Cornell Institute for Biology Teachers

Lab reviewed: 2/2015

Title: **What do Crickets Eat?**

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Appropriate Level: Multiple Grade Levels

Elementary Science Core Curriculum (NYS): Standard 1: Analysis, Inquiry and Design (Mathematical Analysis): Key Idea 1: M1.1c, M2.1b; (Scientific Inquiry): Key Idea 1: S1.1a, S1.2, S1.3; Key Idea 2: (S2.1), S2.3a,b; Key Idea 3: S3.1, S3.2, S3.3, S3.4

Standard 6: Interconnectedness: Common Themes: Key Idea 2, Key Idea 3, Key Idea 5, Key Idea 6.

Standard 7: Interdisciplinary Problem Solving

Standard 4: The Living Environment: Key Idea 1: 1.1a, 1.2a; Key Idea 3: 3.1a, (3.1c, 3.2a); Key Idea 4: 4.2b; Key Idea 5: 5.1a,b; 5.2c, (5.2d), 5.2f, g; Key Idea 6: 6.1b,e.

Abstract: Students will make observations and record data on the types of food that crickets eat. While working in small groups, students will place a variety of foods on brown paper in a container. They will place crickets in the container with food, and then observe and record which foods the crickets visit. Observations will be recorded on a data table. Students will then graph their results as a whole class activity.

Time Requirement: 60 min.

Additional Teacher Information

Objectives

Students will set up and follow a lab procedure, make predictions and draw conclusions while working on the lab; they will work cooperatively in groups of three or four, gather and analyze data, and create graphs from data.

Materials Needed

For one class:

- Variety of foods such as lettuce, fruits, vegetables, cereals, dog food, cheese, chocolate, etc. We recommend that each group has as many different types of food as students, so that each student can observe cricket visits to a particular type of food.
- Transparent plastic containers large enough to hold the crickets and food (6 Qt. shoe boxes) *
- Mosquito mesh to cover the plastic containers. One piece per container. *
- Brown paper cut into small pieces of equal size
- Data table—*see Student Handout Page 2*
- Graph sheet from this lab or additional graphing paper, colored pencils
- Magnifying glasses *
- Crickets

* = 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, so the crickets are less likely to favor familiar foods during the experiment. 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.

Make sure the crickets are hungry when you do the lab. Do not feed them for a few days prior to the experiment (don't worry, this won't harm them). Crickets will eat just about anything that comes their way, however in our trials they showed preference for strawberries and cherries, over lettuce and carrots. However, they have also preferred Cheerios and other types of dry cereal over fresh food—perhaps because they are used to the dry cricket food from the pet store that we feed them. While eating, crickets hold food tightly with their front legs as their jaws move rapidly.

Lab Set-Up

7-10 days before experiment: Buy crickets and supplies for cricket habitat. Set up habitat. Feed and water crickets daily. Have students browse non-fiction books or articles on crickets prior to the lab. This will familiarize them with cricket behavior, enabling them to make an informed hypothesis. Cricket books are available in a wide range of reading levels. See the Teacher Resource section for book suggestions.

3 days before experiment: Stop feeding crickets, so they are hungry when you do the experiment.

1 day before experiment: Discuss with the class what foods they would like to try in the experiment, given what they have learned from the readings. Encourage students to bring food from home, or go out and purchase foods the class has decided on. Try to use foods that will not mold quickly.

Day of experiment: Decide how long you want to run the experiment for. Younger students may focus for shorter amounts of time, while older students can run the experiment longer. Lower grades can do the experiment in two five-minute observation periods (during which the teacher keeps time for the whole class), while higher grades can try two ten-minute observation periods. Make sure to tell the students how long they will run the experiment for; have them record your chosen time interval on Page 3 of the student handout (Step 4).

Help students set up one plastic shoe box per group, containing four different foods on brown paper; place each food in a different corner (see Diagram 1). Use small pieces of food on brown paper—this keeps the boxes neat and clean. Cover the box with mesh so crickets can't escape.

Diagram 1: Set-up for cricket food preference experiment.

Take four crickets per group out of their habitat and place into the boxes, taking care to re-place mesh quickly. Discuss with the students why they should all use the same type of paper and same size pieces—the only variable you want to test and manipulate is food; all others, including the type and size of paper where the food sits, should be controlled.

Let the crickets adjust to their new container, undisturbed, for at least three minutes before instructing students to each choose one cricket in their group's box that they will follow for the experiment. To help students keep track of individual crickets, you may want to mark the crickets with various colors of overhead markers or nail polish.

