

Invertebrate Diversity 2

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General Purpose: To engage students in a scientific study of some familiar and less familiar invertebrates and for students to gain, through this close-up look, a foundation for understanding ideas in biology and an awareness of the diversity of life.

Notes: In the preceding class, we looked at earthworms and beetle larvae. Through close examination, students discovered that these similarly shaped invertebrates are more different than they at first appear. The key differences they saw are that the beetle larvae have exoskeletons and legs, while the worms have neither.

This lesson is modeled on one found at: http://serendip.brynmawr.edu/sci_edu/waldron/. There are a variety of inspiring hands-on science lessons here and elsewhere on the internet.

Specific Objectives:

- *For students to look closely at different invertebrate species and observe interesting differences and similarities;
- *For students to become familiar with concepts and vocabulary related to classification of living things, such as *kingdom, organism, phylum, invertebrate, arthropod, etc.*;
- *For students to build a basis for their understanding of related biology concepts and vocabulary, such as *food chain, environmental niche, and ecosystem* (future lessons);
- *For students to practice and develop their critical thinking skills (analysis and inference) in a scientific context;
- *For students to be stimulated and inspired in their work towards a GED;
- *For students to recognize their own potential in the field of science.

Materials:

Tarantula, generously loaned by Big Fish/Little Fish, Somerville pet store
Crayfish, generously loaned by Petsmart, Cambridge pet store
Crickets, available at any pet store for nominal cost
Container to keep and view crickets (needs lid!)
Lab Report Form (see attached)
Vocabulary exercise (see attached)
GED practice questions (see attached)

Procedures:

1. Review previous lesson, "Invertebrate Lesson 1," through group discussion and questions. What is an invertebrate? How were the invertebrates we saw Monday similar and different from each other? Remind students that 95% of the organisms in the Animal Kingdom are invertebrates.
2. Prompt students to ask questions about today's organisms. Can they guess what creatures they will study today?
3. Give each student a lab report form ("Invertebrate Observation Lab") and explain that they will observe each animal, make a detailed drawing of it, and make notes of interesting observations and questions.
4. Set up separate viewing stations for each organism. Explain that groups of about four students will work at each station. Students may not all get to observe all animals today.
5. Circulate among students. What are they noticing? Are they looking closely? Are they making detailed drawings? What questions are they forming?
6. When students seem ready, discuss as whole group. Have students share observations and questions. How are the animals similar and different? Do all the animals have legs? How are their legs alike? Do the animals have exoskeletons? How is the earthworm different from all the other animals we've observed? Introduce the term *arthropod*, the largest *phylum* in the animal kingdom. Discuss molting.

Other questions to consider, depending on time and interest: What do you guess each animal might eat? What predators might they have? How would you guess they would defend themselves? What habitat might the animal prefer?

7. Have students complete the vocabulary exercise and GED Practice Questions or use to begin follow-up lesson.

Homework: Students will write an essay comparing and contrasting any two of the invertebrates we studied. The essay should be at least 3 paragraphs and should contain specific details about the animals. This is an opportunity for students to concentrate on sentence structure and grammar.

Assessment: Student comprehension and engagement will be continually assessed throughout the lesson through informal conversation and observation of each student's work and drawing. In addition, the essay will reveal how fully individual students have grasped the material.

