



Are Cryptoniscans waiting for a good home?

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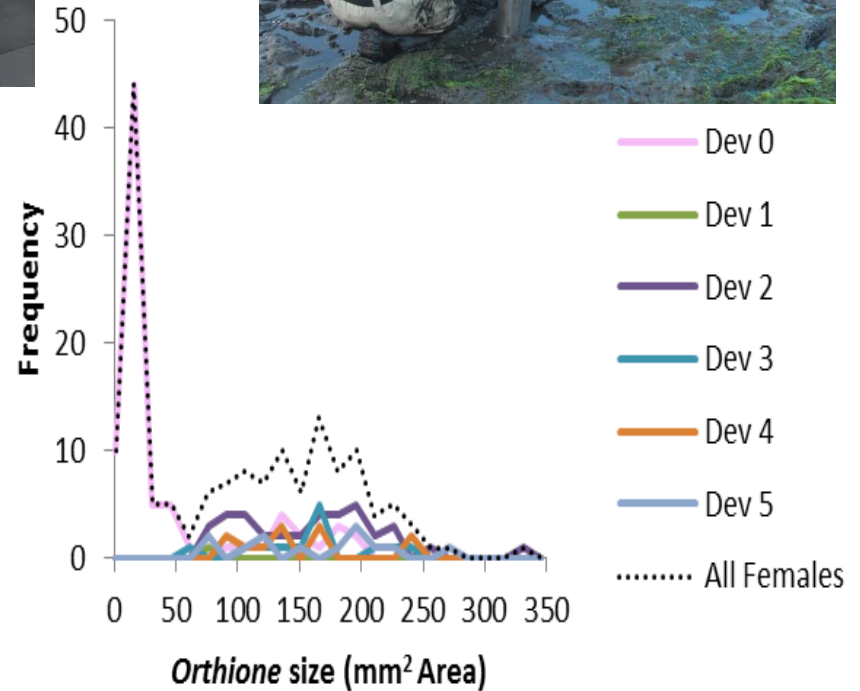


