Pleurobrachia bachei morphology and swimming parameters from samples collected at the Oregon Institute of Marine Biology, Coos Bay, Charleston, OR, in July 2018

Website: https://www.bco-dmo.org/dataset/894939
Data Type: Other Field Results
Version: 1
Version Date: 2023-04-28

Project
» Collaborative Research: Quantifying the trophic roles of epipelagic ctenophores (Ocean Ctenos)

Contributors	Affiliation	Role
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Abstract
This dataset includes morphological and kinematic data affecting swimming performance in free-swimming ctenophores (Pleurobrachia bachei). The data were collected using high-speed videography. Specimens were collected and recorded at the Oregon Institute of Marine Biology (OIMB), Coos Bay, Charleston, Oregon, in July 2018.

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Coverage

Location: Oregon Institute of Marine Biology, Charleston, OR
Spatial Extent: **Lat**:43.345 **Lon**:-124.329
Temporal Extent: 2018-07 - 2018-07

Methods & Sampling

Sixteen individuals of *Pleurobrachia bachei,* ranging from 4.6 to 13 millimeters (mm) in length, were collected with a 0.5-meter (m) ring net with 500-micrometer (µm) mesh, or by hand collecting in jars, from Coos Bay,

Charleston, OR, in July 2018. Organisms were stored in 1-liter containers for no longer than 1 week at ambient field temperatures (11 to 14 degrees Celsius). Individuals were filmed in a glass vessel (350 cubic centimeters (cm^3)) for 15 minutes in a dark-field setup using a Sony camcorder (HDR-CX900) at 60 frames per second, and video analysis was done using ImageJ. The tank volume to ctenophore volume ratio was approximately 700:1, and ctenophores exhibited normal swimming behavior during the video trials. Morphometric parameters, including ctene length, spacing (distance between ctenes), row length, and number of ctenes per row, were also measured for each organism.

Two individuals of *P. bachei* were hand-collected from the docks at Friday Harbor Labs (FHL), WA, in June 2017 for more detailed kinematics. Ctene width and tip speed over time were measured using high-speed microvideography recorded at 1,000 frames per second in 2,048 × 2,048-pixel resolution (Photron Fastcam Mini WX100). Ctene width was measured at the inflection point of the ctene, typically 30 to 40 percent of ctene length from the tip, because this portion changed dynamically during the pulse cycle.

Data Processing Description

Videos were processed using ImageJ software.

BCO-DMO Processing Description

- Adjusted field/parameter names to comply with BCO-DMO naming conventions.
- Added columns for “Latitude” and “Longitude” based on the "Location" column and coordinates given in the metadata description.
- Rounded values for latitude and longitude to 3 decimal places.
- Converted date to format: YYYY-MM.

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Data Files

File	
pleurobrachia_allometry-1.csv	(Comma Separated Values (.csv), 1.21 KB) MD5:0e103d9d4bffbfff9b2f5ff0e4102392
Primary data file for dataset 894939, version 1.	

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Related Publications

Heimbichner Goebel, W. L., Colin, S. P., Costello, J. H., Gemmell, B. J., & Sutherland, K. R. (2020). Scaling of ctenes and consequences for swimming performance in the ctenophore Pleurobrachia bachei. Invertebrate Biology, 139(3). Portico. https://doi.org/10.1111/ivb.12297
Results

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Related Datasets

IsRelatedTo

Colin, S., Sutherland, K. R., Costello, J. H., Gemmell, B. J. (2024) **Lobate ctenophore in situ swimming**

velocities and morphometrics sampled off of Woods Hole, Massachusetts and the Kona coast of Hawaii, USA from 2019 to 2022. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2023-05-18 doi:10.26008/1912/bco-dmo.895989.1 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
Location	The location where specimens were collected; OIMB = Oregon Institute of Marine Biology.	unitless
Latitude	Latitude of sampling site	decimal degrees
Longitude	Longitude of sampling site (West is negative)	decimal degrees
Date	Month and year when specimen was collected and recorded	unitless
Specimen_ID	Specimen identification number	unitless
Body_length	Total oral-aboral length of ctenophore	millimeters (mm)
Ctene_Length	Total length of ctene	millimeters (mm)
Ctene_Spacing	Distance between ctenes	millimeters (mm)
Ctenes_per_Row	Number of ctenes per ctene row	unitless
Ctene_row_length	Total length of ctene row	millimeters (mm)
Beat_Frequency	Ctene beats or metachronal waves per time	Hertz
Swimming_Speed	Speed based on tracking changes in the x, y position at the tip of the animal	millimeters per second (mm s-1)

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Instruments

Dataset-specific Instrument Name	Sony camcorder (HDR-CX900)
Generic Instrument Name	Camera
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

Dataset-specific Instrument Name	Photron Fastcam Mini WX100
Generic Instrument Name	Camera
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

Dataset-specific Instrument Name	Sea Gear 0.5-m ring net with 500-µm mesh
Generic Instrument Name	Ring Net
Generic Instrument Description	A Ring Net is a generic plankton net, made by attaching a net of any mesh size to a metal ring of any diameter. There are 1 meter, .75 meter, .25 meter and .5 meter nets that are used regularly. The most common zooplankton ring net is 1 meter in diameter and of mesh size .333mm, also known as a 'meter net' (see Meter Net).

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Project Information

Collaborative Research: Quantifying the trophic roles of epipelagic ctenophores (Ocean Ctenos)

NSF Award Abstract:
Ctenophores are gelatinous predators found throughout the world's oceans, and their predatory impacts can profoundly affect planktonic communities. A variety of methods employed by marine scientists have converged to demonstrate the key roles these animals play in determining planktonic composition and energy flows in coastal systems. The role of oceanic ctenophores, however, is still sparsely documented. Oceanic ctenophores are characterized by more delicate gelatinous bodies that usually do not survive capture by conventional nets and do not perform naturally when transferred from their wall-less oceanic environment to shipboard bottles and containers. The difficulty in obtaining quantitative measurements on feeding by oceanic species has limited the ability to understand the role of these organisms in oceanic systems. This project will transform the capabilities to quantify key processes of oceanic ctenophores with in situ studies. However, ctenophores are not the only delicate oceanic animals that will benefit from developing advanced in situ methods. Similar techniques and approaches can be applied to other groups such as cnidarian siphonophores, pelagic molluscs, marine snow and large protists such as radiolarians. Additionally, successful application of these methods by divers will open the path for applications on Remotely Operated Vehicles (ROVs) and other submersibles that can greatly extend the depth and range of the techniques. Training of new scientists will involve postdoctoral, graduate and undergraduates. The investigators will broaden public science outreach by using contacts with media and aquariums involved in public education to communicate new findings to a wide public audience.

This project will address the challenge of obtaining information about the role and activity of pelagic oceanic ctenophores by adapting methods developed in the laboratory and employing them in a field setting. The investigators have adapted high-speed, high-resolution imaging and fluid-mechanics methods to the animal's in situ environment. These methods are particularly appropriate for field measurements of animals that are intractable for controlled laboratory studies and must be studied in situ, such as oceanic ctenophores. The goal in this project will be to apply high-speed, in situ particle image velocimetry (PIV) and bright field imaging systems to study a suite of oceanic ctenophores possessing distinct morphologies with potentially variable

trophic roles to quantify: a) their flow and feeding mechanics; b) their ingestion rates and prey selection; and c) their trophic impacts. The results will enable inclusion of about the activities of these widespread and important animals in models of epipelagic food web dynamics.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1829932

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