A Developmental Study of the Marine Crustacean “Paryhale hawaiensis”: the role of the marsupium in growth and survival

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University of Cincinnati Senior Capstone 2019
Background

Research Question: Embryos can be removed from female marsupium at a single cell for detailed study and manipulation, how does stage removed affect survival and growth once hatched?

Hypothesis: Stage an embryo removed (single cell, mid stage, late stage) effects growth and survival of juveniles.
Methods

1. Identify stage
2. Anesthetize in clove oil
3. Forceps retraction, isolate embryos

Growth over Time

Day 1

Day 3

Day 10
Results

- Lower initial survival % for juveniles extracted earlier stage. Both Single Cell and Paddle Tail (mid-stage) hit LD 50, at 5 days since hatched.

- Limb dysmorphia and bacterial growth observed for higher proportion juveniles removed SC and PT.

Results

➢ Significant difference in growth rate between each stage.

➢ Analysis: 2-Way ANOVA test model effect of days since hatched and stage extracted on length

➢ Tukey HSD test for multiple pairwise comparison.

Source: Browne, William E., et. al. “Stages of Embryonic Development in Amphipod Crustacean, Paryhale hawaiensis”
Final Thoughts

**Overview:**
- Single Cell and Mid Stage embryos showed lower survival rate.
- Removal from the marsupium at any stage has a significant effect on juvenile growth.
- Critical window in embryological development.

**Future Research:**
- RNA sequencing for Differential Expression between stages.
- Comparative study microbiome diversity between stages.
Questions?
Tukey multiple comparisons of means
95% family-wise confidence level
Fit: aov(formula = len ~ stage * days_hatched)

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<th>stage</th>
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<th>upr</th>
<th>p adj</th>
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2-Way ANOVA
Fit: aov(formula=len~stage*days_hatched)

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