Effect of phytosterol supplementation on Artemia growth (PhytosterolsZooplank project)

Website: https://www.bco-dmo.org/dataset/724179
Data Type: experimental
Version: 1
Version Date: 2018-01-19

Project
» Collaborative Research: Effects of Marine Algal Sterols on Zooplankton Growth and Reproduction (PhytosterolsZooplank)

Contributors	Affiliation	Role
Hassett, R. Patrick	Ohio University	Principal Investigator
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Abstract
This dataset includes growth rates measured as biomass change of the brine shrimp Artemia that were fed a diet supplemented with a variety of phytosterols.

Table of Contents

- Dataset Description
  - Methods & Sampling
  - Data Processing Description
- Data Files
- Parameters
- Instruments
- Project Information
- Funding

Dataset Description

This dataset includes growth rates measured as biomass change of the brine shrimp *Artemia* that were fed a diet supplemented with a variety of phytosterols.

Statistical results of this experiment: Hassett_Sterol_stats2017-12-05.pdf

Methods & Sampling

Phytosterols were synthesized by J. Giner. Rhodomonas cultures were labeled by dissolving sterols in 100% ethanol at a concentration of 2 mg/ml, and then adding the sterol solution at a concentration of 20 µl sterol solution per 100 ml stock culture (at stock density 1x106 cells/liter). The cultures were mixed on a LabGenius orbital shaker for 2 hr at 100 rpm to allow the sterols to bind to the algal surfaces. In vivo chlorophyll a was monitored with a Turner handheld fluorometer to ensure that all food was consumed before the subsequent feeding. This avoided the problem of algal growth diluting the phytosterol concentration over time.

Artemia were hatched in an aerated 2L beaker and the nauplii distributed to 4L beakers containing seawater at 32 ppt. Animals were fed daily with Rhodomonas supplemented with phytosterols at 50,000 cells/ml in 3 replicate, aerated containers for 8 days. In vivo fluorescence was measured with a Turner handheld fluorometer to ensure that the Rhodomonas was consumed between feedings. At the end of the experiment the containers were drained, cleaned of debris, and the number of individuals counted. Samples were then

strained on 75µm Nitex and transferred to a preweighed 2.5 cm glass-fiber filter. Filters were dried in a 60 degree C oven overnight and weighed on a Mettler analytical balance. A total of 4 experiments were conducted with Artemia, using 3 replicate treatments of 6 phytosterols, except the last experiment when 5 phytosterols were tested. In the first 3 experiments supplementation was begun 2 days after hatching, while in the fourth experiment supplementation was delayed 2 additional days so that animals began supplementation at a larger size. Results were expressed as both average dry weight per individual and total biomass (mg dry wt) per tank.

Data Processing Description

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- filled in the empty cells in expt, sterol_id and sterol_name columns with the data from the preceding cell.
- replaced special characters with ascii characters
- replaced spaces with underscores

[table of contents | back to top]

Data Files

File
Artemia_growth_sterols.csv (Comma Separated Values (.csv), 3.14 KB) MD5:3e4495f10c1cb70a73c73f00295ed467 Primary data file for dataset ID 724179

[table of contents | back to top]

Parameters

Parameter	Description	Units
experiment	experiment identifier	unitless
sterol_id	sterol identifier	unitless
sterol_name	full chemical name of sterol	unitless
biomass_mg	dry weight of Artemia per tank	milligrams
ind_weight_ug	average individual dry weight	micrograms/individual

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Turner hand-held fluorometer
Generic Instrument Name	Fluorometer
Dataset-specific Description	Used to measure chlorophyll-a.
Generic Instrument Description	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

Dataset-specific Instrument Name	
Generic Instrument Name	In-situ incubator
Dataset-specific Description	Sanyo MIR252 incubator
Generic Instrument Description	A device on a ship or in the laboratory that holds water samples under controlled conditions of temperature and possibly illumination.

Dataset-specific Instrument Name	
Generic Instrument Name	Microscope - Optical
Dataset-specific Description	Olympus SZH30 stereo microscope
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope".

Dataset-specific Instrument Name	Mettler analytical balance
Generic Instrument Name	scale or balance
Dataset-specific Description	Used to measure dry weights.
Generic Instrument Description	Devices that determine the mass or weight of a sample.

Dataset-specific Instrument Name	
Generic Instrument Name	Shaker
Dataset-specific Description	LabGenius Digital Orbital Shaker
Generic Instrument Description	A Shaker is a piece of lab equipment used to mix, blend, or to agitate substances in tube(s) or flask(s) by shaking them, which is mainly used in the fields of chemistry and biology. A shaker contains an oscillating board which is used to place the flasks, beakers, test tubes, etc.

[table of contents | back to top]

Project Information

Collaborative Research: Effects of Marine Algal Sterols on Zooplankton Growth and Reproduction (PhytosterolsZooplank)

Description from NSF award abstract:
Autotroph-herbivore interactions in marine food webs are important to fisheries, the global carbon cycle, and, because of harmful algal blooms, human health. The recent hypothesis that harmful algae interfere with the growth and reproduction of zooplankton because of specific structural modifications of the algal sterols will be tested in research on the roles of nutritional factors in planktonic food webs. The effects of marine algal sterols on herbivorous crustaceans will be investigated in three calanoid copepods, *Acartia hudsonica*, *Eurytemora affinis*, and *Calanus finmarchicus*, and brine shrimp, *Artemia salina*. In this project, studies will be carried out to determine whether marine algal sterols can be metabolized to cholesterol by zooplankton and the relative efficiency of this process. This information is critical for assessing the nutritional value of different algal diets. Using the metabolic studies as a foundation, further experiments will seek to determine whether selected sterols, some of which have structural similarities to steroid hormones, have an inhibitory impact on the growth and reproduction of crustaceans. The analytical techniques used in these experiments will be high-field 13C-nuclear magnetic resonance spectrometry (NMR) and gas chromatography-high resolution mass spectrometry (GC-HRMS). Test sterols for these experiments will be labeled with stable isotopes (13C and 2H) in specific positions by chemical synthesis.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1061973
NSF Division of Ocean Sciences (NSF OCE)	OCE-1061957

[table of contents | back to top]