Lab Report: Invertebrate Diversity

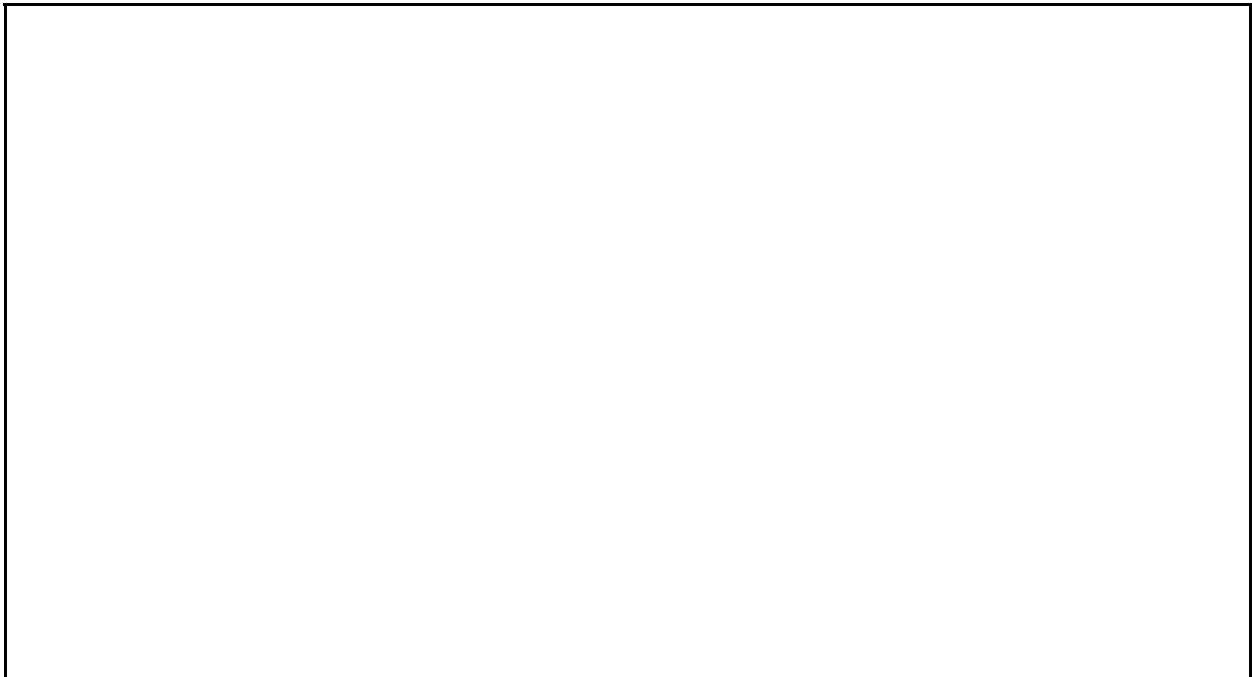
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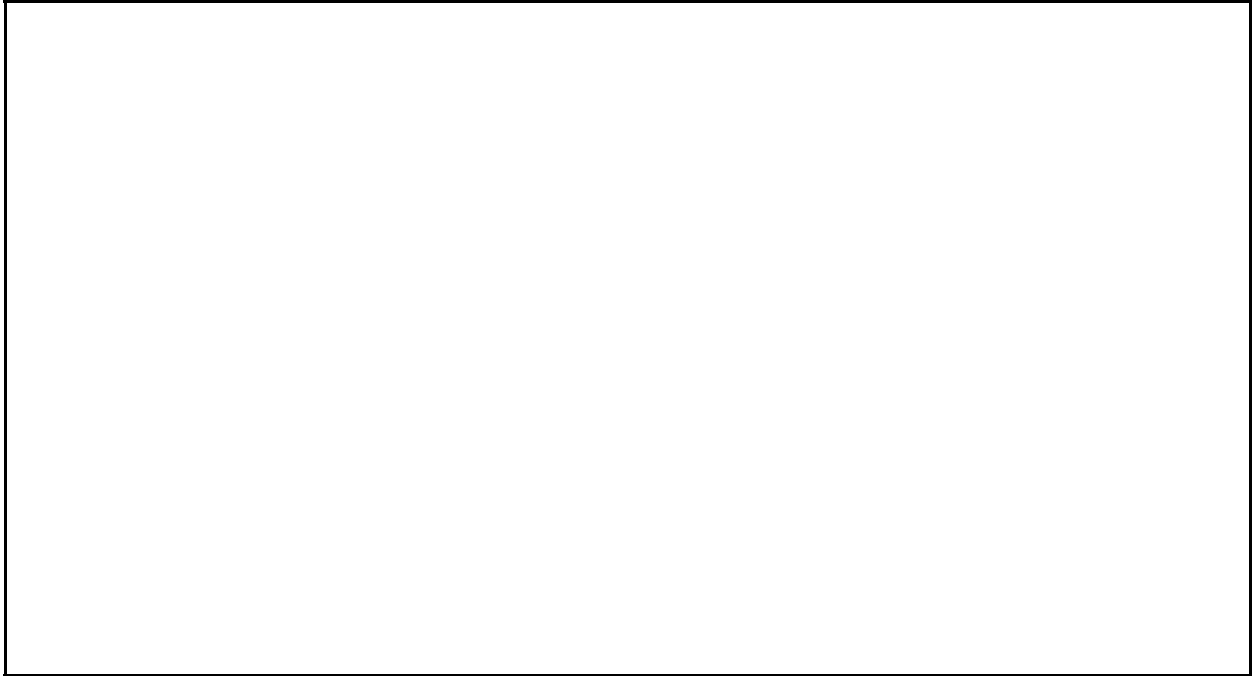
Science Activity: Crickets, Crayfish, and Tarantula