Instruct the students to begin quantitative observations. Assign one cricket to each student. Within groups, each member will record the number of visits that *their* cricket makes to each type of food. Five seconds counts as one visit. At the end of one observation period (5 or 10 minutes), group members will share and copy down each other's data in the data tables. After a brief resting interval, have students continue the experiment for another observation period.

Help students return crickets to their habitat and clean up from the lab. Make sure students clean out containers thoroughly after the experiment, to avoid mold.

*****Important Things to Consider***

You may tailor this exercise to your class's needs by choosing one of three different ways to conduct the experiment:

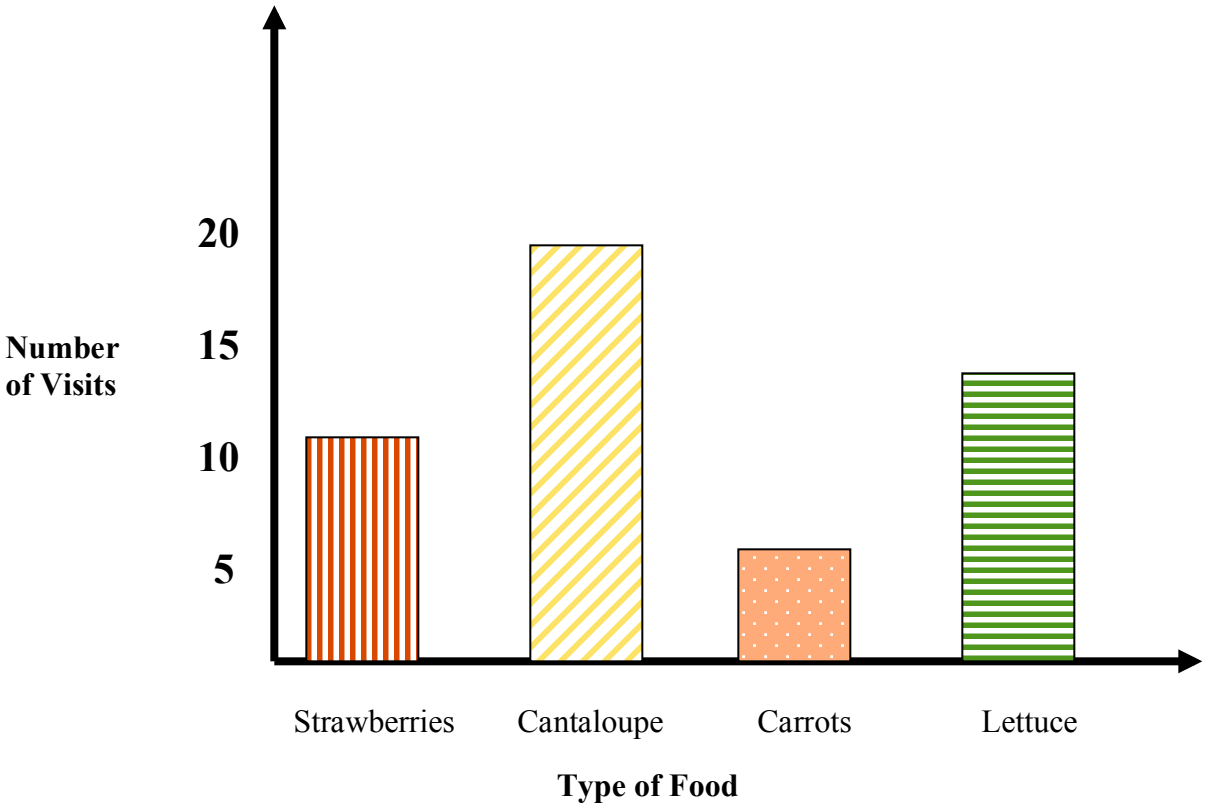
1) If you provide the same four foods to each group, the groups can graph their results individually *and* as a class. This option is simple, and would work best for lower grade levels.
2) If you have each group graph its data *only* individually, the groups will have the freedom to experiment with any type of food they decide on.
3) If you incorporate averaging into the lesson, students can choose many different types of foods while still combining the class's data into a graph at the end (see Graphing Results section). This would be a great exercise for higher grade levels.

Graphing Results

You can direct students to graph their group's data and/or the entire class's results (see ***Important Things to Consider*** above). If you have access to a computer lab, you can teach the kids to make a graph using Excel. It is never too early to get them started!

