

Part 2 of a 2 part manipulative experiment to investigate the existence of cooperative synergy in defensive behaviors of 'guard' crustaceans at Gump Research Station, Moorea, French Polynesia from July 2006 (CDD_in_Reef_Fish project)

Website: <https://www.bco-dmo.org/dataset/727125>

Data Type: experimental

Version: 1

Version Date: 2017-10-05

Project

» [Cryptic density dependence: the effects of spatial, ontogenetic, and individual variation in reef fish](#)
(CDD_in_Reef_Fish)

Contributors	Affiliation	Role
McKeon, C. S.	Smithsonian Marine Station (SMS)	Principal Investigator, Contact
Bolker, Ben	McMaster University	Co-Principal Investigator
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Abstract

Part 2 of a 2 part manipulative experiment to investigate the existence of cooperative synergy in defensive behaviors of 'guard' crustaceans at Gump Research Station, Moorea, French Polynesia from July 2006 (CDD_in_Reef_Fish project).

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Coverage

Spatial Extent: Lat:-17.5 Lon:-149.8333333

Temporal Extent: 2005 - 2007

Dataset Description

This dataset is part 2 of a 2 part manipulative experiment to investigate the existence of cooperative synergy in defensive behaviors of 'guard' crustaceans. Please reference the Related Datasets for additional datasets.

Related Datasets:

- McKeon_et_al_2012 Multiple Defender Effects: <https://www.bco-dmo.org/dataset/727093>
- McKeon_et_al_2012 Multiple Defender Effects Symbiont Behavior: <https://www.bco-dmo.org/dataset/727125> (current page)

Methods & Sampling

We used behavioral observation methods based on those of Glynn (1980) to measure the reaction of *Pocillopora* exosymbionts to *Culcita* presence at different vertical locations on the colony. A coral colony with both *Alpheus* and *Trapezia* exosymbionts was placed on an elevated pedestal within a large seawater aquarium. *Culcita* was presented to the coral sequentially in two different experimental positions, where *Culcita* was held against the side or the top of the coral colony, respectively. Each trial alternated starting position and lasted 3 min with a 5-min rest period between treatments. Defensive behaviors were scored within 3 min with actions recorded on a per minute basis for proximity and degree of contact of the exosymbionts with the *Culcita*. If the *Trapezia* were viewed by the observer to show any response to the presence of the *Culcita* (usually adjusting its position to directly below the *Culcita* while remaining deep within the branches of the coral), it was given a score of 0.25. If the *Trapezia* advanced further, to within 2 cm of the *Culcita*, then it was given a score of 0.5 points. One point was added each time the *Trapezia* attacked by snapping at the body or tube feet of the *Culcita*, and an additional two points were given if the *Trapezia* attack resulted in a cut to the *Culcita* or removal of tube feet. If the *Trapezia* retreated and then re-engaged, the scoring system was restarted and all bouts were summed. The defensive snap of *Alpheus* involves a distinctive snapping sound (Glynn 1980), each of which was given a score of 1 point.

Data Processing Description

BCO-DMO Processing:

- 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
McKeonetal_2012_Multipledefendereffects_Symbiontbehavior.csv (Comma Separated Values (.csv), 213 bytes) MD5:fac68242f10beea1942e93eadc9a925
Primary data file for dataset ID 727125

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Related Publications

Glynn, P. W. (1980). Defense by symbiotic crustacea of host corals elicited by chemical cues from predator. *Oecologia*, 47(3), 287–290. doi:10.1007/bf00398518 <https://doi.org/10.1007/BF00398518>
Methods

McKeon, C. S., Stier, A. C., McIlroy, S. E., & Bolker, B. M. (2012). Multiple defender effects: synergistic coral defense by mutualist crustaceans. *Oecologia*, 169(4), 1095–1103. doi:[10.1007/s00442-012-2275-2](https://doi.org/10.1007/s00442-012-2275-2)
General

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Parameters

Parameter	Description	Units
trial	Trial number	unitless
ttt	A unique identifier for each treatment	unitless
location_of_presentation	Location of Culcita on coral colony	unitless
Shrimp_Agression	Proximity and degree of contact of Alpheus with Culcita	unitless
Crab_Agression	Proximity and degree of contact of Trapezia with Culcita	unitless

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Instruments

Dataset-specific Instrument Name	aquarium
Generic Instrument Name	Aquarium
Dataset-specific Description	A coral colony with both Alpheus and Trapezia exosymbionts was placed on an elevated pedestal within a large seawater aquarium.
Generic Instrument Description	Aquarium - a vivarium consisting of at least one transparent side in which water-dwelling plants or animals are kept

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Deployments

Osenberg_et_al_Moorea

Website	https://www.bco-dmo.org/deployment/644752
Platform	Osenberg et al Moorea
Start Date	2003-05-19
End Date	2015-07-12

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Project Information

Cryptic density dependence: the effects of spatial, ontogenetic, and individual variation in reef fish (CDD_in_Reef_Fish)

Coverage: Moorea, French Polynesia (-17.48, -149.82)

Description from NSF award abstract:

Ecologists have long been interested in the factors that drive spatial and temporal variability in population density and structure. In marine reef systems, attention has focused on the role of settlement-the transition of pelagic larvae to a benthic stage-and on density-dependent processes affecting recently settled juveniles. Recent data suggest that co-variance in settlement and subsequent density-dependent survival can obscure the patterns of density dependence at larger scales, a phenomenon called cryptic density dependence. This research will explore the mechanisms that underlie the spatial covariance of settlement and site quality - a process that has received little attention in the standard paradigm. These mechanistic studies of cryptic density dependence will facilitate the development of new frameworks for fish population dynamics that incorporate larval ecology, habitat quality, density dependence, life history, and the patterns and implications of spatial covariance among these factors. More generally, the work provides a specific empirical context, and a general theoretical treatment, of cryptic heterogeneity (hidden individual variation in demographic rates).

Note: Drs. Craig W. Osenberg and Ben Bolker were at the University of Florida at the time the NSF award was granted. Dr. Osenberg moved to the University of Georgia during the summer of 2014 ([current contact information](#)). Dr. Bolker moved to McMaster University in 2010 ([current contact information](#)).

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0242312

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