

Invertebrate Diversity

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Vertebrates are animals that have a backbone. For example, you are a vertebrate.

Invertebrates are animals that do not have a backbone. For example, an earthworm is an invertebrate.

1. Give some other examples of vertebrates and invertebrates.

Vertebrates	Invertebrates

Today, you will observe four types of invertebrates: earthworms, mealworms, crickets and crayfish. At the end, you will compare these invertebrates with some familiar vertebrates.

This chart shows the classification of these animals. (Some information has been omitted to keep things simple.)

Phylum	Subphylum	Class	Name
Annelida			Earthworm
Arthropoda		Insecta	Mealworm
			Cricket
			Crayfish
Chordata	Vertebrata	Mammalia	Dog
			Cat
			Human

2. All vertebrates are in the phylum _____.

Are all invertebrates in the same phylum?

How do you know?

3. The term "**worm**" is a description of an animal's body shape. A worm has a long thin body. Are all worms in the same phylum?

How do you know?

Today, at one station you will compare earthworms and mealworms, and at another station you will compare crickets and crayfish. **Do not touch** the animals, except as directed by the instructions.

¹ Teachers are encouraged to copy this student handout for classroom use. A Word file (which can be used to prepare a modified version if desired), Teacher Preparation Notes, comments, and the complete list of our hands-on activities are available at http://serendipstudio.org/sci_edu/waldron/. Additional biology activities are available at <http://serendipstudio.org/exchange/bioactivities>.

Comparing Two Worms

Observe the external appearance and behavior of the earthworms and mealworms. You are encouraged to handle them, but please **be careful and don't handle them too roughly**. Turn them over and check out what's underneath. Look at them with a magnifying glass, hand lens, or dissecting microscope.

1. Complete the table.

Name	Symmetry	Other aspects of body form			Other Observations
		Legs?	Eyes/ antennae?	Hard Surface?	
Earthworm Phylum: _____					
Mealworm* Phylum: _____					

*A mealworm is a larva of a Darkling beetle. A mealworm turns into an adult beetle the same way a caterpillar turns into a butterfly.

2. Comparing the earthworm with the mealworm, what differences do you notice in appearance and body form?

3. Measure the length of the same earthworm several times. _____

Is the length of an earthworm always the same or does it change?

4. Describe how the earthworm moves. Is there a relationship between your observations for question 3 and how the earthworm moves?

5. Notice the differences in how the mealworm and earthworm move. How does the mealworm move?

Crickets and Crayfish

Observe the external appearance and behavior of the crickets and crayfish. You can pick up the container to examine the crickets, but **do not open the container**. You can gently prod the crayfish or turn them over (in the water).

1. Complete the table.

Name	Symmetry	Other aspects of body form			Other Observations
		Legs?	Eyes/ antennae?	Hard Surface?	
Cricket Phylum: _____					
Crayfish Phylum: _____					

2. Describe the differences between the cricket's back pair of legs and the front two pairs of legs. How does each pair of legs help a cricket move?

What is one other way that crickets can move?

3. Do there appear to be more sensory organs at the front end or back end of the crayfish?

Why is this location for the sensory organs useful?

4. How does the crayfish move forward?

How does the crayfish move backward?

Does the crayfish move faster when going forward or backward?

When would the fast motion be useful?

5. What are two functions of the hard outer surfaces of crickets and crayfish?

Follow-up Questions

1. Vertebrate animals (e.g. dogs and cats) and all of the invertebrate animals you observed have _____ symmetry, with a concentration of sensory organs at the _____ end.

Explain why this type of body form is useful for these animals.

Give an example of an animal with a different type of symmetry.

What type of symmetry does this animal have?

2. What parts of a human's body have the same function as the hard outer surface of arthropods?

Where are these parts located in humans?

3. Use the animals in the following list to complete the second column of the table:
cats, crayfish, crickets, dogs, earthworms, humans, mealworms
Next, complete the third column of the table.

Type of Skeleton	Animals that have this type of skeleton	Phylum these animals are in
Skeleton on <u>outside</u> of animal*		
Skeleton <u>inside</u> the animal		
No skeleton		

*The hard outer surface you observed on some of the animals is a skeleton on the outside.

Your completed table should show that one characteristic that distinguishes different phyla is the type of skeleton they have.

4. Earthworms and mealworms have a somewhat similar appearance since they both have a long narrow body which is useful for burrowing through soil (earthworms) or grain (mealworms). Does the similar appearance of earthworms and mealworms mean that they are closely related evolutionarily? ___ yes ___ no

How do you know whether earthworms and mealworms are closely related evolutionarily?

5. Which of the animals you studied today has no eyes?

Which has very small eyes?

How do you think the absence or very small size of eyes relates to where these animals live and how they find food?

6. Fill in the blanks with the best matches for the pair of animals shown (one match per blank).

mealworms and earthworms _____

mealworms and crickets _____

- a. both burrowing animals
- b. both in the same phylum
- c. both have a hard outer surface
- d. both have a long narrow worm-shaped body
- e. both have legs
- f. neither has big eyes

Notice that some similarities are due to shared evolutionary history (animals in the same phylum) and some similarities are related to having a similar lifestyle (burrowing animals).