Using their group's data, each student will construct a bar graph showing the food preferences of their group's crickets only. See graph below for an example.

Graph #1. Frequency of crickets' visits to different types of foods



If using the entire class's data, create a master data table and have all groups contribute results. Students can graph this data the same way as above, *if* each group used the same four foods. If the class used more than four types of foods, you can show students how to process the data through a table then have them graph the averages (see Table 1 below).

Table 1. Frequency of class crickets' visits to different types of foods

Type of Food	Total Number of Cricket Visits				**Average Number of Cricket Visits**
	Group 1	Group 2	Group 3	Group 4	
Strawberries	12	-	9	-	(12+9)/2=**10.5**
Cantaloupe	7	15	16	-	(7+15+16)/3=**12.7**
Carrots	-	5	-	-	**5**
Lettuce	-	19	-	4	(19+4)/2=**11.5**
Banana	-	-	9	14	(9+14)/2=**11.5**
Olive	2	-	-	-	**2**
Cereal	-	-	-	20	**20**
Mango	-	1	-	3	(1+3)/2=**2**
Cat Food	16	-	14	-	(16+14)/2=**15**

Feel free to customize the table for your class:

Table 1. Frequency of class crickets' visits to different types of foods

Type of Food	Total Number of Cricket Visits				**Average Number of Cricket Visits**
	Group 1	Group 2	Group 3	Group 4	

Extension Activity: *Quantitative vs. Qualitative Observations*

You can also use this exercise to introduce your students to the concepts of 'quantitative' versus 'qualitative' observations. Quantitative observations are expressed numerically: the actual length of an specimen, or the distance between two points, the number of eyes, the height a cricket jumps, etc. Qualitative observations are expressed with adjectives or opinions: the cricket is small, crickets are gross, the sound is loud, the chirps are annoying, the food is sweet. In this lab, the number of visits represents quantitative observations, whereas their observations about how crickets eat are qualitative.

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/

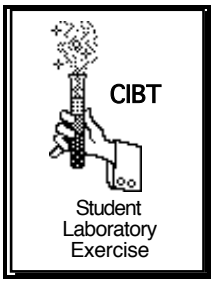
The Cricket Classroom Page
http://telusplanet.net/public/ecade/CricketsintheClassroom/cricketsintheclassroom.html

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

What do Crickets Eat?



Name: _____

Hypothesis

Look at the different types of food chosen by your group. Make a prediction about which food the crickets will prefer to eat. If the group can't agree on one food over another, each group member can make their own hypothesis. 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 it down here:

_____

_____

Materials

- 4 different types of food
- Data sheet
- Transparent plastic container
- Mesh (to cover containers so crickets can't escape)
- Magnifying glass
- 4 crickets (per group)
- Brown paper, cut into small pieces of equal size

Procedure

1. Place a small portion of each food on a piece of brown paper in the four corners of the plastic container. Record your group's food choices on Table 1, one food choice per column.

2. Gently take four crickets out of the habitat and place them in the container with the food. Put the mesh over the container and make sure that it entirely covers the top. Give the crickets 3 minutes to get used to the container.

3. Start recording your observations in Table 1. Each group member will observe one cricket. You will record the number of times that your cricket visits each type of food. A visit is defined as a cricket spending 5 or more seconds on a given food. Every 5 seconds count as a visit. If a cricket spends 10 seconds on one food it counts as two visits. If a cricket spends 13 seconds on a given food it still counts as two visits.

4. Keep observing for ___ minutes. Enter your cricket's number of visits to each food in the first row of Table 1.

5. Take a short break from making your observations. When your teacher says it's okay, begin counting visits again for another ___ minutes.

6. To find the total number of visits per food, add A and B in the table.

Table 1. Number of Cricket Food Visits

	Food:	Food:	Food:	Food:
A. Visits during first __ minutes				
B. Visits during the last __ minutes				
Total number of visits (add A+B)				

