

Inquiry Lesson On Biodiversity
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I-Title- Cricket Adaptations

II-Summary- Students will observe crickets to determine what mating behaviors are noticeable.

III- General Goal- Students will observe that animals have adaptations that help them reproduce. They will also conduct a scientific investigation to study an adaptation they observe.

IV- Duration- Approximately 3 class periods:

- 1) During a 90-minute block the students will choose crickets from a tank.
- 2) Students will observe crayfish and discuss a research plan. They will conduct the experiment and plan a presentation
- 3) Present results of the experiment to the class and discuss the results.

V- Objectives-

Process goals- Students will learn to conduct an experiment and collect data about an adaptation of a cricket. They will learn to take care of animals and return them to the wild.

Content goals- Students will be able to state the different adaptations of cricket that help a cricket reproduce.

I have correlated this lesson to our new district objectives. Our district objectives are based on Project 2061 and a book called Benchmarks for Science Literacy.

Objectives appropriate for this lesson include:

P. 197 Investigations are conducted for different reasons, including to explore new phenomena, to check previous results, to test how well a theory predicts, and to compare different theories.

P. 197 Hypotheses are widely used in science for choosing what data to pay attention to and what additional data to seek and for guiding interpretation of the data.

P. 197 Scientists in any one research group tend to see things alike, so even groups of scientists may have trouble being entirely objective about their methods and findings. For that reason checking each other's research and explanations helps, but that is no guarantee against bias.

P. 202 Write clear, step-by-step instructions for conducting investigations, operating something, or following a procedure.

P. 205 Heritable characteristics can be observed at molecular and organism levels in structure, chemistry or behavior. These characteristics influence capabilities of an organism and how likely it is to survive and reproduce.

P. 222 The variation of organisms within a species increases the likelihood that at least some of that species will survive.

VI-Prerequisite Knowledge- (Vocabulary) Arthropod, hypothesis, adaptation
(Concepts) What is an adaptation? Why are they important?
Experimental procedures-hypothesis, control,
variable, data tables etc.
(Skills) Care and collection of live animals, careful observation, speaking to
the class

VII-Background Information-
(Description of organism investigated) Crickets have a number of adaptations that allow them to reproduce. Students will identify the gender of crickets and choose one male and one female. They will identify the ovipositor on the female. They may also view a video on animal reproduction prior to the lab.

(Tips on information) This should not be a lecture on crayfish.

(Questions) Students will want to know the parts of the crickets. A teacher should have determined if the students need to know parts and what parts are important. It may not even be vital that the students need to know the specific names of parts. A chart or diagram of a crickets may be helpful. Students will also want to know how to design their experiment. What should my hypothesis be? What should I do with the crayfish? How should I set up my experiment? Since part of the goal of this lab is to have the students learn experimental design teachers should be careful in answering these questions. A teacher should not give the students too much information.

VIII-Preparation for Lesson-

Materials required- nets, tanks for crickets, food for crickets, diagram or chart on parts of crickets

Preparation of materials- tanks or aquarium should be set up ahead of time. Water quality should be checked. Glass bowls covered with plastic wrap will allow for control of the crickets and observation.

Maintenance- A plan should be in place to release the crickets back to the wild. They could even be marked for a recapture experiment the following year. Students

should be prepared to take care of a live animal and understand that they are living things that need to be respected.

IX -Instructional Strategy-

Engagement-The students will choose one male and one female cricket. The students will make general observations of the cricket in the room.

Explore-The students will conduct the experiment they design with the crickets. The goal should be to focus on the mating behavior of the crickets.

Explain- Students will present the results of their experiment to the class. They would be required to display their data. The members of the class will provide feedback to the group.

Suggested student activities- Students will be meeting in groups to observe the crickets and complete a plan for their experimental design. Students will be conducting their personally designed experiment. The exact data the groups are recording will vary according to the design of their experiment. They will also meet with their groups to discuss how they will present their data to the class. The groups will present their data to the class. The other members of the class will be evaluating the presentations. On the final day of the unit the students will debrief the exercise. They can evaluate the experiments they completed and also discuss any other observations about traits of crustaceans that were missed the previous day.

Conclusions- Students will make both process and content conclusions as they complete this lesson. The first four objectives will help students clarify their ideas about scientific research, hypotheses and how to write up an experiment. The final two objectives if reached will lead students to the conclusion that all organisms (crickets in particular) have adaptations and characteristics that enable them to survive and reproduce.

X-Assessment-

During the experiment phase assessment would be by observation of the students and asking them questions (ex. What is that? What did you see? Why do you think it is that way? What is your hypothesis? How will you set up your experiment?)

They would also have to turn in a copy of the plan for their experiment. This plan would be reviewed by the teacher to check for any needed revisions. This also allows the teacher time to gather any equipment for the experiments the next day. This would be a formative assessment since the project was still in progress.

During the experiment phase and planning of the presentation observation and questions would be used to again monitor student progress.

During the final presentations, the students would be graded on the elements of their experimental design and knowledge of cricket adaptations. See rubric.

XI-Comments-

Over the summer I did not know that cricket observation was part of our new curriculum. I also got to this unit in the winter when it was hard to get outside to a place to find crayfish. Therefore, I change the original plan to observe crayfish to a plan to observe crickets. They were easy to obtain and easier to care for. I had visions of crickets jumping all over the room but I used dishes with plastic wrap to contain them and the kids cooperated very well. They weren't sure at first what they were supposed to look at but in the end the data and presentations were interesting.

Rubric for Cricket Experiment Presentations

| Criteria | pts possible | your score |
|---|--------------|------------|
| Project started with a question that could be tested | | |
| A hypothesis was stated that answered the question posed by the group | | |
| Data was collected and displayed in an organized manner | | |
| An accurate description of the adaptation for survival was given | | |
| Students used names for parts of cricket as appropriate | | |
| Students made observations of the natural habitat of the cricket | | |
| Students determined whether their hypothesis was supported or refuted by the research | | |
| Students described in detail the steps of their experiment | | |
| Students turned in evaluations forms for other groups | | |

Student Evaluation Form

Evaluator Name _____

1) Names of people in this group

2) Something new I learned from this group was:

3) I liked this presentation because :

4) One thing this group could have done different is :