Larval clownfish (Amphiprion ocellaris) predatory success during first 14 days post-hatch from Lenz lab in the University of Hawaii at Manoa lab from 2012-2015 (PreyEscape project)

Website: https://www.bco-dmo.org/dataset/686907
Data Type: experimental
Version:
Version Date: 2017-04-04

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

Contributors	Affiliation	Role
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Coverage

Spatial Extent: **Lat**:21.3 **Lon**:-157.8197

Dataset Description

This dataset includes the predatory success of larval clownfish (*Amphiprion ocellaris*) between 1 and 14 days post-hatch. They were presented with nauplii, copepodites, and adults of the copepod *Parvocalanus crassirostris*.

Related Reference:
Jackson, J. M. and Lenz, P. H. (2016). Predator-prey interactions in the plankton: larval fish feeding on evasive copepods. Scientific Reports, 6, 33585; doi: 10.1038/srep33585.

Methods & Sampling

All experiments were approved by the University of Hawaii's Institutional Animal Care & Use Committee (IACUC) under protocol #1045. For determination of growth, larval *Amphiprion ocellaris* were euthanized using a solution of 0.06 g/ml Ethyl 3-aminobenzoate methanesulfonate salt (MS222) (Sigma-Aldrich Inc., Saint Louis, MO, USA; catalog no. A5040-25G), preserved in a solution of 5% formalin in seawater, and measured for total length and jaw size within one week of fixation.

Behavioral observations were made of predator-prey interactions between larval fish and copepod prey under conditions that were similar to the feeding conditions in the rearing tank in terms of prey numbers and fish

density. For each trial, 10 *A. ocellaris* larvae were transferred from the rearing tank into the observation chamber (18 x 18 x 10 cm aquarium made of Plexiglas) filled with 3 L of filtered seawater (Whatman filters, GF/C). The fish larvae were allowed to acclimate for 15 minutes, before adding the 3000 prey. Each experimental trial lasted for 60 minutes and prey densities declined by 25% or less during this time. During the trial, a CCTV video camera (Panasonic Corporation, Kadoma, Osaka, Japan; model WV-BP310) equipped with a Nikkor 50 mm lens (Nikon Corporation, Shinjuku, Tokyo, Japan; model 1433) recorded continuously and stored the recording on a digital high definition videocassette recorder (Sony Corporation, Minato, Tokyo, Japan; model GV-HD700). The camera lens was positioned 0.3 m from the observation chamber and the lens was focused in a plane at the center such that the field of view was 4 cm2. The container was uniformly illuminated from above with one 20-watt fluorescent light providing 1,900 lumens of light.

Two separate experimental series were completed: the first one focused on three larval fish ages (1, 3, and 10 dph), and offered a single prey type per experiment (nauplii, copepodites or adults). The second one recorded predatory-prey interactions for larval ages 1 to 14 dph and mixed prey fields (nauplii + copepodites + adults). Capture success was determined from video recordings of predatory interactions between larval clownfish and three developmental stage groups of the copepod *Parvocalanus crassirostris*.

Data Processing Description

For the data analysis, videos were reviewed, larval predatory strikes identified and scored as to outcome (successful/unsuccessful). In a second analysis for experiment II, predatory strikes were scored for the targeted prey type to determine selectivity. For approximately 15% of strikes, resolution, clarity or contrast was insufficient to accurately determine prey type and these were excluded from the final dataset.

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions

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Data Files

File	
clownfish_predation.csv	(Comma Separated Values (.csv), 692 bytes) MD5:da0dfc23eebbe8a51ddd98ba1a8aa673
Primary data file for dataset ID 686907	

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Parameters

Parameter	Description	Units
expt_num	experiment identifier	unitless
larva_age	larval age post-hatch	days
prey_code	prey type: nauplii (1); copepodites (2); or adults (3)	unitless
attack_outcome_success	number of successful predatory strikes	unitless
attack_outcome_fail	number of failed predatory strikes	unitless

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Instruments

Dataset-specific Instrument Name	CCTV video camera (Panasonic Corporation, Kadoma, Osaka, Japan; model WV-BP310) equipped with a Nikkor 50 mm lens (Nikon Corporation, Shinjuku, Tokyo, Japan; model 1433)
Generic Instrument Name	Camera
Dataset-specific Description	Used to record feeding behavior
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

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Deployments

PredatorSuccess_2016

Website	https://www.bco-dmo.org/deployment/687836
Platform	Lenz_lab
Start Date	2016-01-01
End Date	2016-12-31
Description	Larval Clownfish (Amphiprion ocellaris) studies

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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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