7. Share your observations with your group members. Record the *group's* totals in Table 2.

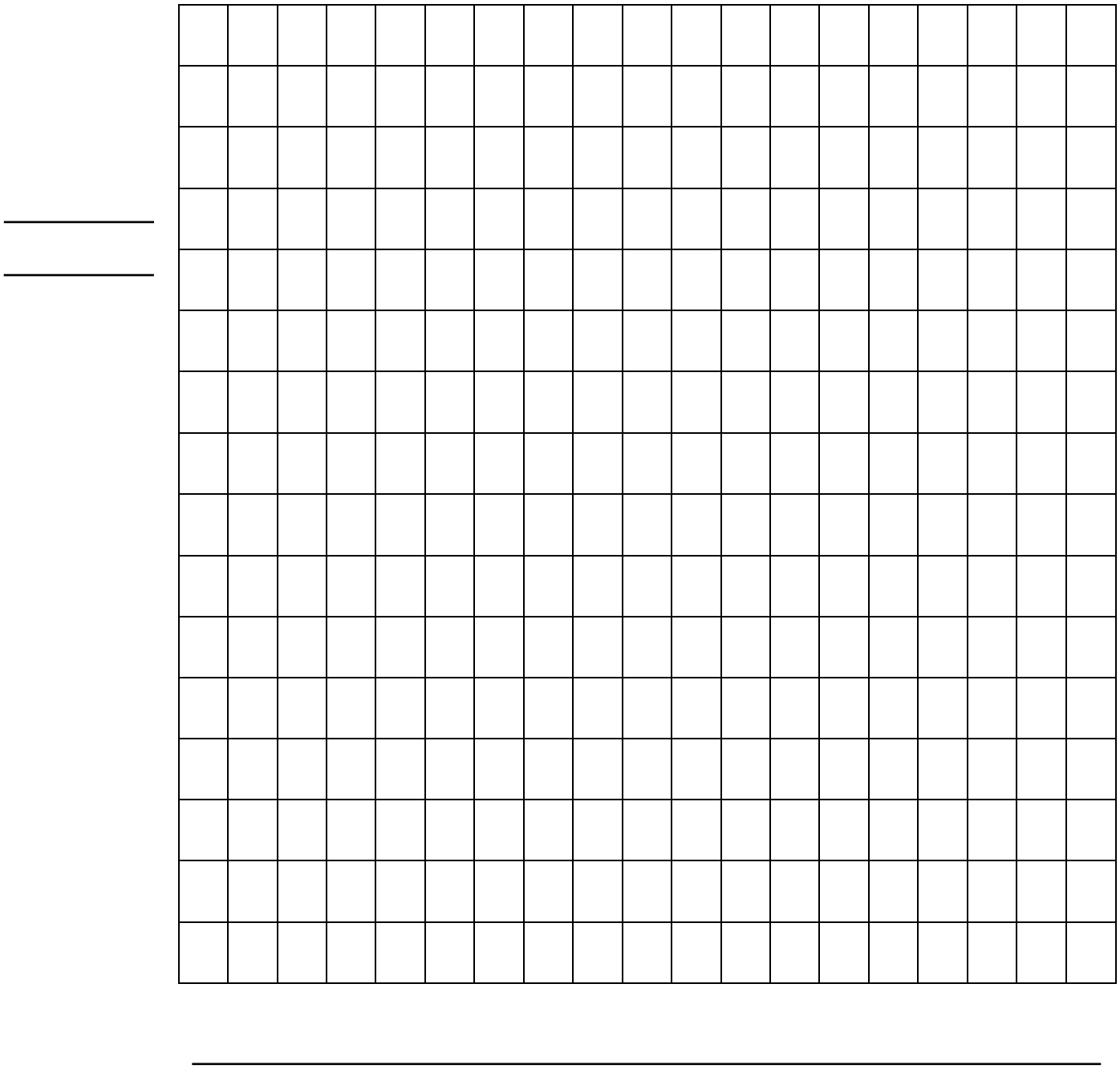
Table 2. Total Number of Cricket Food Visits *in the Group*

	Food:	Food:	Food:	Food:
Group Member 1 **Total**				
Group Member 2 **Total**				
Group Member 3 **Total**				
Group Member 4 **Total**				
Entire Group's Totals (add from above)				

Graphing Your Data

Using the data from Table 2, construct a graph below. A bar graph showing the types of food versus the total number of visits would be most appropriate. Remember to title your graph and label the axes. Ask if you need help!

Graph 1. _____



Analysis and Discussion

1. Which foods did the crickets prefer to eat? How did you come to this conclusion? (Support your answers using your data.)

_____

_____

_____

2. What do you think attracted the crickets to their preferred foods?

_____

_____

_____

3. Go back to Page 1 and re-read your hypothesis. Do your results support your hypothesis?

_____

_____

_____

4. What other factors might be affecting the crickets' behavior during the experiment?

_____

_____

_____

5. If we repeated this lab to make the results more accurate, how would you do it differently?

_____

_____