Sex Differences in Metabolic Rate of Brown House Cricket (*Acheta domesticus)*

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Background

Respiration provides the necessary oxygen for an organism's metabolism. Measuring respiration in an isolated system, a respirometer, gives information on that organism's rate of metabolism.

Metabolism is sum of chemical reactions for an organism to sustain itself. The rate of metabolism for an organism can vary depending on growth, reproduction, or responses to the environment. Understanding and quantifying metabolic rate provides insight into a species' life cycle and its requirements for survival. Deviations from normal metabolic rate may also signify disease or injury, and studying these effects can lead to treatments.[3]

This experiment sought to determine if there was a difference in the basal metabolic rate between the sexes of *Acheta domesticus*, differences that have been noted by Hack and Kolluru et al.[1,2]

Methods/Materials

Two Brown House Crickets, a male and female of masses 0.51 g and 0.48 g respectively, were used for repeated trials. Their oxygen consumption was measured in a respirometer at 5-minute intervals for a period of 30 minutes. The experimental set-up is shown in Figure 1.

Objective

The experiment sought to determine the difference in rate of metabolism between sexes of the Brown House Cricket.

Hypothesis

We hypothesized that the female cricket, due to sex-related biological processes for reproduction, will exhibit a higher metabolism throughout the experiment, given the specimens remain relatively inactive.

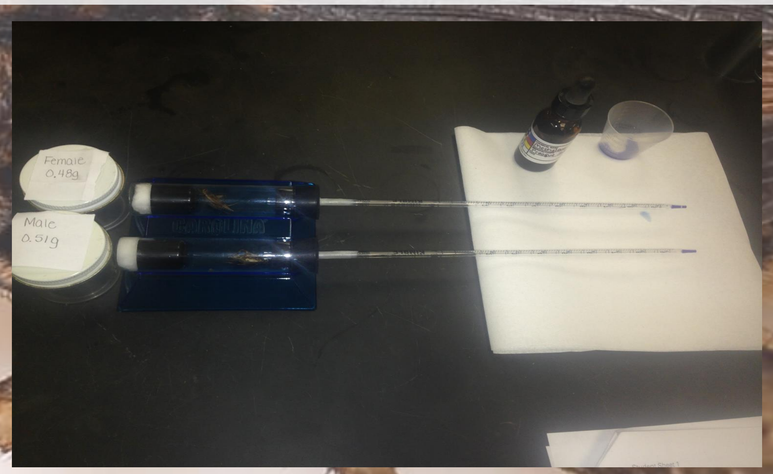

Figure 1: Experimental respirometers for two test subjects.

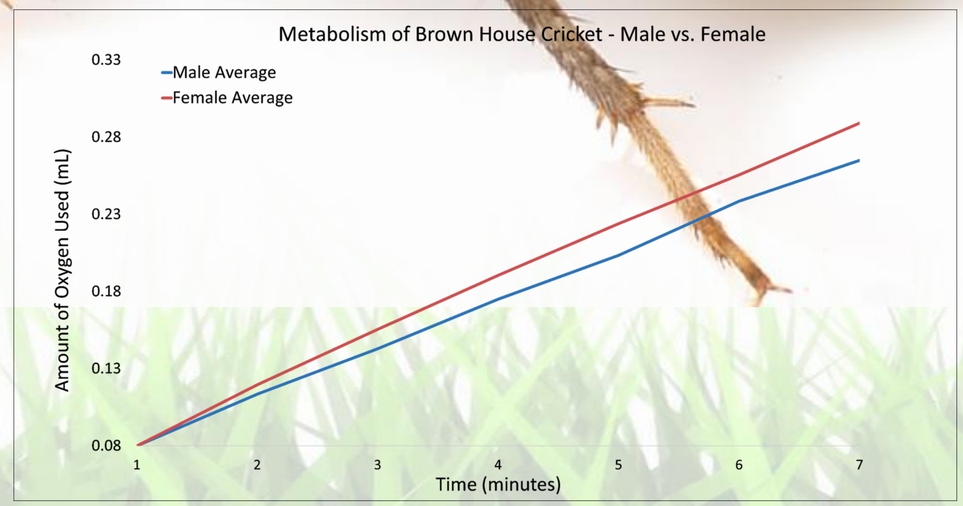

Figure 2: Graph of respiration rate averages for male and female crickets.

Results

This experiment showed a significant difference between male and female oxygen consumption, 1.04 and 1.20 L/kg*hr respectively. The difference in oxygen consumption correlates to the higher metabolic rate of female Brown House Crickets. These results are shown in Figure 2.

Discussion

The female brown house cricket demonstrated a higher metabolic demand in our experiment due to energy demand for internal reproductive processes, such as egg formation. Kolluru et al. noted the same increase in metabolic rate of females and made the same sex-based conclusion during periods of inactivity.[2]

Expanded tests on metabolic rate during varying stages of life cycles, response to stimuli, and response to disease/injury can lead to a greater understanding of how metabolic rate changes for a given set of parameters, and what the changes mean.

Acknowledgements

[1] Hack, M.A. (1997a) The effects of mass and age on standard metabolic rate in house crickets. Physiological Entomology, 22, 325–331

[2] Kolluru, G. R., Chappell, M. A., & Zuk, M. (2004). Sex differences in metabolic rates in field crickets and their dipteran parasitoids. *Journal of Comparative Physiology B, 174*(8), 641-648.

[3] Deberardinis, R., & Thompson, C. (2012). Cellular Metabolism and Disease: What Do Metabolic Outliers Teach Us? Cell, 148(6), 1132-1144. doi:10.1016/j.cell.2012.02.032

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