



Cornell Institute for Biology Teachers

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Lab reviewed: 2/2015

Title:

Crickets' Response to Light

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Appropriate Level:

Grades 4-6

NYS Standards:

Standard 1: Analysis, Inquiry and Design (Scientific Inquiry)

Standard 4: Science (The Living Environment)

Abstract:

Students will test light preferences in crickets. In the first part of the lab students will find out whether crickets prefer bright areas versus darker spots. During the second part of the lab students will choose three different colors and test whether the crickets have a preference for a particular color or not.

Time Requirement:

45 min.

Additional Teacher Information

Objectives

Working cooperatively in groups of three or four, students will determine if crickets respond to light or dark. They will also draw conclusions as to whether or not crickets prefer different colors.

Materials Needed

- Transparent plastic containers (6 Qt. shoe boxes) *
- Mosquito mesh to cover the plastic containers. One piece per container. *
- Small black desk lamps *
- Laminated black construction paper *
- 8 different colored transparencies, laminated *
- Crickets and habitat (including food and water)

* = included in CIBT kit

Cricket Care & Feeding

You can buy crickets at a pet shop and set up a habitat in the classroom that includes a source of food (such as Fluker's High Calcium Cricket Diet, cornmeal, dry pet food, fruits and vegetables), and either water (they can drink from a soaked cotton ball or sponge) or cricket quenchers (such as Fluker's Original Cricket Quencher). Include a variety of foods (both fresh and dry) in their diet. When you use fresh food, be sure to replace it every couple of days before it gets moldy.

Crickets also need a place to hide. Pet shops often use portions of egg cartons to provide crickets with dark spots to hide in and rest.

Crickets do better away from direct light, so a darker corner away from the windows would be appropriate. Make sure your crickets stay warm enough (ideally around 70°F), especially if the classroom's heat is turned off overnight. They will die if the temperature drops below 50°F for extended periods of time.

Lab Set-Up

7-10 days before experiment: Buy crickets and supplies for cricket habitat. Set up habitat. Feed and water crickets daily.

Day of experiment: Help students set up one plastic shoe box per group, covered with mesh. Take several crickets (about a dozen per group) out of their habitat and place into the boxes, taking care to replace mesh quickly. Turn on the small black lamps, and place the boxes underneath (see Figure 1 in

Student Handout). Let the crickets adjust to their new environment, undisturbed, for at least three minutes.

Part I of the experiment deals with crickets' preference for either light or dark environments. Instruct students to place black construction paper over half of their containers, with the lamp shining on the other half from a distance (about 60 cm). Explain to the students why the lamp's position is important: if the lamp were closer, it would introduce the variable of heat into the experiment. In this experiment, we are only testing crickets' response to *light*, so other variables should be eliminated.

Begin timing the experiment. Every minute, for the next five minutes, have students observe the crickets from above (they will be looking down at the top middle of their container) and record in Table 1 how many are in the light half, and how many are in the dark half. Now instruct the students to switch the light half with the dark half, so the light is shining where the black paper used to be and vice versa. After giving the crickets an adjustment period of about three minutes, have the students record the same observations on Table 2.

In Part II of the experiment, students will be looking at crickets' response to two different colors of light. Instruct students to put two different colors of transparencies over the cricket containers. Make sure the colors don't overlap, as this would introduce a third color of light. Again, allow the crickets to adjust, and then have students record the number of crickets on each side of the container every minute for five minutes (on Table 3). The observation technique should be the same as it was in Part I. Switch the positions of the two colors, let the crickets adjust, and then have students record observations on Table 4.

Special Notes

Crickets are most active at night. In nature they are found in tall grass, mulch piles, weeds, rock piles and rotting logs. Crickets might spend their entire lives inside buildings and basements, in warm places where there is enough moisture and food. They live behind or under objects and in cracks or crevices. At night they are attracted to bright light, but during the day they prefer darker places.

As far as color preferences, most insects (including crickets) have limited color vision. However, they can see many colors that humans can, but not red. In addition, crickets can see ultraviolet light that humans cannot see. Students might find that instead of preference for a particular color, crickets seek darker spots and favor darker colors over light. Because of time constraints, this section of the lab limits the color preference investigation to two colors only. Teachers might choose to give more time to students to investigate color preferences among 3 or 4 colors.

Extension Activity

Investigate color preferences among more colors—try 3 or 4 different colors.

Curriculum Integration

Many books will allow you to incorporate language arts into your science lessons and labs about crickets. Here are a few suggestions:

Chester Cricket's New Home and Chester Cricket's Pigeon Ride. Both by George Selden and Bantam Doubleday Dell Books.

The Cricket in Times Square by George Seldom and Douglas & McIntyre Press.

Nicholas Cricket by Joyce Maxner and Harper and Row Publishers.

The Very Quiet Cricket by Eric Carle and Philomel Books.

Old Cricket by Lisa Wheeler and Atheneum Books.

Teacher Resource: Non-Fiction Cricket Books for Kids

Allen, J. and Humphries, T. 2002. *Are you a grasshopper?* New York: KingFisher.

