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What will be the effect of the number of times cricket's chirp if temperature is manipulated in the environment?

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Increasing Temperature above Room Temperature has no Effect on the Number of Chirps by *Acheta domesticus* Crickets

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INTRODUCTION

Animals perform different behaviors throughout their lifetime. Behaviors are essential in order to obtain nourishment as well as find an adequate mate (Urry 2017). One behavior that crickets perform is chirping. In an experiment by Pires and Hoy, they found that acoustic communication of crickets is affected by a change in temperature. Specifically, they found that by increasing temperature of specific parts of their body, the males begin to chirp more, whereas the females tend to listen to the songs (Pires and Hoy 1992). This indicates that chirping in male crickets is a vital behavior to help find a reproductive mate.

Our hypothesis states that changing the temperature of the crickets' environment will influence the total number of chirps over the specified time. We predict that if the temperature of the environment increases, the number of chirps will also increase over the specified time. The null hypothesis states that changing the temperature of the crickets' environment will have no effect on the total number of chirps over the specified time period. Therefore, the null prediction shows that there will be no difference in the overall number of chirps the temperature of the environment is changed.

METHODS

One male cricket was placed into a tank at a time. To allow the cricket to become acclimated to the new environment, it was left alone for three minutes before any data collection. The lights in the room were turned off to mimic the night, for crickets are nocturnal. The cricket chirps were then recorded over an 8-minute period. The experiment was performed under both room temperature, 23° C, and increased temperature, 33° C, conditions. The sample size was 16 crickets, with which a room temperature and an increased temperature trial was performed. To increase temperature, a heating pad was applied underneath the tank. To counterbalance the experiment, data collection for half of the crickets began with a room temperature environment and the other half began with heat. These two groups were then switched, undergoing the opposite environmental condition. To analyze the data, the number of chirps over each cricket's 8-minute interval was counted, and the data were used to perform a paired t-test.



