What's All the Chirp About?
How Octopamine Affects Male Cricket Aggression During Mate Displays

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- Female audience increases the male tendency to initiate and escalate fights

- Octopamine, the invertebrate equivalent of noradrenaline, is necessary for mediating the aggression-promoting effects of potentially rewarding experiences, such as mating.

- Octopamine levels increase in crickets during antagonistic encounters, regardless of winner-loser status

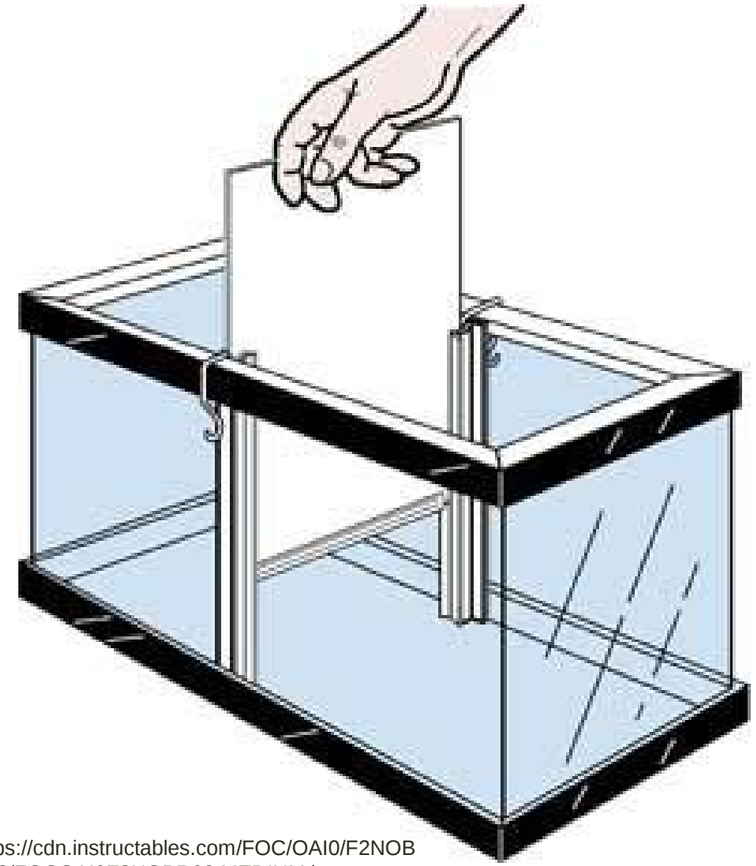
http://www.the-piedpiper.co.uk/graphics1/housecricket1.jpg

Hypothesis: If octopamine functions similarly to testosterone in a "challenge," then administering octopamine to male crickets will escalate and prolong aggressive behaviors associated with mating.

Experimental Design

No Octopamine No Female Audience	No Octopamine Female Audience
Octopamine No Female Audience	Octopamine Female audience

The experiment was run with either the presence of a female audience or no, and the presence of octopamine application or no



