How do tadpoles use chemical cues to assess risk? Predator identity, cue concentration, and pulse frequency

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Introduction

Chemical cue concentration depends on both the number and size of prey killed.

Cue pulse frequency depends on predation rate, irrespective of prey size.

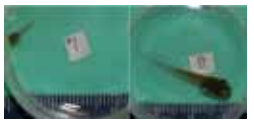
If pulse frequency provides less ambiguous information on risk, prey may respond more strongly to this aspect of chemical cues.

Prey: red-eyed treefrog *Agalychnis callidryas* tadpoles

Predators: waterbug, dragonfly

Predator identity & cue concentration

Treatments
1) Control
2) 0.0025 prey
3) 0.025 prey
4) 0.05 prey



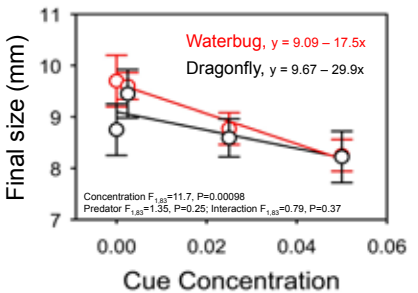
Day 1 Day 7

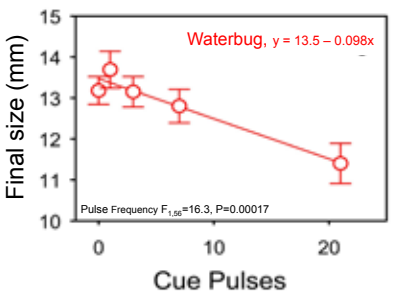
Individual tadpoles in 400 ml cups, for 7 d. Cue from hatchlings consumed by waterbug or dragonfly in separate containers, diluted as needed, dosed daily.

Cue pulse frequency

Treatments (12 replicates)
1) 0 pulses
2) 1 pulse of 0.105 prey
3) 3 pulses of 0.035 prey
4) 7 pulses of 0.015 prey
5) 21 pulses of 0.005 prey

Total cue was 0.105 prey in all treatments, generated by waterbug predator only.





Results

A. callidryas growth was dose dependent. High cue concentration elicited the greatest growth reduction for both predators.

Predator identity did not affect growth.

Increasing cue pulse frequency strongly reduced growth, even though individual pulses in high frequency treatments contained very little cue.

Significance

The strong response of tadpoles to higher cue pulse frequencies, despite lower individual doses, suggests they use the rate at which predation events occur as an index of risk.

Cue pulse frequency may be more informative than cue concentration for prey risk assessment.

Controlling the prey biomass that generates cues, while allowing number of prey killed to vary, may be insufficient to equalize the perception of risk.

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