Acheta domesticus

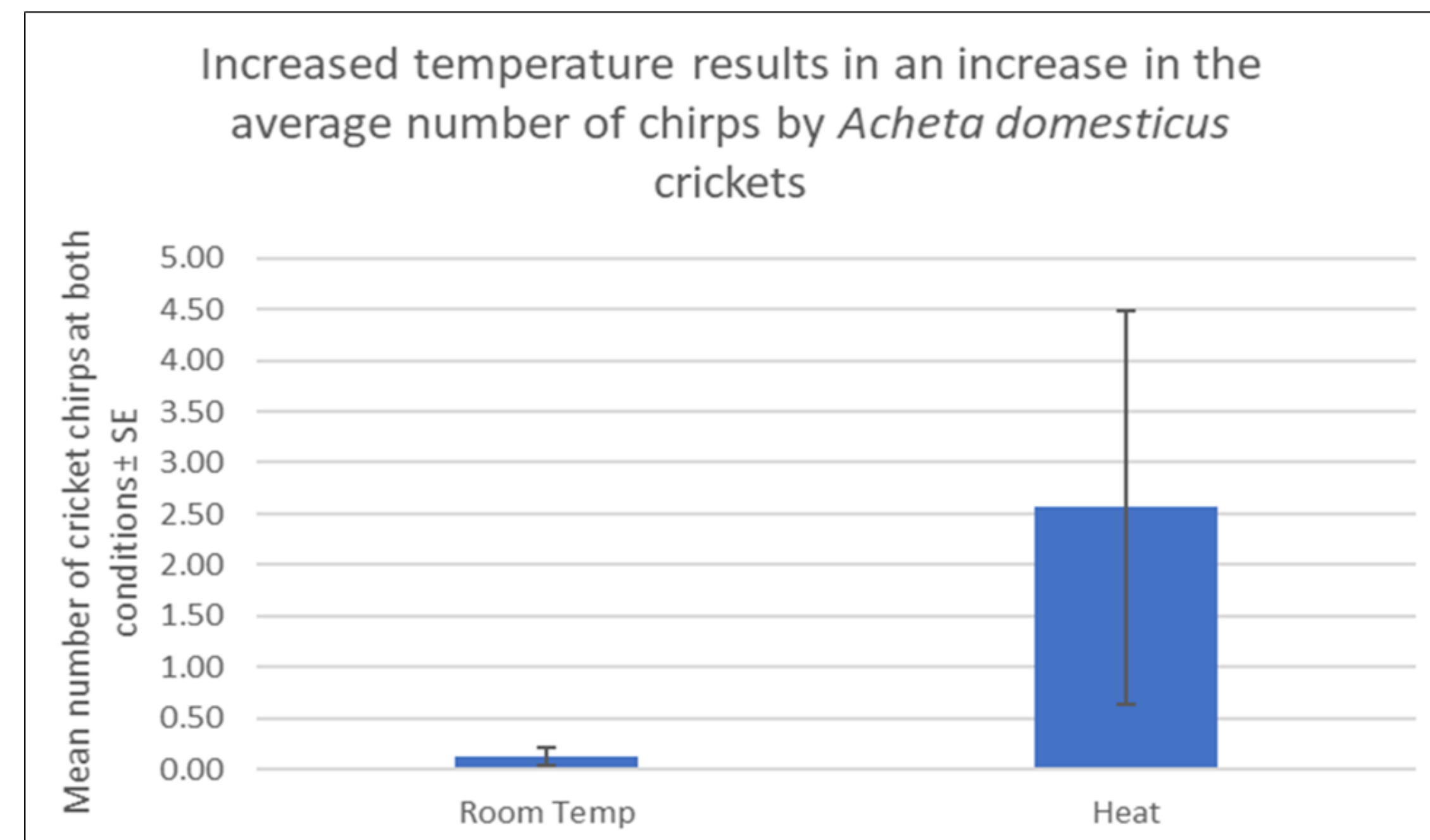


Figure 1 – Number of chirps, on average, for the crickets increased after the temperature was raised using the heating pad. Room temperature conditions were at 23° C and the heat conditions were at 33° C. The experimental bars show the average number of chirps for both conditions.

RESULTS

After testing 16 crickets, using a counterbalanced experiment, it was found that increasing the temperature above room temperature does not significantly increase the number of chirps (Fig. 1). The mean for the number of chirps at room temperature was 0.13 ± 0.09 and the mean number of chirps at an increased temperature of 33°C was 2.56 ± 1.93 . The paired t-test resulted in a p-value of 0.21. As 0.21 is greater than 0.05, the data collected is not statistically significant, and therefore there is most likely no relationship between temperature and cricket chirps.

DISCUSSION

Our results from the experiment do not support the hypothesis that changing the temperature will increase the total number of chirps of male crickets. Although the mean values of cricket chirps between room temperature and heated environments show that the mean number of chirps is higher when the temperature is increased, the p-value displays that the results are not statistically significant. Regardless of non-significance, a trend in the data leads to possible further research in which one could increase test sample size or look into the variability of individual crickets. Despite all three experiments utilizing different species of crickets, our hypothesis parallels the results and ideas of the Pires' and Hoy's and also Symes' experiments that show cricket chirps and temperature change to be directly correlated (Pires and Hoy 1992, Symes et al. 2017). Therefore, our results do not support what has been previously found which could be a result of various factors. One unusual behavior observed throughout the experiment was that as we reunited crickets in one box after experimenting on them, these crickets began chirping much more than the individuals. This unusual behavior in crickets can be a result of a proximate cause that can be looked into for future experiments. In further research, one can research whether the chirp of *Acheta domesticus* is solely a mechanism for attracting mates or a form of general, behavioral communication.

CONCLUSION

- The frequency of *Acheta domesticus*' chirping is not significantly affected by the temperature in the environment.
- A trend in data does not necessarily equate to overall significance.

LITERATURE CITED

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