Particle image velocimetry data of swimming in two species of tailed ciliates collected from the North Atlantic and Gulf of Mexico from 2011-2014 (Protist Behavior and Imposed Flow project)

Website: https://www.bco-dmo.org/dataset/636371
Data Type: experimental
Version: 2016-01-22

Project
» Linking Propulsive Morphology, Swimming Behavior and Sensory Perception by Marine Planktonic Protists to their Trophic Roles within Marine Food Webs (Protist Behavior and Imposed Flow)

Contributors	Affiliation	Role
Buskey, Edward J.	University of Texas - Marine Science Institute (UTMSI)	Principal Investigator
Gemmell, Brad J.	University of South Florida (USF)	Contact
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Dataset Description

Related Reference:
Gemmell et al. 2015. A tale of the ciliate tail: investigation into the adaptive significance of this sub-cellular structure. Proceedings of the Royal Society B. 282 (1812) DOI: 10.1098/rspb.2015.0770

Related Datasets:
Ciliate PIV data: Fig 3-RSBP
Ciliate PIV videos

Methods & Sampling

Methodology

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Data Files

File
PIV_ciliates.csv (Comma Separated Values (.csv), 4.09 MB) MD5:99dc570522a6c2d1bfacde0850637c75 Primary data file for dataset ID 636371

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Related Publications

Gemmell, B. J., Jiang, H., & Buskey, E. J. (2015). A tale of the ciliate tail: investigation into the adaptive significance of this sub-cellular structure. Proceedings of the Royal Society B: Biological Sciences, 282(1812), 20150770. doi:10.1098/rspb.2015.0770
Results

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Related Datasets

Different Version

Gemmell, B. J., Jiang, H., & Buskey, E. J. (2015). Data from: A tale of the ciliate tail: investigation into the adaptive significance of this sub-cellular structure [Data set]. Dryad Digital Repository. https://doi.org/10.5061/dryad.r5f7m

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Parameters

Parameter	Description	Units
title	PIV run identification	unitless
p1	position	millimeters
p2	position 2	millimeters
v1	V-position	millimeters
v2	V-position 2	millimeters

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Camera
Dataset-specific Description	Photron SA6 high-speed camera with a 150W fiber optic illuminator (Fisher Scientific)
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

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Project Information

Linking Propulsive Morphology, Swimming Behavior and Sensory Perception by Marine Planktonic Protists to their Trophic Roles within Marine Food Webs (Protist Behavior and Imposed Flow)

Coverage: US coastal North Atlantic water, and US coastal Gulf of Mexico water

Description from NSF award abstract:
One of the central issues in biological oceanography is to understand the processes that regulate the biomass and distribution of phytoplankton in the ocean. The fate of most phytoplankton is to be consumed by grazers, and it is now generally accepted that marine planktonic protists are the most important grazers on phytoplankton, and that grazing by protists can fundamentally affect phytoplankton biomass and distribution in the ocean. Protists can become temporarily very abundant (up to tens of thousands per liter) and can grow nearly as rapidly as phytoplankton do, which gives them great potential to regulate phytoplankton populations. Adaptations by protists to feed selectively on the fastest growing species of phytoplankton and to reduce predation by metazoan zooplankton should enhance the coupling between phytoplankton growth and grazing, and therefore promote planktonic ecosystem stability. Compared to larger metazoan zooplankton such as copepods, relatively little is known about the morphological and behavioral adaptations in protists for selective feeding and predator avoidance.

The PIs will study details of selective feeding behavior and predator avoidance behavior of free-swimming planktonic protists in 3-dimension using high-speed video. Under the same conditions, they will measure flow fields imposed by individual free-swimming protists using a time-resolving stereo micro-particle image velocimetry (microPIV) system. To gain a mechanistic understanding, they will also conduct empirical data-driven, reality-reproducing computational fluid dynamics (CFD) simulations of the protist-imposed flow fields. The results will be used to test the hypothesis that diversity and flexibility in propulsive morphology facilitates protists to achieve sophisticated swimming behaviors and sensory perception capabilities that adapt them for selective feeding and predator avoidance. These capabilities may also serve as important driving forces for protistan biodiversity, represented by various sizes, shapes, propulsive morphologies and motility patterns.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1129668

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