www.bco-dmo.org/dataset/670714
Data Type: experimental
Version:
Version Date: 2016-12-20

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

This dataset contains thin-section images of the coccolithophorid algae Pleurochrysis carterae (CCMP645 cells) using a Transmission Electron Microscope (TEM). Image metadata such as magnification and cell_id are also included.

The thin section images were taken on 21 January 2016. The file names indicate the metadata such as phytoplankton species (though P. carterae CCMP 645 reduced to just "645"), culture age, and magnification (4,600 x - 46,000 x).

The following zip files contain transmission electron micrograph images in TIF and JPG format. Metadata for these images, including the age of the imaged cell, are available by clicking the "Get Data" on this page.
TIF format(54MB)
JPG format(13MB)

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

Methods & Sampling

Fifty milliliter P. carterae CCMP 645 cultures grown in F/2 medium to mid-exponential phase (~ 1 × 10e6 cells ml-1) were centrifuged at 3,000 × g for 5 min and the supernatant was discarded. The cell pellets were fixed

for 2 h with 2.5% glutaraldehyde in 0.2 M sodium cacodylate buffer, pH 7.2 at 4C. The pellets were washed twice in cacodylate buffer and sent to Electron Microscopy Laboratory facility at the University of Maine, Orono, ME, USA for further processing and imaging. At the microscopy facility, the sample was postfixed for 2 h in 2% OsO4 in cacodylate buffer at 4C. The cells were enrobed with 1.5% agar solution and the agar blocks were dehydrated in an ethanol series and embedded in Epon. Ultra-thin sections were double-stained with uranyl acetate and lead citrate and examined with a Phillips/FEI EM201 transmission electron microscope operated at 100 kV.

Data Processing Description

BCO-DMO processing notes:
* metadata information was extracted from image names and edited to serve on the data page.
* whitespaces in image names replaced with an underscore
* 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_thin.csv (Comma Separated Values (.csv), 4.91 KB) MD5:44ab769c611ba424bd9d988b12023109 Primary data file for dataset ID 670714

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Parameters

Parameter	Description	Units
imagename	Name of image	unitless
days_old	Age of culture imaged in days	unitless
magnification	Magnification of image	unitless
cell_id	Cell identifier	unitless
comment	Comment indicating cell state	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	Phillips/FEI EM201 transmission electron microscope operated 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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