

Claws So High Other Crawdads Wanna Fight Me (That Fish Cray): Temperature Experience-Dependent Agonistic Behavior in *Austropotamobius pallipes*

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Do crayfish fight better in water temperatures they are more familiar with? Although crayfish agonistic behavior has been studied in-depth, this particular question has not been investigated.

Male crayfish (*A. pallipes*)

- Are able to live in various water temperatures
- Establish dominance within fifteen minutes of observing another male
 - These fights are usually quick and nonlethal.
- Water temperature may determine mate choice



Might experience in a certain water temperature change how a crayfish fights in that water temperature?

Experimental Design and Results:

Two tanks (each with seven male crayfish) were set up in a temperature-controlled room. One tank was kept at a temperature of 16°C, and the other at 23°C. They were kept like this for five days, then fought in a cold tank (16°C), a hot tank (23°C), and a neutral tank (20°C—the control condition). Their agonistic behaviors were scored.

Hypothesis: If a crayfish has previous experience in a certain temperature, then he will display more agonistic behavior in a tank of that same temperature.

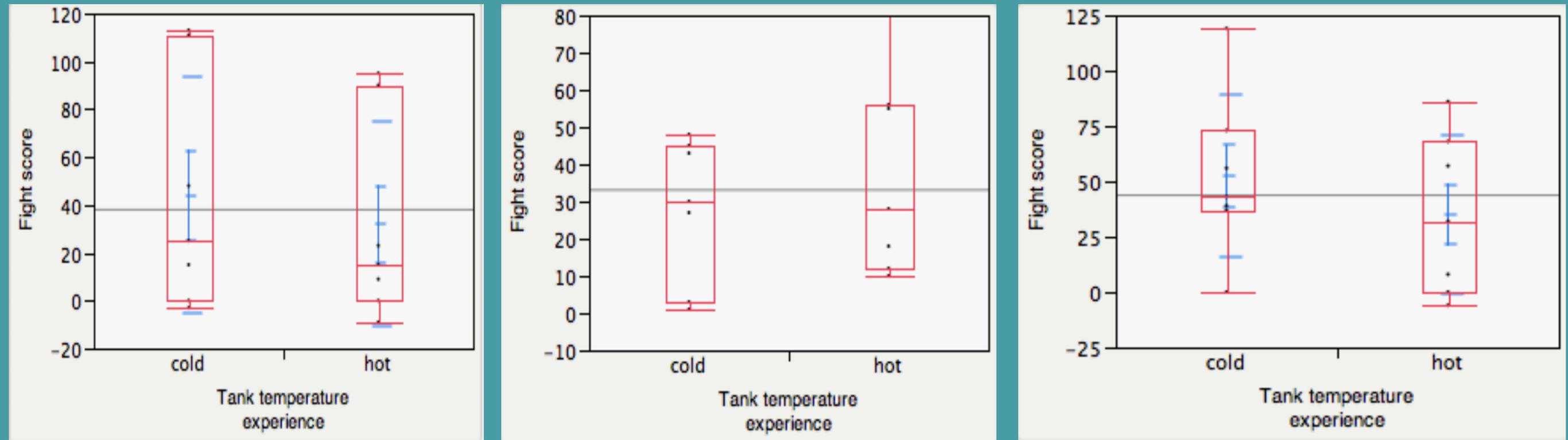


Figure 1: Chi-squared results for each fight. The first image is from the cold fighting tank, the second is from the hot fighting tank, and the third is from the control tank. As shown by the bars, the crayfish with experience in cold water did better/displayed more agonistic behavior in both the control and the cold tank conditions. However, the crayfish from the hot tank displayed more agonistic behavior than those from the colder tanks when they were fought in the hot fighting tank.

MATERIALS AND METHODS

Materials used:

- 3 thermometers
- 14 male 'feeder' crayfish
- 3 20-gallon tanks of de-ionized water
- 3 cups of gravel for the bottoms of the hot and cold tanks
- 1 black divider
- 1 stopwatch
- 2 water heaters
- 2 filters and air hoses



Procedure:

- Crayfish were stored in their acclimitization tanks for five days
- One tank was kept at 23°C, the other at 16°C, in the temperature-controlled room of the Reed College biology building.
- There were three fighting conditions: cold fighting tank, hot fighting tank, and neutral fighting tank (the control). The cold was 16°C, the hot was 23°C, and the neutral was 20°C.
- The crayfish were allowed 5 minutes to acclimate to the fight tank (pictured above and to the left), during which they were separated from each other with a black divider. The fights began after 5 minutes, when the black divider was lifted.
- They were observed for 15 minutes.
- The agonistic behavior was scored using the Bowling Green State University crayfish agonist behavior ethogram.

Conclusion:

There is a trade-off!



Future Directions:

How would these temperatures influence mating behavior, as opposed to agonistic behavior? Would this experiment have gone differently with a larger sample-size? This study could also be run again, this time with a tank group with experience in a tank with an intermediate temperature. Would size differences change the results (as in, would a larger crayfish from a warm tank fighting with a smaller crayfish from a cold tank in a cold tank come out on top?). The experiment could also be replicated in non-deionized water.

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J-Watcher

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Acknowledgements:

Thanks to Suzy Renn, Gene Oleson, and Kristine Gunter, for their support, knowledge, and infinite patience.