Phytoplankton nutrient traits and data sources collected from the Kellogg Biological Station, MSU, Michigan in 2014 (Phytoplankton Traits project)

Website: https://www.bco-dmo.org/dataset/636127
Data Type: experimental
Version: 2
Version Date: 2021-06-10

Project
» Phytoplankton Traits, Functional Groups and Community Organization: A Synthesis (Phytoplankton Traits)

Contributors	Affiliation	Role
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Dataset Description

This dataset combines Tables 1 and 2 from Edwards et al (2015) Ecology. Cell volume measurements for nearly all species in the nutrient trait data set is also available, see Table 3. Nutrient utilization traits. Each row presents a single species/strain from one publication. If multiple traits were measured on that strain in that publication, they are all listed in the same row. If the same strain was tested at multiple temperatures, the measurements from each temperature are recorded in different rows. Temperature of the experiment, irradiance, day length, taxon, system (freshwater/marine), isolate ID, cell volume, C per cell, and citation source are all included as well.

These data were obtained from http://www.esapubs.org/archive on 2016-01-21.

Full metadata details

Related Reference:

Kyle F. Edwards, Christopher A. Klausmeier, and Elena Litchman. 2015. Nutrient utilization traits of phytoplankton. Ecology 96:2311. http://dx.doi.org/10.1890/14-2252.1

Methods & Sampling

Data acquisition, methodology, and criteria for inclusion: We comprehensively searched the literature for studies that used unialgal cultures to measure how phytoplankton growth, nutrient content, and nutrient uptake rate respond to nutrient supply. We focused on experiments using nitrate, ammonium, or phosphate as the limiting nutrient. We only compiled studies where light was not strongly limiting, and where only a single nutrient was limiting. For one diazotroph (*Trichodesmium*), the experiments compiled here did not include

nitrogen in the medium.

Data Processing Description

BCO-DMO data manager processing notes

* Version 2 (2021-06-10) replaces version 1 (2016-01-21). There was an unsupported character in the source file. Converted to utf-8. Author's name in comment now reads "Toxic Marine Phytoplankton vol. 4, eds. A. Gran´li, B. Sundstr_m, and L. Edler."

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Data Files

File
nut_traits_T1-2.csv (Comma Separated Values (.csv), 140.00 KB) MD5:4cf20e74f1c1c2152a369f074aebc0b2 Primary data file for dataset ID 636127

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Parameters

Parameter	Description	Units
species	Species name	text
isolate	Isolate ID	text
taxon	Taxon name	text
system	Freshwater/marine	text
temperature	Culture temperature	degrees Celsius
irradiance	Culture irradiance	umol photons/m^2/s^1
light_hours	Culture daylength	hr
synonym	Former species name	text
volume	Cell volume	um3
c_per_cell	Carbon per cell	umol cell-1
c_citation	C per cell citation	integer
mu_inf_amm	u(infinity) for ammonium-limited growth	day-1
mu_amm	umax for ammonium-limited growth	day-1
k_amm_m	Km for ammonium-limited growth	umol L-1
k_amm	K for ammonium uptake	umol L-1
vmax_amm	Vmax for ammonium uptake	umol N cell-1 day-1
vmax_amm_c	Vmax:C for ammonium uptake	umol N umol C-1 day -1
qmin_amm	Qmin for ammonium-limited growth	umol N cell-1
qmin_amm_c	Qmin:C for ammonium-limited growth	umol N umol C-1
qmax_amm	Qmax for ammonium-limited growth	umol N cell-1
qmax_amm_c	Qmax:C for ammonium-limited growth	umol N umol C-1

mu_inf_nit	u(infinity) for nitrate-limited growth	day-1
mu_nit	umax for nitrate-limited growth	day-1
k_nit_m	Km for nitrate-limited growth	umol L-1
k_nit	K for nitrate uptake	umol L-1
vmax_nit	Vmax for nitrate uptake	umol N cell-1 day-1
vmax_nit_c	Vmax:C for nitrate uptake	umol N umol C-1 day-1
qmin_nit	Qmin for nitrate-limited growth	umol N cell-1
qmin_nit_c	Qmin:C for nitrate-limited growth	umol N umol C-1
qmax_nit	Qmax for nitrate-limited growth	umol N cell-1
qmax_nit_c	Qmax:C for nitrate-limited growth	umol N umol C-1
mu_inf_p	u(infinity) for phosphate-limited growth	day-1
mu_p	umax for phosphate-limited growth	day-1
k_p_m	Km for phosphate-limited growth	umol L-1
k_p	K for phosphate uptake	umol L-1
vmax_p	Vmax for phosphate uptake	umol P cell-1 day-1
vmax_p_c	Vmax:C for phosphate uptake	umol P umol C-1 day-1
qmin_p	Qmin for phosphate-limited growth	umol P cell-1
qmin_p_c	Qmin:C for phosphate-limited growth	umol P umol C-1
qmax_p	Qmax for phosphate-limited growth	umol P cell-1
qmax_p_c	Qmax:C for phosphate-limited growth	umol P umol C-1
citation_code	Publication code	integer
full_citation	Citation for the original publication	string

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Deployments

Litchman_2014

Website	https://www.bco-dmo.org/deployment/636298
Platform	Unknown Platform
Start Date	2014-01-01
End Date	2014-12-31
Description	Phytoplankton trait studies

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Project Information

Phytoplankton Traits, Functional Groups and Community Organization: A Synthesis (Phytoplankton Traits)

Description from NSF award abstract:
Phytoplankton account for half of global primary productivity and their biomass and community composition

significantly impact global carbon and other biogeochemical cycles and ecosystem functioning. Explaining patterns of global distributions of phytoplankton groups and predicting how phytoplankton communities will re-organize under anthropogenic environmental change requires knowledge of diverse eco-physiological traits defining ecological niches of phytoplankton species. In this project, the investigators will assemble a query-based database of diverse phytoplankton traits such as cell/colony size, growth rates, resource acquisition and predator avoidance traits, among others. Data for all available species and strains will be included. They will use the database to answer fundamental questions in phytoplankton ecology such as:
1) what traits exhibit trade-offs (pairwise and beyond) and what shapes are they?
2) What traits scale allometrically with cell/body size? Can scaling exponents from first principles be predicted? What are potential limits to allometric scaling as a way of simplifying the complex trait space that characterizes real organisms?
3) What are trait differences among major functional/taxonomic groups of phytoplankton and how much does taxonomy/phylogeny constrain particular functional traits?
4) Are there differences in trait distributions between marine and freshwater groups?

The investigators will also use the database to parameterize novel models of phytoplankton community organization and evolution based on adaptive dynamics approaches. They will use the models to explore how community structure emerges under different environmental scenarios, given physiological constraints and ecological interactions. Changes in elemental stoichiometry, size structure and functional group distributions at different spatial and temporal scales will also be examined.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0928819

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