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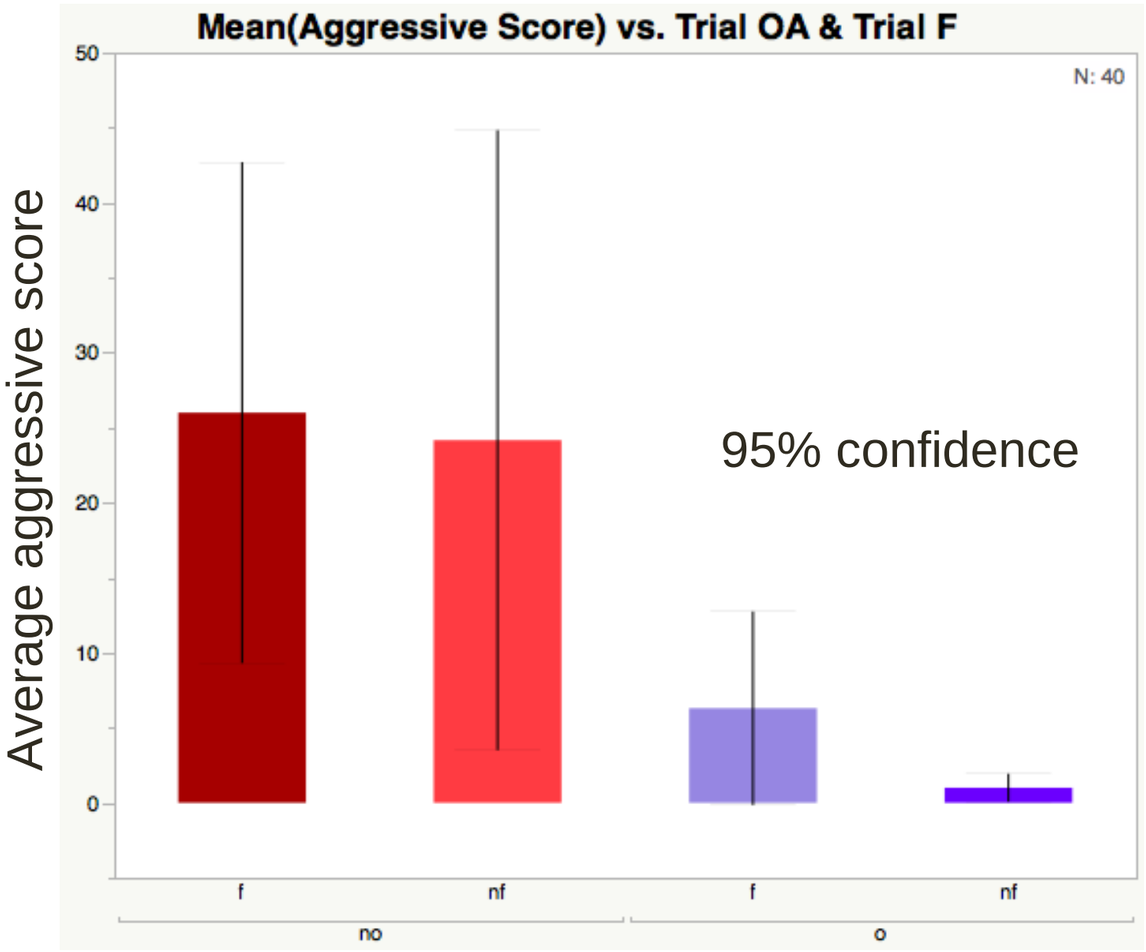
http://www.cleggs.com/wp-content/uploads/2013/11/Cricket_House.jpg

Fight tank set up (left) and method of application for octopamine (right)

Results

The presence of octopamine lowered the average aggressive score of male crickets (2-way ANOVA, p=0.0089). Female presence did not appear to change average aggressive score (2-way ANOVA, p= 0.6482).



Octopamine tended to make the crickets exhibit deviant behaviors not listed on the ethogram. Such as: contortion of body, kicking with no opponent around, movement of only mandibles, lack of any movement

Females, No OA

No Females, No OA

Females, OA

No Females, OA

http://mybugguardian.com/wp-content/uploads/2014/10/cricket.jpg

Conclusion

Our results contradict the previously established conclusion that a female audience increases aggressive behavior in male crickets. Our hypothesis that octopamine would increase male aggressive behavior was rejected. Octopamine appeared to have a negative effect on male aggression.

Future Directions:

The unexpected effects of octopamine requires us to address potential flaws in our methods. Future trials would include testing different methods of administration, comparing different concentrations of solution through hormonal analysis, and observing how long CO2 effects last in crickets in both octopamine and non octopamine groups.

References:

[1] Barron, A.B., Maleszka, J., Vander Meer, R.K., Robinson, G.E., Maleszka, R. “Comparing injection, feeding and topical application methods for treatment of honeybees with octopamine.” Journal of Insect Physiology, 2007. Vol 53: 187-194.

[2] Montroy, K., Loranger, M.J., Bertram, S.M. "Male crickets adjust their aggressive behavior when a female is present.” Behavioural Processes, 2015. Vol. 124 (2016):108-114.

[3] Stevenson, P.A., Rillich, J. “Controlling the decision to fight or flee: the roles of biogenic amines and nitric oxide in the cricket.” Current Zoology, 2016. 1-11.

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Images:

http://www.the-piedpiper.co.uk/graphics1/housecricket1.jpg

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