Connections

- Katie Crooks: Cryptoniscans are waiting

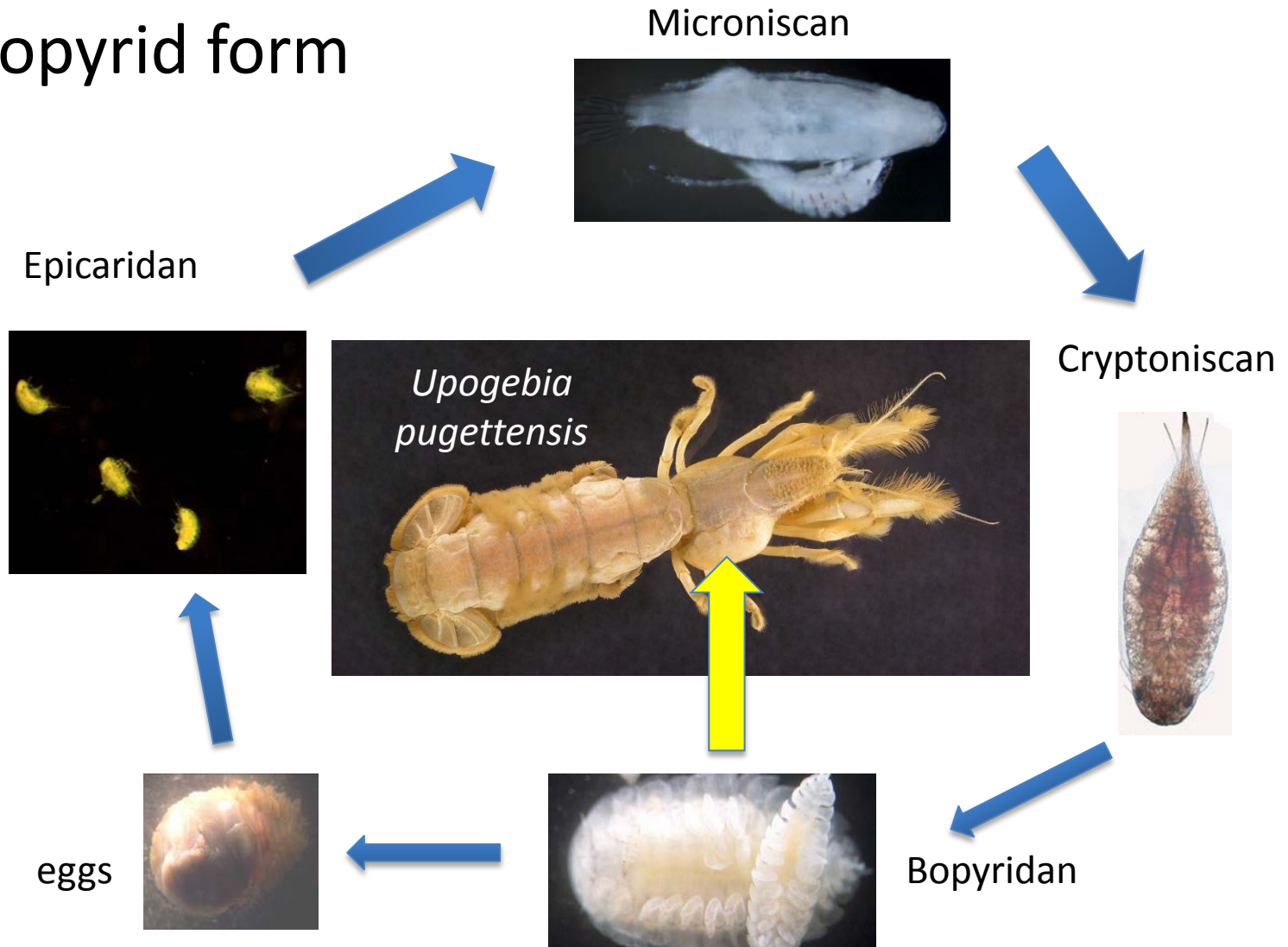


- Amber Little and the SNRC: Bopyrids are not recruiting or growing
- Kelsey Yates: Why?



Orthione griffenis

- Bopyrid form



Upogebia pugettensis

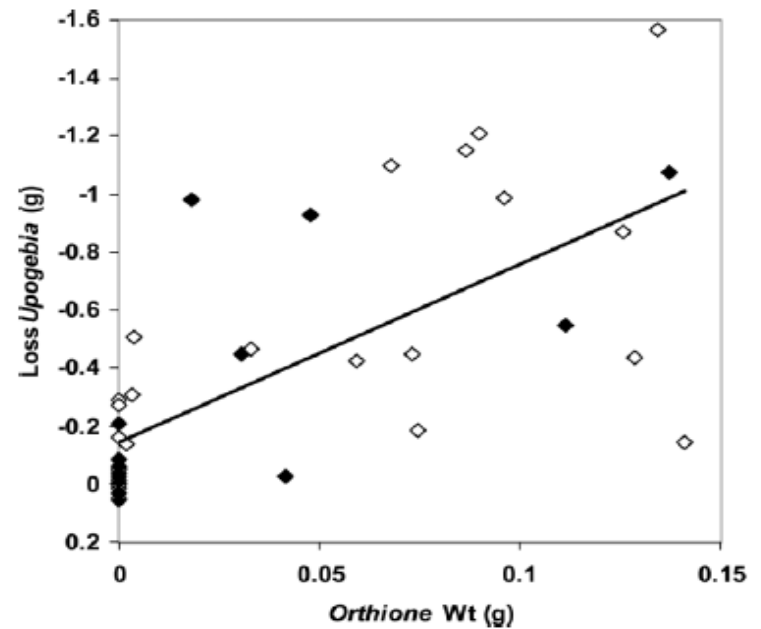
- Populations decline due to castration
- How this happens has been unclear



