EDCI 5724
Anna Delgado and Chris Ayers

The Effect of Temperature on Cricket Chirping

Background: Crickets are *poikilotherms*; they are cold-blooded organisms whose internal body temperatures are regulated by the outside temperature. The surrounding temperatures directly affect their activities and metabolism. When the temperatures are warm, crickets become more active. One aspect of their behavior that is easy to examine is their chirping! In this lab, we will determine the number of chirps per second.

Purpose/Rationale: The purpose of this lesson is to determine how temperature affects the chirping frequency of crickets.

SOL's:
BIOL 5: TSW investigate and understand life functions of monerans, protists, fungi, plants, and animals, including humans. Key concepts include:
5.2: comparison of their metabolic activities.
5.3: analyses of their responses to the environment.
5.4: maintenance of homeostasis.

BIOL 8: The student will investigate and understand how populations change through time. Key concepts include:
8.3: recognizing how adaptations lead to natural selection.

Materials:
10 adult crickets
ice
thermometers
500-mL beakers
hot plates
black construction paper
small and large tongs
4 large containers (jars or terrariums)
plastic gloves (optl)
4 Vernier ULI Microphone
4 Vernier Logger Pro Software units

Temperatures: To monitor the cricket chirping, we will use 4 sets of temperatures in different areas. The temperatures will be 5-15° C,20-25° C,
30-35° C and 45-50° C. Each group will choose a different temperature. (At the end of the lab, we will put all of our temperature data together).

Safety: Safety goggles must be worn when boiling water.

Procedure:

Explore

Students will explore differences in temperatures by completing the lab and answering the following questions (in lab groups): What do you think will happen? What would be the outcome of the organisms were warm-blooded, instead? (30 minutes).

Explain

Students will prepare a graph of temperature vs. chirping per/s. Working in groups, they will answer the following question: What does your graph tell about the relationship between temperature and chirping? Students will present and explain their graph to the class. (20 minutes).

Elaborate

Students (and teacher) will participate in a class discussion about how cold-blooded organisms (*poikilotherms*) use the surrounding environment to heat up their internal body temperature, while warm-blooded organisms (*homeotherms*) are able to self-regulate their own body temperatures, without the outside environment. Also, what were some possible errors that may have affected the lab? If time allows, the students will discuss the outcome of the same experiment with different organisms and investigate the differences in chirping at individual life stages (this would be an extension lab, most likely performed in about class period) (20 minutes).

Evaluate

Standard	**Demonstration**	**Points**
SWBAT explain the difference between poikilotherms and homeotherms by explaining and giving examples of each.	Participation in group discussions and completion of entry in lab book.	**100:** Successfully participates within lab group and demonstrates understanding and knowledge. **50:** Does not successfully complete both tasks for 100 pt. total. **0:** Does not successfully complete any task or demonstrate any understanding or knowledge
SWBAT demonstrate proper laboratory procedures, including set-up, clean up and safety.	Cooperation in lab group, successfully answering class discussion questions and completion of entry in	

	lab book.	
SWBAT elaborate on what their graphs mean and how they used the information to make a conclusion.	In-class presentation of data collected and facilitating questions.	

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Demo: The Effect of Temperature on the Respiration Rates of Crickets

Background: Crickets are *poikilotherms*; they are cold-blooded organisms whose internal body temperatures are regulated by the outside temperature. The surrounding temperatures directly affect their activities and metabolism. When the temperatures are warm, crickets become more active. When they become more active, their bodies are better able to metabolize foods and break down sugars. When sugars are broken down in the presence of O_2, CO_2 is released. We will measure how fast crickets consume O_2 by how fast they produce CO_2.

Purpose/Rationale: The purpose of this demonstration is to determine the respiration rates of crickets.

SOL's:
BIOL 5: TSW investigate and understand life functions of monerans, protists, fungi, plants, and animals, including humans. Key concepts include:
5.2: comparison of their metabolic activities.
5.3: analyses of their responses to the environment.
5.4: maintenance of homeostasis.

BIOL 8: The student will investigate and understand how populations change through time. Key concepts include:
8.3: recognizing how adaptations lead to natural selection.
Procedure:

Engage

The teacher will engage students in learning about respiration by measuring how much CO_2 crickets produce! Building on the students' prior knowledge of cellular respiration, the teacher will perform a demo, showing how much CO_2 is produced when crickets are exposed to different temperatures. During the demo, students will be introduced to the Vernier Logger Pro Software, including set-up and graphing, in which they will use for their own lab. (20 minutes).