Introduction

• Three species of fiddler crabs, Uca pugilator, U. pugnax, and U. minax, are commonly found in estuaries along the Atlantic coast of the United States, each with distinct adult estuarine habitats differing in salinity and sediment grain size [3, 4, 10].

U. pugilator U. pugnax U. minax

• Larvae exhibit selective settlement; however, how they choose their species-appropriate habitat to settle in is still unknown [1, 6, 11].

• Chemical cues from adult crabs stimulate and accelerate molting in lab-reared megalopae, suggesting that megalopae molt faster in conspecific odor water [5, 3, 7, 8, 9].

• Field-caught megalopae demonstrate stimulation of molting by conspecific odor water, but not acceleration of molting [12].

• Few U. minax molt in 35 ppt salinity water, suggesting that lab salinity conditions were not ideal for this species [12].

Objectives

• To determine if more U. minax will be stimulated to molt in lower salinity water (10 ppt), than in Welch et al.’s (2016) experiment conducted at 35 ppt salinity water.

• To gain further insight into the stimulation and acceleration of fiddler crab molting from conspecific odor water.

Methods

• Adult crabs collected from local sandflat and salt marsh in Beaufort, NC (Fig. 1a).

• Control water: diluted estuarine water to 10 ppt using deionized water.

• Treatment waters: soaked 25 g of adult crabs of each species in 500 ml of 10 ppt estuarine water for 1 h (Fig. 1b).

• Megalopae collected by plankton net (Fig. 1c).

• Individual megalopae maintained in 10 ml of control water or one of three treatment waters for 10 days at 25°C in a 14:10 h light:dark cycle.

• Megalopae fed Artemia nauplii and water changed daily.

• Megalopae molt status monitored 4 times per day.

• All megalopae preserved in 95% ethanol for identification after molting or at end of experiment (Fig. 1d).

• Species identification conducted using DNA extraction, multiplex PCR [13], and gel-electrophoresis.

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Discussion & Conclusions

Acceleration of Molting (Fig. 2)

• U. pugilator and U. pugnax molted significantly earlier in all odor water treatments than in control water, molting earliest in their conspecific water treatment.

• Few U. minax molted, and those that did, did not molt significantly earlier than in their conspecific water treatment.

Stimulation of Molting (Fig. 3)

• U. pugilator molted in all water treatments, with significantly more molts in odor water than in control water.

• U. pugnax molted significantly more in their conspecific water than in any other odor water treatment.

• U. pugnax adults already present.

• Although only 20% U. minax molted in their conspecific water, more U. minax molted in their conspecific water in this study than in a previous study [12].

• Acceleration of molting of fiddler crab megalopae in low salinity seawater

Figure 1 (a-d). (a) Adult fiddler crab collection at Bell Creek Salt Marsh in Beaufort, NC. (b) Preparation of odor waters, and pictures of fiddler crab (c) megalopa and (d) first crab instar (molted megalopa).

Results

Does conspecific odor water accelerate molting?

Figure 2. Mean time to molt (±SE) in hours for megalopae of U. pugilator, U. pugnax, and U. minax exposed to estuarine seawater (control) or seawater treatments with different adult chemical cues. Numbers in bars represent the total number of megalopae that molted in each treatment. Lowercase letters above error bars indicate treatments that do not differ by Tukey post-hoc tests.

Does conspecific odor water stimulate molting?

Figure 3. Percent of U. pugilator, U. pugnax, and U. minax megalopae that molted (dark bars) and did not molt (light bars) for 10 days of exposure to estuarine seawater (control) or seawater treatments with adult chemical cues. Different lowercase letters above bars indicate statistically significant differences in percent molting by a-test for proportions. Megalopae that died during the experiments were excluded from analysis.

Future Directions

10 ppt seawater conditions may not be ideal for U. minax, suggesting other factors besides salinity may stimulate and accelerate molting; for instance, U. minax may:

• Require longer time to molt

• Rely on visual presence of other U. minax megalopae

• Respond better to habitat cues than adult odor cues

• Need stronger chemical cue concentration

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References