

# Experimental results describing Copepod fed phytoplankton mixtures that were analyzed at San Francisco State University in 2013

**Website:** <https://www.bco-dmo.org/dataset/546536>

**Data Type:** experimental

**Version:** 2015-01-15

## Project

» [Feeding and food limitation in copepod nauplii, the neglected life stage](#) (food limitation in copepod nauplii)

Contributors	Affiliation	Role
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## Dataset Description

An approach was developed to recover prey DNA from gut contents of nauplii of a predatory copepod by blocking the detection of predator, *Tortanus dextrilobatus*, with ligase and a blocking oligonucleotide and amplifying prey DNA with universal primers. Adding 25 U of ligase improved predator clamping, while 100 and 200 U reduced efficiency. Field collected nauplii consumed a broad range of prey. This dataset measures the performance of the blocking oligonucleotide with increasing amounts of ligase and at two ratios of prey to predator DNA concentration. Data are also shown for wild nauplii at 25 and 100 U of ligase.

This dataset is published in Figure 2, Craig et al (2014).

### Related Reference:

\* Craig, Carrie, Wim J. Kimmerer, and C. Sarah Cohen. 2014. A DNA-based method for investigating feeding by copepod nauplii. *Journal of Plankton Research* 36 (1): 271-275

Vogt, R.A., T.R. Ignoffo, L.J. Sullivan, J. Herndon, J.H. Stillman, and W. Kimmerer. 2013. Feeding capabilities and limitations in the nauplii of two pelagic estuarine copepods, *Pseudodiaptomus marinus* and *Oithona davisae*. *Limnology and Oceanography* 58: 2145-2157.

## Methods & Sampling

mix1=Artificial mixture of 1 part prey to 100,000 parts predator

mix2=Artificial mixture of 1 part prey to 10,000 parts predator

## Data Processing Description

Raw data was plotted to determine gut fluorescence in raw units, subtracting background fluorescence from copepods with empty guts (background).

### BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date, reference information
- renamed parameters to BCO-DMO standard
- reordered columns

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## Data Files

File
<b>fig2_food_mix.csv</b> (Comma Separated Values (.csv), 243 bytes) MD5:7ddcdf9a816c5ccd7590bb550dc7669f Primary data file for dataset ID 546536

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## Parameters

Parameter	Description	Units
sequence_id	sequence identification or sample name: TDF=adult; TDN = nauplii	unitless
ligase	amount of ligase in PCR	enzyme units
prey_pred_mix1	Artificial mixture of 1 part prey to 100,000 parts predator	percent
prey_pred_mix2	Artificial mixture of 1 part prey to 10,000 parts predator	percent
wild_gut	Natural mixture found in field-caught animals	percent

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## Instruments

<b>Dataset-specific Instrument Name</b>	Fluorometer
<b>Generic Instrument Name</b>	Fluorometer
<b>Dataset-specific Description</b>	Turner 10AU
<b>Generic Instrument Description</b>	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.

<b>Dataset-specific Instrument Name</b>	
<b>Generic Instrument Name</b>	plate reader
<b>Dataset-specific Description</b>	Tecan Infinite F200 or Biotek Synergy 2 microplate reader was used for each analysis. Each microplate reader contained a 430/20 EX, 680/20 EMfilter pair for Chl a.
<b>Generic Instrument Description</b>	Plate readers (also known as microplate readers) are laboratory instruments designed to detect biological, chemical or physical events of samples in microtiter plates. They are widely used in research, drug discovery, bioassay validation, quality control and manufacturing processes in the pharmaceutical and biotechnological industry and academic organizations. Sample reactions can be assayed in 6-1536 well format microtiter plates. The most common microplate format used in academic research laboratories or clinical diagnostic laboratories is 96-well (8 by 12 matrix) with a typical reaction volume between 100 and 200 uL per well. Higher density microplates (384- or 1536-well microplates) are typically used for screening applications, when throughput (number of samples per day processed) and assay cost per sample become critical parameters, with a typical assay volume between 5 and 50 µL per well. Common detection modes for microplate assays are absorbance, fluorescence intensity, luminescence, time-resolved fluorescence, and fluorescence polarization. From: <a href="http://en.wikipedia.org/wiki/Plate_reader">http://en.wikipedia.org/wiki/Plate_reader</a> , 2014-09-0-23.

<b>Dataset-specific Instrument Name</b>	Spectrophotometer
<b>Generic Instrument Name</b>	Spectrophotometer
<b>Dataset-specific Description</b>	Agilent 8453 spectrophotometer (Agilent Technologies)
<b>Generic Instrument Description</b>	An instrument used to measure the relative absorption of electromagnetic radiation of different wavelengths in the near infra-red, visible and ultraviolet wavebands by samples.

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## Deployments

### Kimmerer\_2013

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/546436">https://www.bco-dmo.org/deployment/546436</a>
<b>Platform</b>	SFSU RTC
<b>Start Date</b>	2009-09-01
<b>End Date</b>	2014-08-31
<b>Description</b>	Copepod feeding studies

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## Project Information

**Feeding and food limitation in copepod nauplii, the neglected life stage (food limitation in copepod nauplii)**

## Coverage: San Francisco Estuary

This project will investigate feeding by copepod nauplius larvae, the most abundant metazoans in the sea. It will answer three questions: 1) How does food selection by adults and nauplii differ when they are fed multiple prey species in the laboratory? 2) How does food selection by adults and nauplii differ when they are feeding on natural prey assemblages? and, 3) How do growth, development, and survival differ between copepodites and nauplii when their growth is food limited? Comparative experiments and field-based measurements will contrast the food consumed, and the effects of food limitation, between nauplii and later life stages. This contrast will include attributes of food such as size, taxon, and motility, and will include experiments with cultured prey offered singly or in a mixture, and natural prey, and apply genetic techniques to determine prey consumption by a predatory copepod. Copepods will be collected from the San Francisco Estuary, with four species selected for experiments to span taxonomic groups, sizes, salinity ranges, and general feeding behavior. A variety of techniques will be applied to account for the inevitable biases and limitations of each; all but one have previously been applied in our laboratories. These will include laboratory feeding experiments using cultured prey individually and in mixtures, and experiments using natural prey. Consumption of prey in experimental bottles will be measured as chlorophyll concentration and through particle counts by microscopy and flow cytometry. Radioactively labeled prey will be used in short incubations to determine feeding on particular prey types. Samples from the field will be examined for gut fluorescence. Separate experiments will determine how nauplii and copepodites survive and grow at different concentrations of food. Investigations of feeding by a predatory copepod (*Tortanus dextrilobatus*) will use molecular techniques to identify mitochondrial and nuclear DNA from diverse suspected prey species. Specific primers will be developed for common zooplankton species consumed by *T. dextrilobatus* in the laboratory. General primers and screening protocols developed here will be useful for identifying food web interactions in other estuarine communities.

Copepod nauplii are important both in their diverse trophic roles in ocean foodwebs and in the population dynamics of copepods. Nauplii have a completely different feeding apparatus from later stages, and the first feeding stage can be very sensitive to starvation, making these life stages critical to population dynamics. Yet extant copepod population models treat nauplii as miniature adults. This work will provide valuable input to the growing efforts at modeling ocean ecosystems.

[Further details from final report \(pdf\)](#)

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## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-0929075</a>

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