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| The Musical World of CricketsName:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |

**Introduction**

In this lab you will determine whether crickets prefer colder versus warmer areas, and how temperature affects a cricket’s song (chirping). Crickets are *ectotherms*, or as some scientists like to say, variable-temperature animals. This means that a cricket’s body temperature changes according to the surrounding temperature.

Adult males of most cricket species begin to chirp when they are six to eight weeks old. They chirp by rubbing their forewings together. This process is called *stridulation*. The adult male stridulating organ consists of a smooth scraper on one forewing that is drawn across a serrated file on the other forewing to produce a song. Because crickets spend most of their time hidden in the grass or under leaves and almost never see each other, sound is one of their most important communication tools.

Male field crickets (the ones you may find in your backyard) have at least three songs: one that attracts females, one that woos the female after he gets her attention, and one that warns other males to back off. Some males use the chirping sounds to mark their territory. Crickets can also disguise their “voices” when in danger. By lowering his “voice,” a cricket can make himself sound far away. Chirping patterns are specific to each species and females respond only to the song of their own species.

*Figure 1: Female cricket’s“ear”*

Females hear the males through a small pit or depression on the front side of the leg, that has a thin membrane stretched over it (Figure 1). This “ear” picks up the vibrations of the chirps and helps the females find the males.

**Hypotheses**

1. Make a prediction as to whether the crickets will prefer colder versus warmer areas. Be sure you have a good reason to help explain your choice. Your hypothesis will read, somewhat, as follows: “The crickets will prefer \_\_\_\_ areas because \_\_\_\_.” Write it down here:

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2. Make a prediction as to how you think the crickets will react to temperature changes in terms of chirping. Be sure you have a good reason to help explain your choice. Your hypothesis will read, somewhat, as follows: “When temperature is \_\_\_\_\_\_ (warmer / cooler), the crickets will chirp \_\_\_\_\_ (more / less) because \_\_\_\_\_\_.” Write it down here:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Materials**

|  |  |
| --- | --- |
| * Plastic transparent container
 | * Thermometers (2 per container)
 |
| * Mesh (to cover container so crickets can’t escape)
 | * Heating pad
 |
| * Reusable freezer pack (should be frozen for the experiment)
 | * At least 8 crickets, ideally all males
 |
| * Magnifying glass
 |

**Part I. *Do crickets prefer cold or warm temperatures?***

**Procedure**

1. Tape two thermometers to the inside of the container (one on each end). Make sure that they are not touching the bottom of the container.
2. Place the crickets you will be using in the container and immediately cover with mesh so the crickets cannot escape.
3. Set the heating pad under one half of the container.
4. Place the frozen, reusable freezer pack under the other half of the container. Make sure the container is flat. This might be hard because the freezer pack may have an irregular surface, while the heating pad is very flat. Use books or notebooks to get the container nicely leveled. See Figure 1.

**Figure 1. The Musical World of Crickets Setup**

Container

Crickets

Heating Pad and Plug

Books

Frozen Freezing Pack

Thermometer





1. After giving the crickets three minutes to adjust to their surroundings, observe them to determine their reaction to the temperature differences. Every three minutes, stop and record the temperature on both sides of the container and count how many crickets are on either side of the container. Record your data in Table 1.

# Data and Analysis

***Table 1. Cricket temperature preferences***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Minutes | Cold EndTemperature (°C) | Hot EndTemperature (°C) | Number of Crickets at the Cold End | Number of Crickets at the Warm End |
| 3 |  |  |  |  |
| 6 |  |  |  |  |
| 9 |  |  |  |  |
| 12 |  |  |  |  |

1. Which part of the container did the crickets tend to move to? How might this be similar to what they do in their natural environment? Use your data to support your answer.

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2. Why do you think crickets tend to move towards this area of the container?

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**Part II. *Crickets’ Reaction to Changes in Temperature***

**Procedure**

1. Gently remove most of the crickets from the container, leaving only one cricket per group member. **Make sure all the remaining crickets are males**, because only males chirp. Each group member will choose their own cricket to follow.
2. Using a magnifying glass, spend a few moments watching your cricket up close. Is your cricket chirping? What parts of his body does he use to make the chirping sound?

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1. You will now count your cricket’s chirps in 5-minute intervals (the number of chirps that your cricket produces during a period of 5 minutes) in Table 2. Record the number of times he chirps on the hot end of the container, and the number of times he chirps on the cold end of the container. Make sure someone keeps track of the time (perhaps your teacher). In Table 2, record the temperature in the side of the container where the cricket was chirping at the end of the 5 minute interval.
2. Repeat Step 2 for three more 5-minute intervals, continuing to record on Table 2.

# Data and Analysis

***Table 2. Relationship between cricket chirping and temperature***

|  |  |  |
| --- | --- | --- |
| Minutes | Hot EndTemperature (°C) / Number of Chirps | Cold EndTemperature (°C) / Number of Chirps |
| 0-5 | **/** | **/** |
| 6-11 | **/** | **/** |
| 12-17 | **/** | **/** |
| 18-23 | **/** | **/** |

1. Did you notice a difference in the number of chirps the crickets made between the hot side of the container the cold side of the container? Explain your observations using your data.

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1. What may be some other factors that affect a cricket’s ability or desire to chirp?

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1. Suppose students in a different class ran this experiment and their crickets didn’t chirp at all. What would you suggest they do?

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