Aggregation kin versus nonkin experiments in marine bryozoans from shallow seagrass habitats in St. Teresa, Florida, USA in June 2017

Website: https://www.bco-dmo.org/dataset/893150
Data Type: Other Field Results
Version: 1
Version Date: 2023-04-04

Project
» Consequences of kin structure in benthic marine systems (Marine kin structure)

Contributors	Affiliation	Role
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Abstract
This dataset is part of an integrated series of experiments to study how dispersal affects the density and relatedness of neighbors, and how the density and relatedness of neighbors in turn affect fitness. Spatial aggregation at settlement in groups of marine bryozoan larvae (composed of kin and nonkin) was empirically estimated in shallow (less than 2 meters) seagrass habitats near the Florida State University Coastal and Marine Laboratory (FSUCML) in St. Teresa, Florida, USA (29° 54' N, 84° 30' W). Larvae neither actively preferred nor avoided conspecifics or kin at settlement.

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Coverage

Spatial Extent: **Lat**:29.9 **Lon**:-84.5
Temporal Extent: 2017-06-17 - 2017-06-20

Methods & Sampling

Reproductive colonies of *B. neritina* were collected from the seagrass at Dog Island near the Florida State University Coastal and Marine Laboratory (FSUCML) in St. Teresa, Florida, USA (29° 54' N, 84° 30' W) from a depth of more than 1 meter on 17th June 2017. Colonies were kept in dark, aerated aquaria for two days. Each colony was then placed in its own glass bowl filled with 250 milliliters (mL) of seawater and then exposed to bright light to induce larval release. Larvae were then pipetted into new bowls with a 6 centimeter x 6 centimeter roughened acetate sheet floated on the surface so larvae would settle on the roughened underside. Roughened acetate sheets were held in aerated unfiltered seawater for 2 days prior to developing a biofilm to provide settlement cues. Glass bowls were randomly allocated to one of two treatments. One treatment consisted of larvae from the same maternal sibship (‘Sibs’, n = 13). The other treatment consisted of larvae

where each larva was from a different maternal sibship (‘Non-sibs’, n = 13). The number of larvae placed in each glass bowl was haphazardly chosen, and settlement density ranged from 4 to 20 settlers per sheet in both treatments.

Data Processing Description

BCO-DMO processing description:
- Adjusted field/parameter names to comply with BCO-DMO naming conventions

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Data Files

File
aggregation_kin_vs_nonkin.csv (Comma Separated Values (.csv), 9.33 KB) MD5:86e3dc22d8531b68ea017afe5a164419 Primary data file for dataset 893150, version 1.

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Related Publications

Burgess, S. C., Powell, J., & Bueno, M. (2022). Dispersal, kin aggregation, and the fitness consequences of not spreading sibling larvae. Ecology, 104(1). Portico. https://doi.org/10.1002/ecy.3858
Results

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Related Datasets

IsRelatedTo

Burgess, S., Powell, J., Bueno, M. M. (2023) **Dispersal distance in a marine bryozoan in shallow seagrass habitats in St. Teresa, Florida, USA, between October and December 2017.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2023-04-03 doi:10.26008/1912/bco-dmo.893092.1 [view at BCO-DMO]

Burgess, S., Powell, J., Bueno, M. M. (2023) **Marine bryozoan aggregation experiments in shallow seagrass habitats in St. Teresa, Florida, USA in May 2017.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2023-04-04 doi:10.26008/1912/bco-dmo.893115.1 [view at BCO-DMO]

Burgess, S., Powell, J., Bueno, M. M. (2023) **Microsatellite genotypes of marine bryozoan from shallow seagrass habitats in St. Teresa, Florida, USA in June 2017.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2023-04-05 doi:10.26008/1912/bco-dmo.893165.1 [view at BCO-DMO]

Burgess, S., Powell, J., Bueno, M. M. (2023) **Postsettlement performance in kin groups from shallow seagrass habitats in St. Teresa, Florida, USA in November and December 2017.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2023-04-04 doi:10.26008/1912/bco-dmo.893158.1 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
Sheet_ID	Unique identifier for each settlement plate (=sheet)	unitless
Relatedness	Sib = each settler came from the same mother (half-sib or full-sib); NonSibs = each settler came from a different (unrelated) mother.	unitless
Point	Unique identifier for each settler	unitless
Raw_X	The distance from the left side of the image	millimeters (mm)
Raw_Y	The distance from the bottom side of the image	millimeters (mm)
True_X	The distance from the left side of the focal settlement area	millimeters (mm)
True_Y	The distance from the bottom side of the focal settlement area	millimeters (mm)

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Project Information

Consequences of kin structure in benthic marine systems (Marine kin structure)

Coverage: Gulf of Mexico

NSF Award Abstract:
In marine systems, the production, dispersal, and recruitment of larvae are crucial processes that rebuild depleted adult stocks, facilitate changes in species geographic ranges, and modify the potential for adaptation under environmental stress. Traditionally, the tiny larvae of bottom-associated adults were thought to disperse far from their parents and from each other, making interactions among kin improbable. However, emerging evidence is challenging this view: larval dispersal does not always disrupt kin associations at settlement, and a large fraction of invertebrate diversity on the seafloor contains species in which most larvae disperse short distances. Limited dispersal increases the potential for interactions among kin, which has important consequences for individual fitness across many generations, and therefore the productivity of populations and the potential for adaptation. But when these consequences occur, and how exactly they manifest, remains largely unexplained. The key challenge now is to explain and predict when kin associations are likely to occur, and when they are likely to have positive or negative ecological consequences. Therefore, the key questions addressed by this research are: 1) how and when do kin associations arise and persist, and 2) what are the consequences of living with kin for survival, growth, and reproduction. This concept-driven research combines genomic approaches with experimental approaches in lab and field settings using an experimentally-tractable and representative invertebrate species. The project trains and mentors PhD students and a postdoctoral scholar at Florida State University (FSU). Field and laboratory activities are developed and incorporated into K–12 education programs and outreach opportunities at FSU.

The spatial proximity of relatives has fundamentally important consequences at multiple levels of biological organization. These consequences are likely to be particularly important in a large range of benthic marine systems, where competition, facilitation, and mating depend strongly on the proximity and number of neighbors. However, explaining and predicting the occurrence, magnitude, and direction of such effects remains challenging. Emerging evidence suggest that the ecological consequences of kin structure are unlikely to have a straight-forward relationship with dispersal potential. Therefore, it is crucial to discover new reasons for when kinship structure occurs and why it could have positive, negative, or neutral ecological consequences. This research aims to provide a new understanding of how dispersal and post-settlement processes generate spatial kin structure, how population density and relatedness influence post-settlement fitness, and how the relatedness of mating partners influences the number and fitness of their offspring (inbreeding and outbreeding). The research combines genomic approaches, experimental progeny arrays, and manipulative experiments in field and lab settings to test several hypotheses that are broadly applicable across species. By focusing on an experimentally tractable species to test broadly applicable hypotheses, the project

achieves generality and a level of integration that has been difficult to achieve in previous work.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1948788

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