Previous Studies

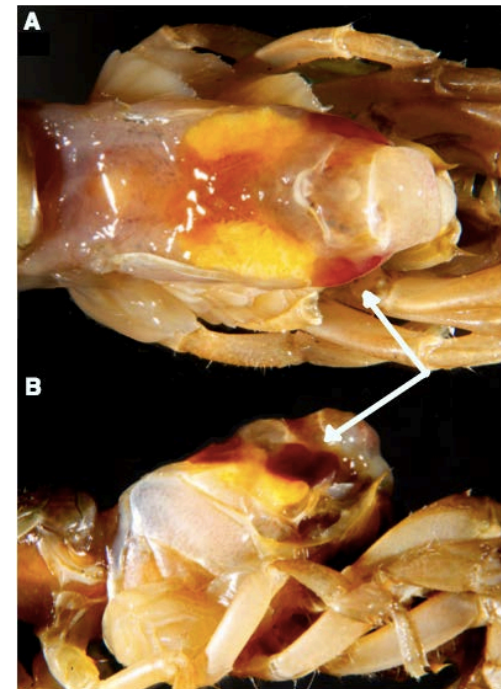
Smith et al. 2008

- No correlation between host weight loss and isopod size



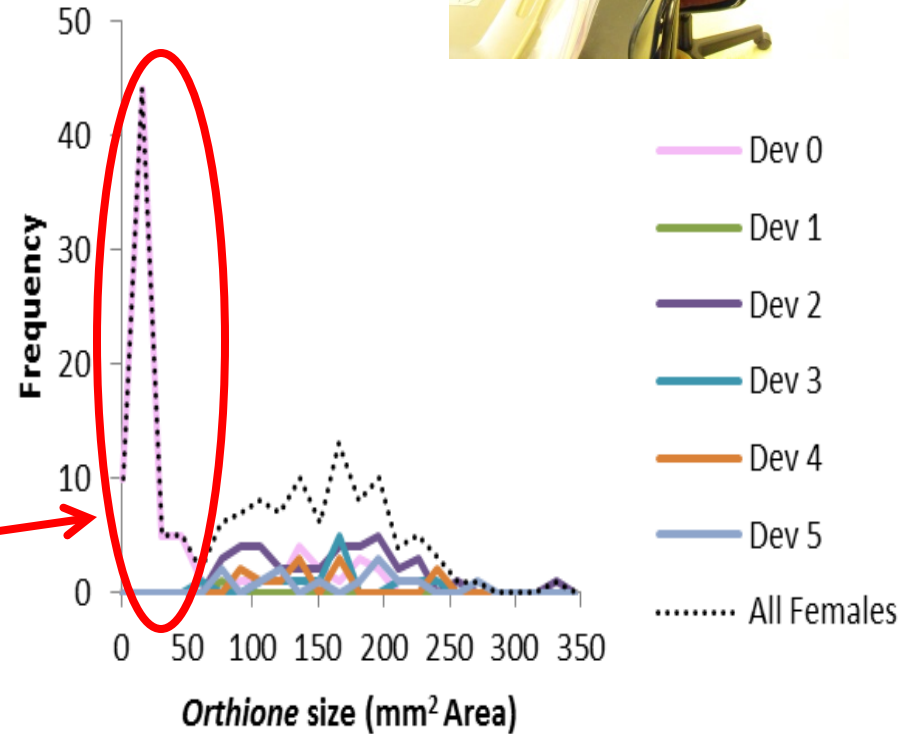
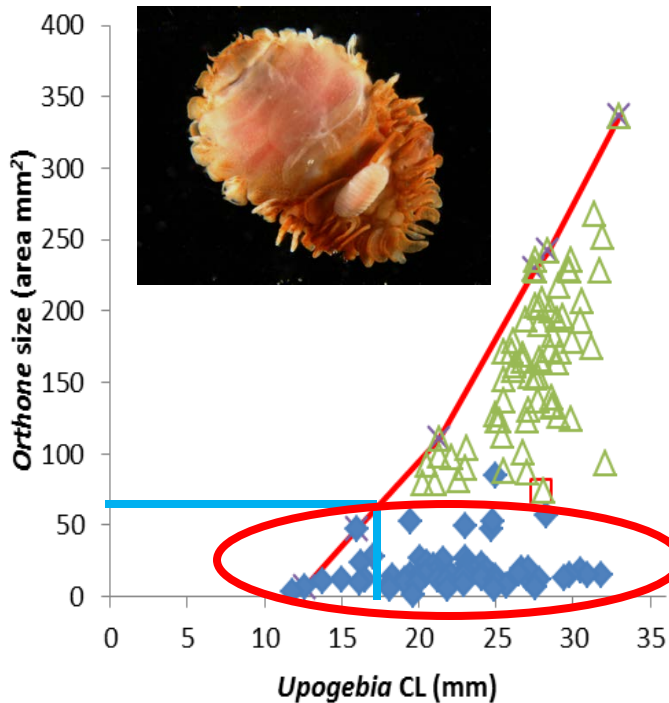
Repetto and Griffen 2011

