



Effects of physical activity on monoamine-dependent behavior in house crickets

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Background

- Physical activity has been observed to modulate behaviors important for survival in mammals through adaptations in monoaminergic systems, such as dopamine and norepinephrine.
- Although these effects have been studied in mammals, little attention has been given to the effects of exercise on monoamine-dependent survival behaviors in invertebrates.
- In the common house cricket (*Acheta domesticus*), the norepinephrine analog octopamine is involved in experience-dependent changes in aggressive behavior and bite-force.

Objective

- The objective of this study was to determine if the effects of exercise are generalized along the different taxa.
- We hypothesize that physical activity in crickets increases bite-force.

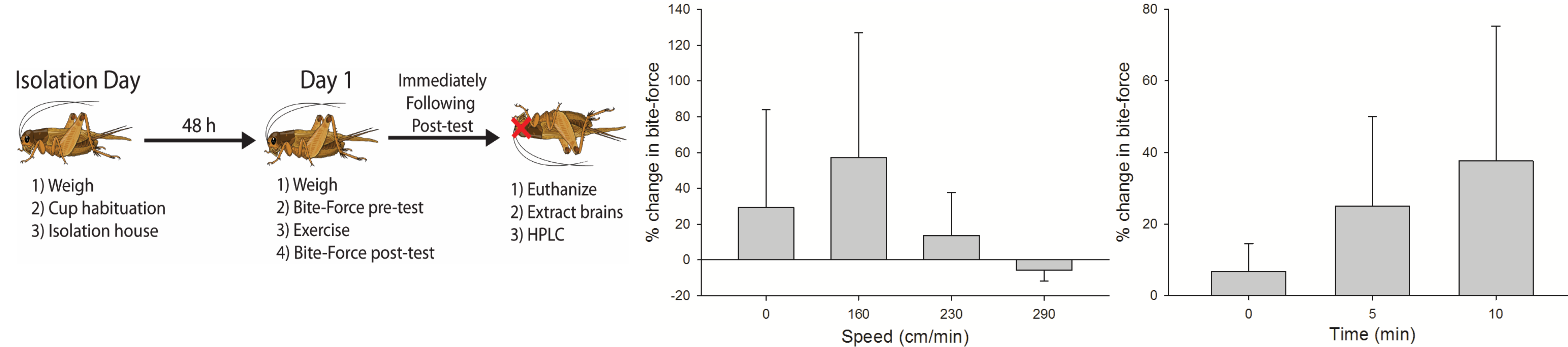
Methods

- Cricket were randomly exposed to 0, 5 or 10 minutes of running at randomly assigned speeds of 0, 160, 230 or 290 cm/min for either 1 day or 9 days.
- Cricket were placed into 120 mL containers. All containers were modified with Insect-a-slip and sand.
- The crickets' bite-force scores were taken both prior to and following exercise or sedentary conditions.
- Cricket bit a thin sensor which recorded the bite-force. A Tekscan FlexiForce Measurement System was used to determine the force.

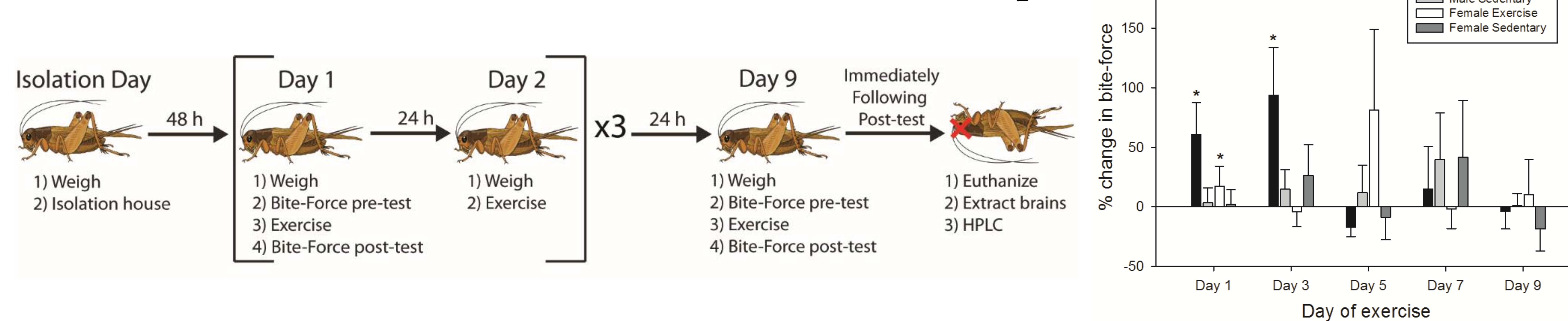


120 mL container attached to rotating rack and rotated.

Effect of exercise speed and exercise duration on bite-force

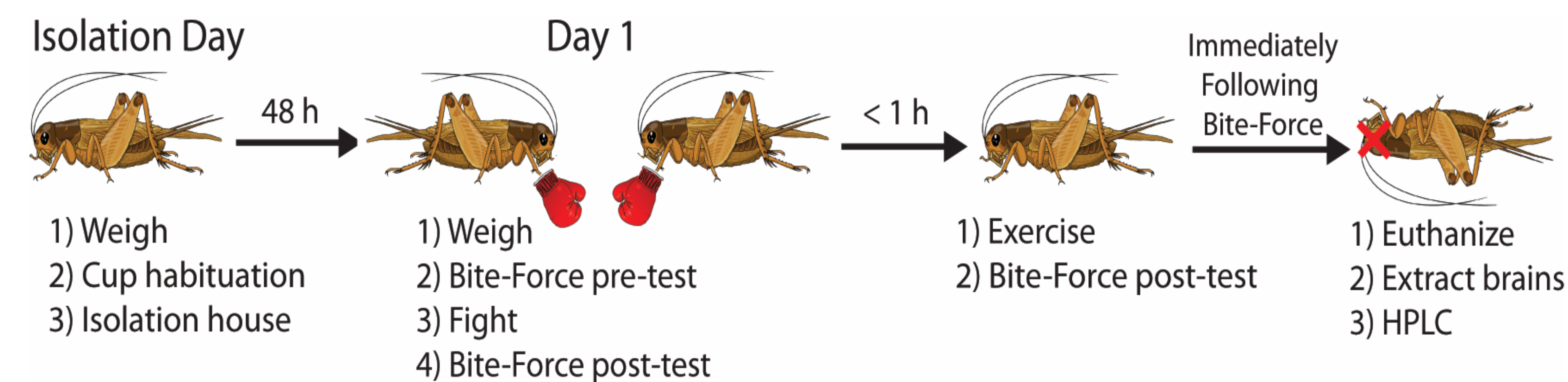


Acute exercise increases bite-force at the onset of training



Future Studies

- A follow-up experiment will test how exercise affects octopamine levels and bite-force following an event that results in decreased octopamine and bite-force.
- Following a fight, the loser of the fight experiences decreased octopamine levels, decreased aggression, and decreased bite-force.



Conclusions

- Exercise increases bite-force in males and females at the onset of training, but there is no chronic effect of exercise training.
- These data suggest that exercise can modulate survival behaviors in crickets.



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