Lesson 1: *What is an Arthropod?*

THE LESSON AT A GLANCE

Students:

- Discuss classification.
- Examine specimens of arthropods to look for characteristics they have in common. Record data.
- Develop a working definition of the term arthropod.
- Classify the Backyard Invertebrate Cards; sort for arthropods.

RECOMMENDED TIME: 2 Class Sessions

MATERIALS

Journals
16 Hand lenses
5 Millipede specimen slides
5 Darkling beetle specimen slides
5 Pillbug specimen slides
*Chart paper and markers
*Resource materials, including a dictionary and an encyclopedia, tradebooks and textbooks, field guides, and posters
*Microscopes, if available
*Rulers
***Teacher Provides These Items**

GETTING READY

1. Students may want to look up information about terms such as kingdom, phylum, arthropod, and insect. Provide a good dictionary and/or an encyclopedia as well

as other appropriate resources for this activity.

2. Try to obtain one or more microscopes for students to use throughout the unit. Many identifications and analyses are based on very small visual characteristics. This is a good opportunity to practice using the microscope, and to practice making drawings from images seen through the lenses.

3. On the board or on a piece of chart paper, write out the following diagram in the traditional step-wise fashion:

Kingdom
Phylum
Class
Order
Family
Genus
Species

THE INVESTIGATION

1. Let students know that they are about to begin a study of insects that will include many different topics, such as insect anatomy, life cycles, and the structures insects build. But first, it is important to review how insects are classified and to figure out where they fit in the world of animals. Open a brief discussion on the classification system by focusing attention on the chart you have prepared. Ask:

- What does this diagram represent? (Students will probably recognize that it represents the classification system.)

HOW ARE HUMANS CLASSIFIED?

Kingdom Animalia
Phylum Chordata
Subphylum Vertebrata
Class Mammalia
Order Primate
Family Hominidae
Genus Homo
Species sapiens

Discuss classification.

Then fill in the first three categories as follows:

Kingdom Animalia
Phylum Arthropoda
Class Insecta

Now ask:

- There are two languages used in the classification system. One is English. Do you recognize the other one? (Students may or may not know it is Latin.)
- Why do you think scientists use Latin names for organisms? How does it help them communicate with each other?
- Look at the word Animalia, which is pretty obvious. We are going to be studying animals. But what does Arthropoda mean? How could you find out?
- How does Class Insecta relate to Phylum Arthropoda? Are insects a smaller or a larger category of animals?

Note: Keep the chart posted. Students will later add their definitions of arthropod and insect.

Examine specimens of arthropods to look for characteristics they have in common. Record data.

2. Divide the class into five teams. Distribute the preserved arthropod specimens, hand lenses, and measuring tools. Ask students to draw and label the three specimens, and to record their observations in their journals. Their objective is to search for observable similarities, the attributes that arthropods have in common. These will give us clues about why they are classified in the same phylum.

JOURNAL PROMPT

- On the blank page, draw each arthropod. Label as many of its parts as you can. Take measurements and record them on the drawing.
- On the lined page, write a brief description of each animal.
- What do all three animals have in common? What characteristics make them arthropods?

MANAGEMENT TIP

Whenever journal prompts are provided, they are intended as suggestions and guidelines. Feel free to modify the prompts to suit your own students. To help students focus, provide a visual display of the prompts, perhaps on the board, an overhead, or on chart paper.

As students work, encourage them to use the microscopes (if available). When they have completed their observations, allow them to use the resources you have provided, such as dictionaries and encyclopedias, tradebooks, texts, and field guides.

CHECKPOINT: Recording Skills

- The three arthropods are difficult objects to draw and require complex written descriptions as well as very fine measurement. Take note of how much effort students expend. Notice whether the descriptions are complete and accurate, and whether the drawings are an honest attempt to record what students actually observed.
- Also notice how well students organize their data. It will be important for them to be able to retrieve and analyze the data in coming lessons.
- Acknowledge that these are difficult tasks, and reassure students that they will improve with practice. Offer coaching to students who seem to be struggling.

3. When students have completed their observations, hold a discussion on their findings. Ask:

- How are these three organisms alike? What characteristics do they have in common?
- Based on your findings, how would you define the term arthropod? Record students' definitions on the chart, next to Phylum Arthropoda.

Note: Students' definitions should include these elements: An arthropod is an animal without a backbone (spineless animals are also called invertebrates), with a hard outer skeleton (or exoskeleton), a segmented body, and paired jointed legs.

- What are the advantages of having an exoskeleton? What does an exoskeleton provide for the animal?
- Are there disadvantages to having an exoskeleton? How does it limit the animal?

Develop a working definition of the term arthropod.

THE PURPOSE OF CHECKPOINTS

Checkpoints are included as an invitation to the teacher to pause for a moment and consider "How are we doing so far?" They are a way for the teacher to think about how the class as a whole is progressing, and to make adjustments in teaching or offer coaching. Individual student assessments are provided at the end of Investigations.

Classify the Backyard Invertebrate Cards; sort for arthropods.

UNKNOWNS

Students may want to establish a category for creatures about which they have questions. It would be useful to record their questions and make them a focus of further research. Students may also find that, as the unit progresses, they will discover their own answers to these questions.

WORMS AND OTHERS

The worm is included for a purpose: to help get out students' prior knowledge about larval stages of insects. Maggots, grubs, and caterpillars are all insect larvae, but are often confused with worms because of their soft, segmented bodies and their sometimes-inconspicuous legs. Please see Investigation 2 for more complete information on insect larvae. Also see *A Guide to Backyard Invertebrates* for more information about worms, grubs, maggots, and caterpillars.

4. Distribute the Backyard Invertebrate Cards, one set to each team. Based on the definition they have developed, ask students to sort the Backyard Invertebrate Cards into two or possibly three categories: arthropod, non-arthropod, and (if questions arise) unknown.

Discuss students' classification and the reasons they sorted the animals the way they did. If possible, have students leave their sorted cards in the two or three piles they constructed so they may return to them later.

5. Revisit the chart and the definitions students developed for the term arthropod. Ask if they want to make any additions, deletions, or corrections to their definitions.