- No correlation between bopyrid size and mass of hepatopancreas
 - Hepatopancreas is a supposed energy storage organ in shrimp
- Also found no relationship between infested shrimp and hepatopancreas mass



SNRC Data

- Maximum *Orthione* size increase with *Upogebia* size
- High occurrence of small *Orthione* in samples of all sizes of shrimp
- *Orthione* not found in small shrimp (<12 mm)
- Reproductive *Orthione* (area of $\sim 60 \text{ mm}^2$) are not found in shrimp with carapace length <15mm



Questions

- How do *Orthione* effect the mass of the shrimp over time?
 - Not examined before
- What is the growth rate of *Orthione*?
- Do infested shrimp lose more weight than uninfested shrimp over time?



Predictions



- Smaller isopods in large shrimp would have the highest growth rate
- Greatest weight loss observed would be of infested shrimp

Infested and uninfested shrimp collected from Sally's Bend mud flat in the Yaquina Bay estuary on July 26th, 2014 with help from the Summer Natural Resources Crew

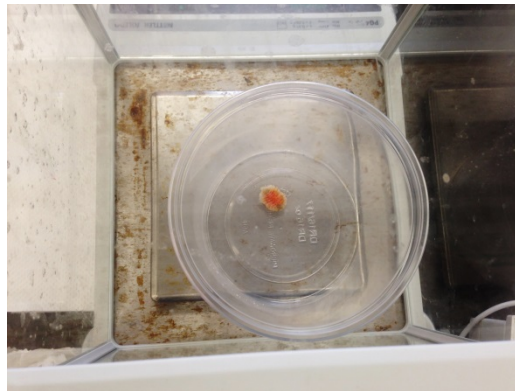


Data Collection

Test groups: Uninfested, Infested, Implanted



Weighed and measured *Upogebia*



Weighed and measured *Orthione*
 $Area = size = (L/2 * W/2)\pi$

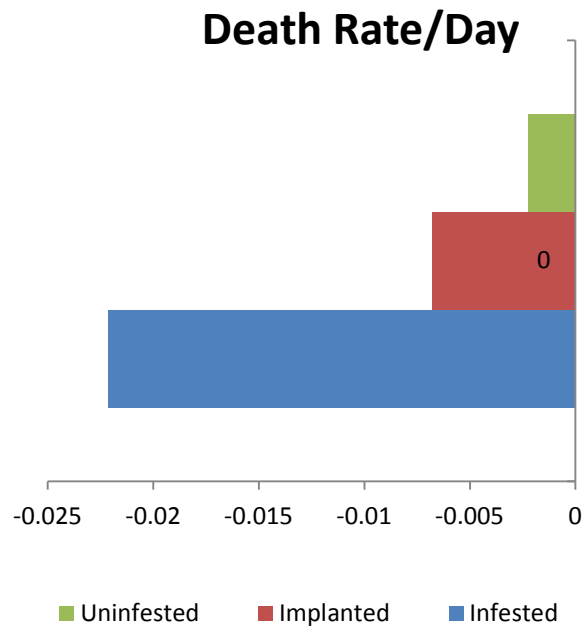


Uninfested shrimp implanted with small *Orthione*

Series of gutters delivered ocean water 24/7 for 14 days
Shrimp in individual cups
Measured individuals a total of 5 times during study



