Copepod nauplius appendage measurements collected during escape response University of Hawaii at Manoa in 2015 (PreyEscape project)

Website: https://www.bco-dmo.org/dataset/627968
Data Type: experimental
Version: 2015-12-15

Project
» The Drive to Survive: Copepods vs Ichthyoplankton (PreyEscape)

Contributors	Affiliation	Role
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Dataset Description

High-resolution measurement of body displacement and angular position of individual appendages during escape swims of nauplii of the calanoid copepod, *Bestiolina similis.*

Related Reference:

Lenz, P.H., Takagi, D. and Hartline, D.K. 2015. Choreographed swimming of copepod nauplii. J. Royal Society Interface 12: 20150776.

Methods & Sampling

Spontaneous escape swims were recorded at 5000 fps with an Olympus Industrial i-SPEED high-speed camera at 10x magnification through an inverted microscope (Olympus IX70). See publication for additional details.

Data Processing Description

Each video image in a swim sequence was converted into a bitmap (tiff format) and analyzed using ImageJ (Wayne Rasband rsbweb.nih.gov/ij/). Distance traveled from the initial rest point was calculate using Pythagorean theorem using X0, Xt and Y0, Yt coordinates. See publication for additional details.

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Data Files

File
prey_escape.csv (Comma Separated Values (.csv), 35.01 KB) MD5:729d7ae294883c39cb21c55554cbe889 Primary data file for dataset ID 627968

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Parameters

Parameter	Description	Units
meas_num	Measurement number made in the data series. Not all start from 0 since the start time was normalized across data files.	unitless
x_axis	X-axis measurement in mm in relation to the top left corner of the image where x=0 and y=0.	millimeters
y_axis	Y-axis measurement in mm in relation to the top left corner of the image where x=0 and y=0.	millimeters
image_frame	refers to the image number after converted from the video that capture the swim episode at 5000 fps.	unitless
time_elapsed	Time in ms set to 0 at the beginning of the measured sequence and is given as increments of 0.2 ms computed from video recording speed (5000 fps) .	milliseconds
A1_angle	Angular measurement of first antenna with respect to main body axis in degrees.	degrees
A2_angle	Angular measurement of second antenna with respect to main body axis in degrees.	degrees
mand_angle	Angular measurement of mandible with respect to main body axis in degrees.	degrees
distance	Computed displacement of nauplius in mm using Pythagorean theorem	millimeters

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Camera
Dataset-specific Description	Olympus Industrial i-SPEED high-speed camera
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

Dataset-specific Instrument Name	
Generic Instrument Name	Microscope - Optical
Dataset-specific Description	Inverted microscope (Olympus IX70)
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".

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Deployments

Naup_2015

Website	https://www.bco-dmo.org/deployment/627988
Platform	Lenz_lab
Start Date	2012-09-01
End Date	2015-11-09
Description	Measurements of copepod escape response.

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Project Information

The Drive to Survive: Copepods vs Ichthyoplankton (PreyEscape)

Coverage: Pacific

Description from NSF award abstract:
This study will experimentally elucidate the dynamics of predator evasion by different species and life stages of copepod responding to a model larval fish predator. The PIs will use standard and high-speed videographic and cutting-edge holographic techniques. Predator-prey interactions within planktonic communities are key to understanding how energy is transferred within complex marine food webs. Of particular interest are those between the highly numerous copepods and one of their more important predators, the ichthyoplankton (the planktonic larval stages of fishes). The larvae of most fishes are planktivorous and heavily dependent on copepods for food. In general, evasion success increases with age in copepods and decreases with the age of the fish predator. How this plays out in detail is critical in determining predatory attack outcomes and the effect these have on predator and prey survival. To address this problem, different copepod developmental stages will be tested against several levels of predator competence, and the results examined for: 1) the success or failure of attacks for different combinations of predator and prey age class; 2) the kinematics (reaction latencies and trajectory orientation) for escape attempts, successful and unsuccessful, for different age classes of copepod; 3) the hydrodynamic cues generated by different ages and attack strategies of the predator and the sensitivity of different prey stages to these cues; and 4) the success or failure of the predatory approach and attack strategies at each prey stage. The data obtained will be used to inform key issues of zooplankton population dynamics. For the prey these include: predator-evasion capabilities and importance of detection ability, reaction speed, escape speed, escape orientation, and trajectory irregularity; for the predator they are: capabilities and importance of mouth gape size, stealthiness, hydrodynamic

disturbance production, and lunge kinematics.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1235549

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