Damsels in Distress!!!
Post settlement competition among damselfishes
By Matt Nauman
And Cory Padilla

A Fish Called Wanda
- Pomacentrus wardi
- Plectroglyphidodon lacrymatus
- Eupomacentrus Apicalis
- All 3 are common species of herbivorous reef dwelling damselfish
- Inhabit reef crests near sea level off northwestern shores of Australia
- They grow to be about 35 cm at biggest
- They all settle on the same substrate, crushed coral
- They share the same resources
- They maintain equal size territories (<1m)
- 78°C (optimum for these guys)
- dKH (CaCO3 concentration): 11°
- Ph = 8.2
Come Sale Away

From his observations in the wild Sale saw that these damselfish exhibit equal competition, in the way that they settle and defend a territory.

We will test to see if the damselfish are equal competitors once they settle (their mean relative abundance is symmetric).

We will test to see if the introduction of damselfish’s primary predators has an effect on the mean relative abundance.
Hypothesis #1

- General: Post-settlement competition between three damselfishes *E. apicalis*, *P. wardi*, and *P. lachrymates* is symmetrical (or not)
- Alt specific hypothesis 1: if we introduce equal proportions of larvae of the three species, then subsequent (1 mo) proportions of the three species will be equal. Conclude competition symmetrical
- Alt specific Hypothesis 2: if we introduce equal proportions of larvae of the three species, then subsequent (1 mo) proportions of the three species will not be equal, then conclude competition is asymmetrical
- Since there are only two possible outcomes, the rejection of one hypothesis means that the other hyp. is supported.

Experiment setup

- Tank dimensions: 10m x 5m x 3m, with level substrate across bottom
- Will maintain epithilic algae
- Fill our tank with water and equal amounts of larvae of each spp. In large enough quantities to saturate larval pool (~100 of each)
- Let the larvae settle and recruit for 2 months
- At end of the 2 months take a final tally of relative abundances for each spp.
- Drain the system, remove all fish and larvae, refill and repeat
- After 15 repetitions compare/graph mean relative abundances
Control

- We first need to see that all these damselfish are settling in the tank
- So....
- We will add ~100 larvae of *E. apicalis* only and see if they settle and survive
- We will repeat for the other 2 spp. To ensure survivorship and settlement

Predicted Results

<table>
<thead>
<tr>
<th>Mean Relative Abundance After Settlement (No Predators)</th>
</tr>
</thead>
<tbody>
<tr>
<td>competition is symmetrical</td>
</tr>
<tr>
<td>P. wardi</td>
</tr>
<tr>
<td>0.00%</td>
</tr>
<tr>
<td>10.00%</td>
</tr>
<tr>
<td>20.00%</td>
</tr>
<tr>
<td>30.00%</td>
</tr>
<tr>
<td>40.00%</td>
</tr>
</tbody>
</table>

Competition: Symmetrical vs. Asymmetrical
Hypothesis #2

- General: The introduction of a predator(s) will cause a shift in mean relative abundance (or not).
  - Symmetric
- Alt Specific hypothesis 1: The addition of a predator will shift the symmetry of the mean relative abundance to asymmetrical
- Alt specific hypothesis 2: The addition of a predator will not shift the symmetry of the mean relative abundance.
  - Asymmetric
- Alt specific hypothesis 3: The addition of a predator to an asymmetric mean abundance will cause a shift towards a symmetric mean abundance
- Alt specific hypothesis 4: The addition of a predator will not cause a shift in mean relative abundance
- Alt specific hypothesis 5: The addition of a predator will cause a shift in mean relative abundance to different proportions of asymmetry

Experiment setup

- Tank dimensions: 10m x 5m x 3m, with level substrate across bottom
- Fill our tank with water and equal amounts of larvae of each spp. in large enough quantities to saturate larval pool (~100 of each)
- Let the larvae settle and recruit for 2 months
- At end of the 2 months take a final tally of relative abundances for each spp.
- Drain the system, remove all fish and larvae, refill and repeat
- After 15 repetitions compare/graph mean relative abundances
- Add 5 groupers (a main predator of these reef systems)
Predicted Results

Mean Relative Abundance If Competition Initially Symmetrical, Predators Introduced

<table>
<thead>
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<th>E. apicalis</th>
<th>P. lacrymates</th>
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Mean Relative Abundance If Competition Initially Asymmetrical, Predators

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