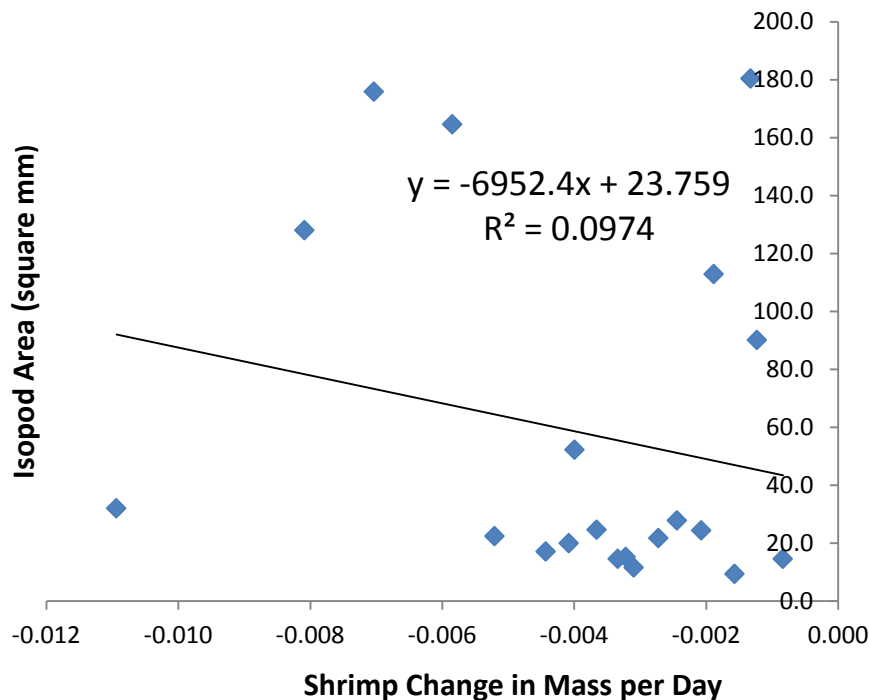
- Higher death rate among infested shrimp
- High occurrence of unknown disease causing ballooned or black carapaces in shrimp



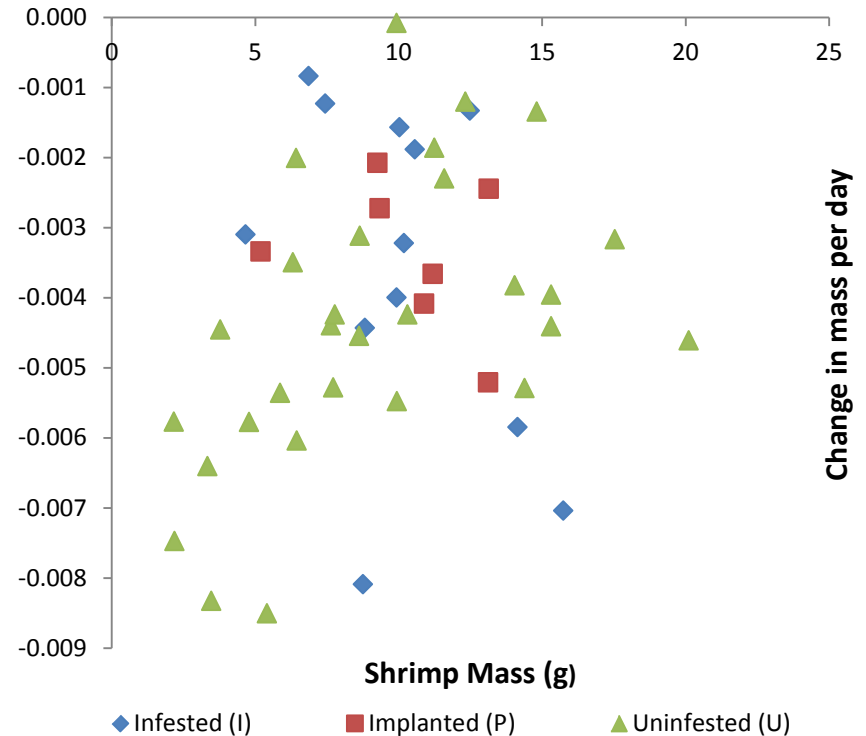
Results

- No correlation between shrimp weight loss and isopod size
 - Rate of weight loss calculated using: $r_w = \ln(W_1/W_0)/t$
- No difference in weight loss among treatments
 - Infested: -0.003, Implanted: -0.004, Uninfested: -0.004