Closely study and make a large detailed drawing of each animal in the spaces provided. Record your observations and questions. Be sure to label your drawings and notes.

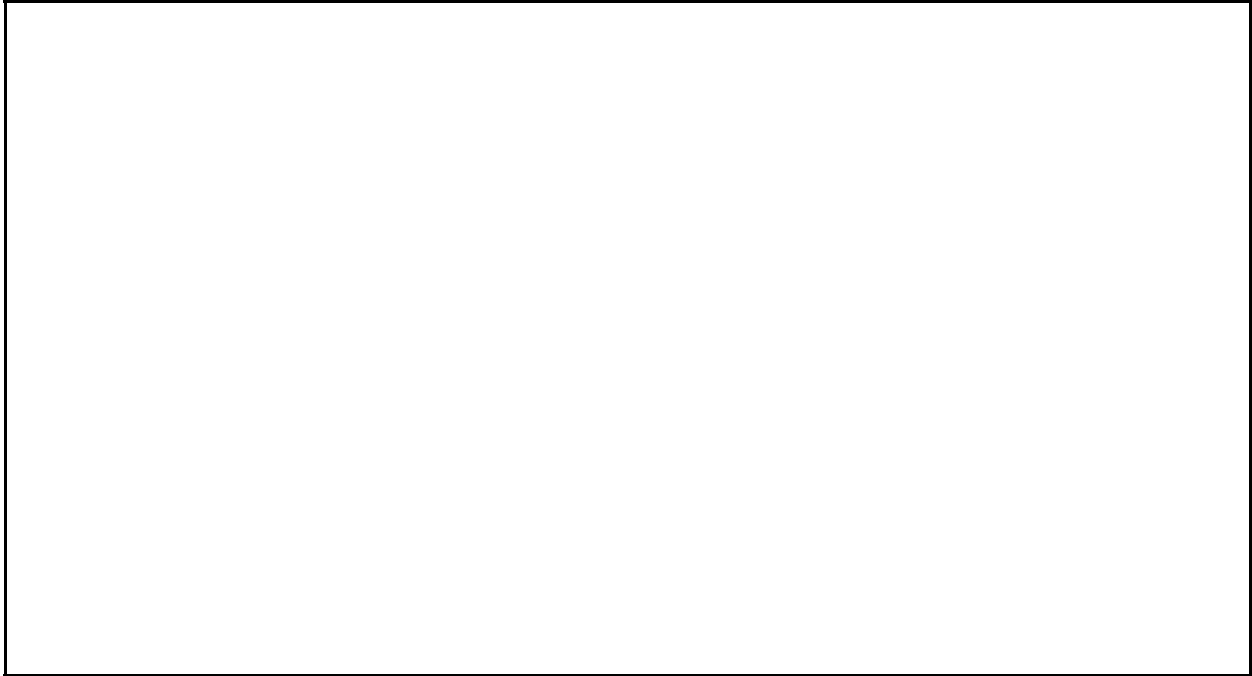
Think about: Does the animal have legs? How many? Wings or other appendages? Does it have eyes or antennae? How does it move? What does it feel like? Hard or soft? What else do you notice?



