Why is growth important?

- Growth indicates health, and physical and ecological stresses experienced
- Growth is plastic: organisms can change relative resource allocation to growth and reproduction
- Help improve aquaculture methods and increase declining wild populations
- Growth curves can determine maximum size for fishery and the harvesting reason

Predator-induced changes in growth and metabolism of the green sea urchin

Strongylocentrotus droebachiensis

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Methods:

Flow/no flow metabolism experiment

- Oxygen consumption of 40 unfed urchins was measured using respirometry for 20 minutes in flow conditions and 6 days later no flow conditions (Fig. 1)
- urchins were fed 14 days and 7 days before their assigned measurement day
- Individual urchins were measured at 13.8 degrees C in flow and no flow conditions on one of 5 measuring days

Predator/no predator growth experiment

- Grew 56 urchins in the presence or absence of scent of 4 Jonah crabs Cancer borealis (Fig. 2) in flow through tanks of ambient seawater.
- Flow rate= 4.5-L/min
- Rotated the individual cages through the positions to control for position effect (Fig. 1)
- Fed ad libitum for 5 weeks

Conclusions/ Future Work:

- Grew 56 urchins in the presence or absence of scent of 4 Jonah crabs Cancer borealis (Fig. 2) in flow through tanks of ambient seawater.
- Flow rate= 4.5-L/min
- Rotated the individual cages through the positions to control for position effect (Fig. 1)
- Fed ad libitum for 5 weeks

Factors affecting growth

Flow

- Patterson (1992): flow impacts metabolism
- Johnson lab (2005): slower growth in small urchins predicted due to decreased rates of oxygen transport on metabolic rate

Predation

- Reimer and Tedengren (1996): Exposure to crabs slows growth in blue mussels Mytilus edulis
- Dumont et al. (2004): smaller urchins hide more often in crevices to avoid predation
- We think hiding may reduce the flow they experience

Hypotheses:

Flow

- Urchins will have a higher metabolism in high flow environments than low flow environments

Predation

- Urchins exposed to chemical cues from Cancer borealis will grow more slowly than urchins not exposed to the cue
- Urchins in the smaller size classes will exhibit a stronger response to the predation risk than urchins in larger size classes

Results: Higher metabolism in higher flow

- Urchins grown in ambient seawater consumed more oxygen in high flow environments

Results: Predator scent reduced growth

- Urchins acclimated to 14 degrees-centigrade seawater consumed more oxygen in high flow environments

Literature Cited:


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