Shrimp change in mass per day vs
Isopod area

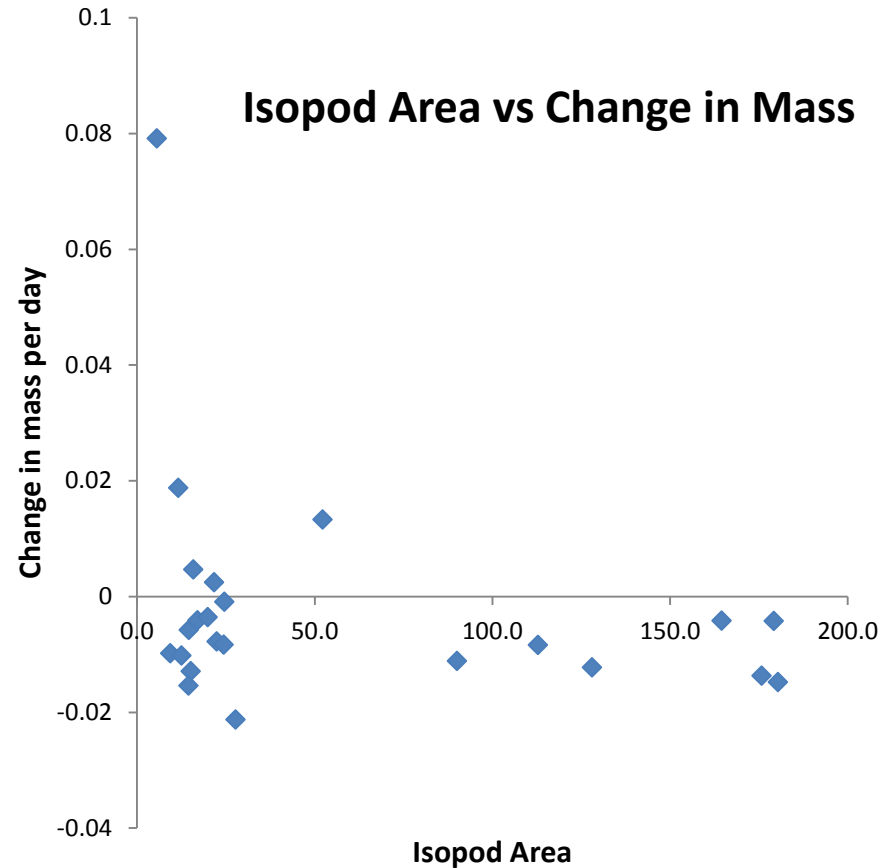
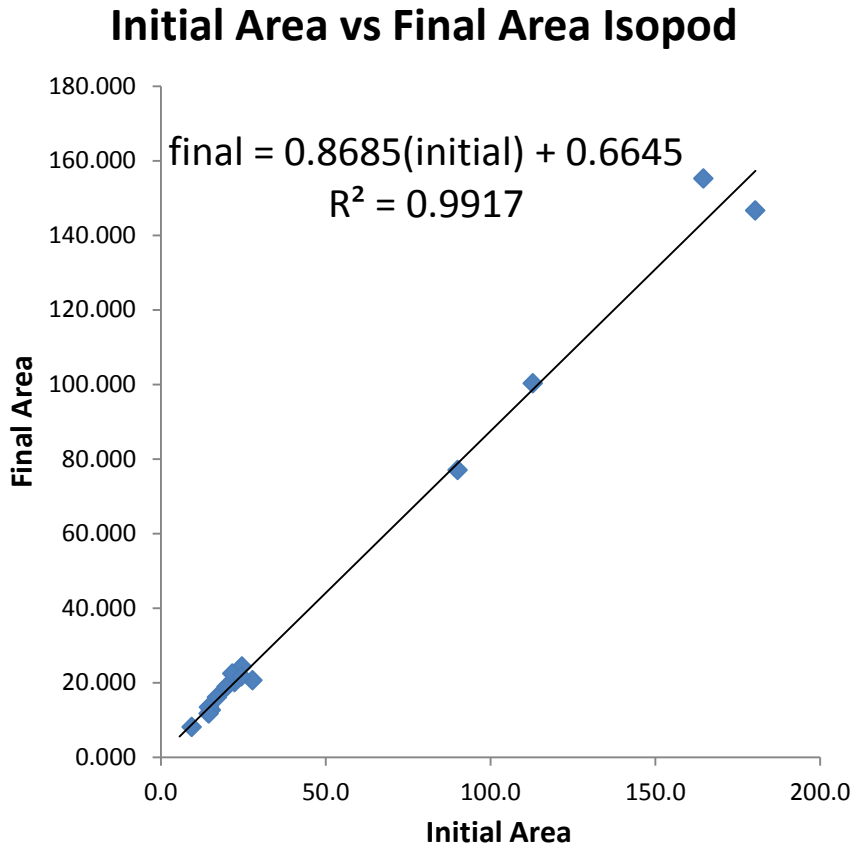