Animal #1: _____



Animal #2: _____



Animal #3: _____

Invertebrate Diversity: Some Vocabulary

Write the words below next to their correct definitions.

Arthropod **Insect** **Crustacean** **Arachnid** **Exoskeleton** **Molt**
Larva **Invertebrate** **Animal Kingdom** **Phylum** **Organism**

- _____ A small arthropod animal with six legs
- _____ The immature form of an insect
- _____ An animal lacking a backbone
- _____ A group of arthropods that usually lives in water
- _____ A rigid external covering for the body
- _____ A category of living things that can move and that are heterotrophic (can't make their own food)
- _____ A category of living things within a kingdom
- _____ An individual plant, animal, or single-celled life form
- _____ A class of arthropods that includes spiders, scorpions, and ticks
- _____ A large phylum of invertebrate animals that contains insects, crustaceans, and arachnids
- _____ To shed old hair, skin, or shell to make way for new growth

Definitions adapted from *American Oxford Dictionary*.

Invertebrate Diversity: GED Practice Questions

1. Almost all species of arthropods have exoskeletons, rigid outer coverings which provide structure and support to the body. In order to grow, an arthropod has to molt or shed its exoskeleton. This is because

- 1) a mature arthropod no longer requires an exoskeleton
- 2) the exoskeleton grows along with the rest of the organism
- 3) the exoskeleton becomes too small as the organism develops
- 4) a mature arthropod develops into a vertebrate
- 5) the exoskeleton becomes worn and damaged with time

2. Autotrophs are organisms that use sunlight to make food through a chemical process called photosynthesis. Heterotrophs cannot make their own food and have to rely on plants and other organisms for sources of nourishment. Which of the organisms below is an autotroph?

- 1) a tarantula
- 2) an earthworm
- 3) a crayfish
- 4) a dandelion weed
- 5) a cricket

3. As they grow through successive molts, crickets develop their wings; juvenile crickets do not yet have wings. Sexually mature adult males create chirping sounds by rubbing their wings together. This sound is one way that the males attract mates. Based on this information, you can infer that

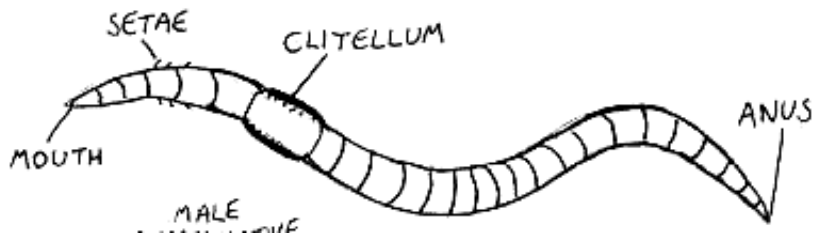
- 1) female crickets don't have wings
- 2) crickets are able to hear
- 3) female crickets are unable to hear
- 4) juvenile crickets chirp loudly
- 5) juvenile crickets chirp softly

4. After molting, an arthropod is vulnerable until its new exoskeleton hardens. For this reason, pet stores advise owners of tarantulas

- 1) to feed their pet immediately after molting
- 2) to toughen the new exoskeleton by handling the organism
- 3) to prevent molting at all costs
- 4) to stimulate molting with high-vitamin nutrition
- 5) not to feed the animal as even a cricket could cause injury

5. Crayfish are freshwater crustaceans. They are closely related to

- 1) lobsters
- 2) mussels
- 3) tarantulas
- 4) scorpions
- 5) earthworms



6. Earthworms perform an essential role in the ecosystem by digesting bacteria and aerating and loosening the soil, thereby improving its fertility. Above is a diagram of a mature earthworm. Based on this diagram, you can infer that

- 1) the earthworm is identical at both ends of its body
- 2) the clitellum aids the earthworm in its undulating movement
- 3) the earthworm has a digestive system
- 4) the setae enable the earthworm to capture prey
- 5) the setae enable the earthworm to defend itself from predators