Green, E. 2007. *World of Insects: Crickets*. Minneapolis: Bellwether Media.

Miller, H. 2004. *Cricket*. Minnesota: KidHaven Press.

Ross, M.E. 1996. *Cricketology*. Minneapolis: Carolrhoda Books.

Simon, S., *Discovering what crickets do*. New York: McGraw-Hill Book Co., 1973.

Squire, A. 2003. *Crickets and grasshoppers*. Scholastic Print.

White, N. 2001. The magic school bus explores the world of bugs. Scholastic Print.

References

The Critter Catalog, *Gryllidae*

<http://www.biokids.umich.edu/critters/Gryllidae/>

The Cricket Classroom Page

<http://telusplanet.net/public/ecade/CricketsintheClassroom/cricketsintheclassroom.html>

Cricket Rearing Guide

<http://insected.arizona.edu/cricketrear.htm>

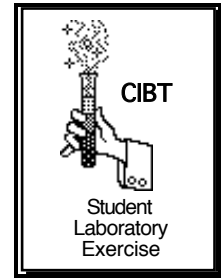
Enchanted Learning

<http://www.enchantedlearning.com/subjects/insects/orthoptera/Cricket.shtml>

Mr. Nussbaum

<http://www.mrnussbaum.com/cricket.htm>

Crickets' Response to Light



Name: _____

Hypotheses

1. Write a prediction about whether the crickets will prefer light or dark places. Make sure you have a good reason to help explain your choice. Your hypothesis will read, somewhat, as follows: "The crickets will prefer ___ because ___." Write down your hypothesis here:

2. Given two different colored areas, make a prediction about which area the crickets will prefer. Make sure you have a good reason to help explain your choice. Your hypothesis will read, somewhat, as follows: "The crickets will prefer the ___ area because ___." Write down your hypothesis here:

Materials

- Transparent plastic container
- Mesh (to cover container so crickets can't escape)
- Several crickets
- Laminated black construction paper, $\frac{1}{2}$ the size of the container
- Small lamp
- Two different colors of transparencies
- Stopwatch

Procedure

1. Place several crickets in the plastic container.
2. Cover the container with mesh so the crickets cannot escape. Give the crickets a couple of minutes to get used to their new container.
3. Place black construction paper over half of the container.
4. Shine the light on the other side of the container. Be sure the light is far enough away so the crickets do not become too warm and heat does not play a factor in the experiment (approximately 60 cm is a good distance).
5. Every minute, for the next five minutes, count the number of crickets on either side of the container. Observe the container by looking down from above into the top middle of the container. **Do not observe looking through the sides.** See Figure 1 below. Record in Table 1 (Trial 1).

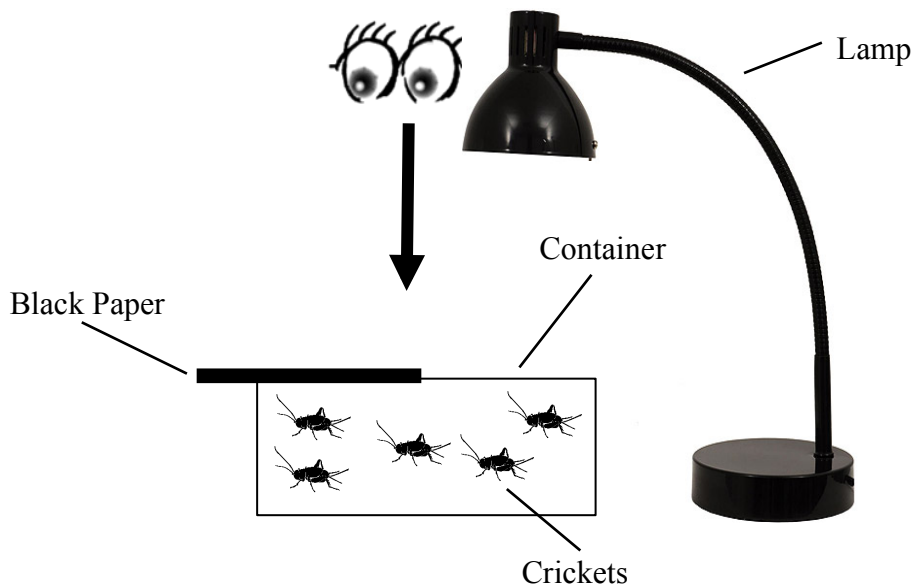


Figure 1. Observation technique

6. Switch the positions of the light and the black paper, so the black paper is now on the spot where the light was. The light will now be shining on the spot where the black paper was before. Give the crickets a couple of minutes to adjust to the new set-up.
7. Every minute, for the next five minutes, count the number of crickets on either side of the container. Observe the container by looking down from above into the top middle of the container. **Do not observe looking through the sides.** See Figure 1. Record in Table 2 (Trial 2).
8. Remove black construction paper.

9. Place the two different colors of transparencies you chose over both halves of the container. **Do not overlap them.** See Figure 2. Give the crickets a couple of minutes to adjust to the new set up, or wait until the teacher tells you to begin observing the crickets.