Shrimp mass (g) vs rate of weight loss



Results

- Isopods had no measurable growth
 - Use more accurate scale in future





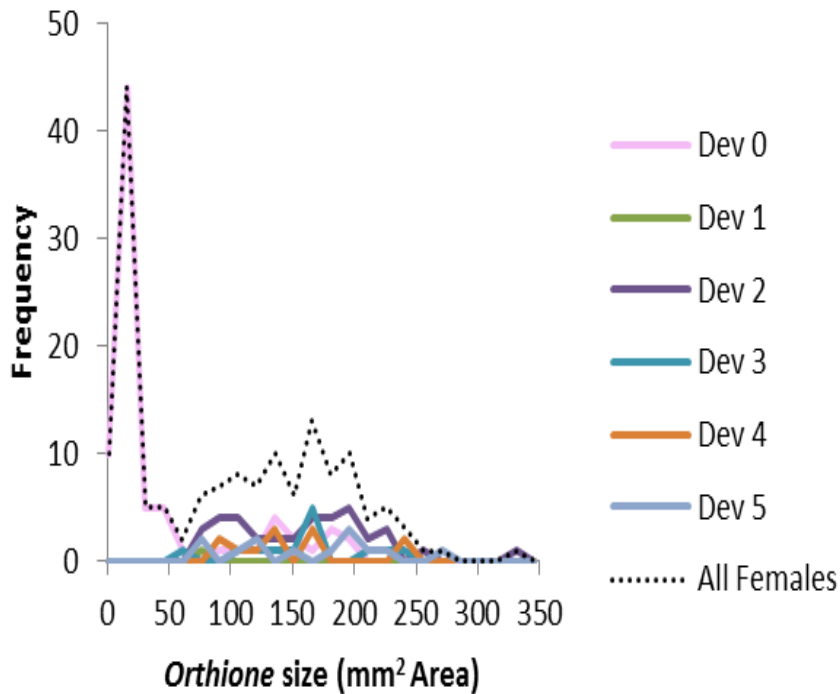
Discussion



- Infested shrimp did not lose more weight than uninfested shrimp in lab
 - Isopods did not use the shrimp's resources at a measurable rate
 - Isopods may have been starving along with shrimp
- Isopods did not to grow
 - Isopods grow with their hosts
 - *Upogebia* growth is cyclical (Food sources must be as well)
 - Isopods may only feed when shrimp have adequate energy stores
 - May be why isopods only infest larger shrimp (>15mm)

Amber Little and SNRC Data Collection

- No recruitment or growth of isopods in the field
- Experimental results consistent with field data



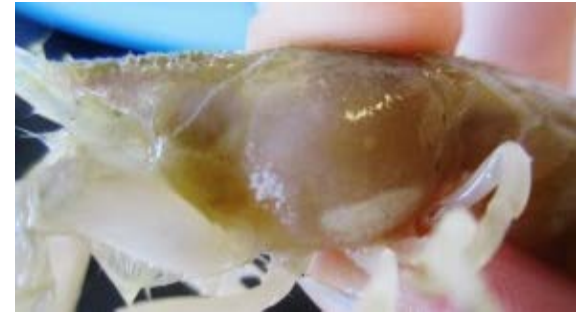
Conclusions

- Cryptoniscans wait
 - Katie's Study
- Maybe they have no homes right now





Suggestions For Improvement



- Some incidence of isopods being lost
 - Recommend implanting the isopod far up under the gill covering to limit removal by shrimp
- High incidence of infections
 - Recommend use of antibiotics to limit chance of infection
- High Incidence of death in infested shrimp
 - Recommend measuring shrimp less to limit stress associated with removing and re-implanting isopods



Thank You!



Acknowledgements:

- John Chapman
- Andrea Burton
- Amber Little and the SNRC
- Itchung Cheung
- HMSC



Questions?

Sources



- Ralph A. Breitenstein^{1*} John W. Chapman² Craig Bauer³ (Unpublished MS) Ecology of *Orthione griffenis* and *Iona cornuta* larvae (Isopoda, Bopyridae) in an Oregon Estuary
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