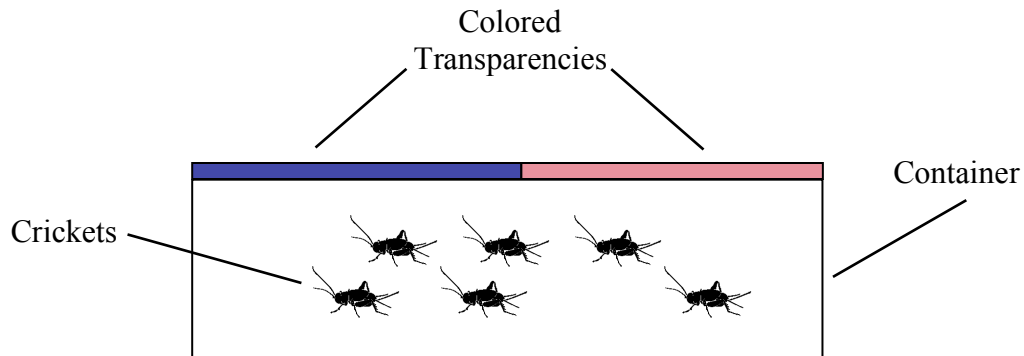


Figure 2. Crickets and light preference setup

10. Every minute, for the next five minutes, count the number of crickets on either side of the container. Just like before, observe by looking down from above into the top middle of the container. Again, **do not observe looking through the sides.** Record in Table 3 (Trial 1).
11. Switch the positions of the colors so they are now on the opposite half. Give the crickets a couple of minutes to adjust to the new set up, or wait until the teacher tells you to begin observing the crickets.
12. Every minute, for the next five minutes, count the number of crickets on either side of the container. Observe the container by looking down from above into the top middle of the container. **Do not observe looking through the sides.** Record in Table 4 (Trial 2).
13. Put the crickets back into their habitat and clean up your supplies and workstation.
14. Answer all the questions in the Data and Analysis section.

Data and Analysis

Part I. Do crickets prefer lighter environments over darker environments?

Table 1. Crickets' lighting preferences (Trial 1)

Time of Observation	Number of Crickets in the Light	Number of Crickets in the Dark
1 min		
2 min		
3 min		
4 min		
5 min		
TOTALS (add up the number of crickets for Light and Dark)		

1. Add up all the numbers for Crickets in the Light and record under **TOTALS**. Add up all the numbers for Crickets in the Dark and record under **TOTALS**. Compare these totals. Do the crickets prefer light or dark? _____ Support your answer with data from the experiment.

Table 2. Crickets' lighting preferences (Trial 2)

Time of Observation	Number of Crickets in the Light	Number of Crickets in the Dark
1 min		
2 min		
3 min		
4 min		
5 min		
TOTALS (add up the number of crickets for Light and Dark)		

2. Add up all the numbers for Crickets in the Light and record under **TOTALS**. Add up all the numbers for Crickets in the Dark and record under **TOTALS**. Compare these totals. Do the crickets prefer light or dark? _____

3. Compare the **TOTALS** from Trial 1 and Trial 2. What can you conclude from these trials? Use your data to answer this question.

Part II. *Do crickets have a preference for color?*

Table 3. Crickets' color preferences (Trial 1)

Time of Observation	Color 1: _____ Number of Crickets Under This Color	Color 2: _____ Number of Crickets Under This Color
<p align="center">TOTALS (add up the number of crickets for each color)</p>		

4. Add up all the numbers for Crickets Under Color 1 and record under **TOTALS**. Add up all the numbers for Crickets Under Color 2 and record under **TOTALS**. Compare these totals. Do the crickets prefer one color over the other? _____ Which color do they seem to prefer? _____ Use your data to answer this question.

5. The larger the difference between the two **TOTALS**, the higher the preference crickets have for a color. So far, what can you conclude from these results?

Table 4. Crickets' color preferences (Trial 2)

Time of Observation	Color 1: _____ Number of Crickets Under This Color	Color 2: _____ Number of Crickets Under This Color
TOTALS (add up the number of crickets for each color)		

6. Add up all the numbers for Crickets Under Color 1 and record under **TOTALS**. Add up all the numbers for Crickets Under Color 2 and record under **TOTALS**. Compare these totals. Do the crickets prefer one color over the other? _____ Which color do they seem to prefer? _____ Use your data to answer this question.

7. Compare the **TOTALS** for **each color** for both trials. Because you switched the position of the colors on top of the container, make sure that you recorded the data accurately. The larger the difference between the two **TOTALS**, the higher the preference crickets have for a color. What can you conclude from your results? Use your data to answer this question.

Discussion

1. Using information from your data tables, explain what conclusions you can draw about crickets preferring dark or light areas.

2. Go back to Page 1 and re-read your hypotheses. Does your data support your first hypothesis (about light vs. dark)? Does your data support your second hypothesis (about color preferences)?

3. In both Part I and Part II we switched the position of the paper, the light, and the transparencies after one trial. Explain why this simple procedure made your data more accurate.

4. How can the results of this lab influence where we place our cricket habitat in our classroom?
