



Growing the Future by Teaching Children in the Gardens

granny@grannysgardenschool.org

20 Miami Lane, Loveland, OH 45140
www.GrannysGardenSchool.org

513-324-2873

Crustaceans in the Garden Grade Four

Lesson Summary

When to use this lesson

Use this lesson in early spring to observe pillbugs and sowbugs.

Objective

Students will understand how pillbug and sowbug characteristics help them live in their environment.

Standards

S4L2. Students will identify factors that affect the survival or extinction of organisms such as adaptation, variation of behaviors (hibernation), and external features (camouflage and protection).

- a. Identify external features of organisms that allow them to survive or reproduce better than organisms that do not have these features (for example: camouflage, use of hibernation, protection, etc.).

Materials

- Compost thermometer to measure soil temperature
- Air thermometer
- Collect pillbugs and sowbugs in advance for students
- Worksheet for each student
- Clipboard for each student
- Pencil for each student
- Enough bug boxes, plastic plates, or Frisbees for the number of groups you will have
- Dark sided container and lid
- Dry leaves and damp leaves
- Magnifier for each student

Estimated Duration

30 minutes

Activity

- Collect pillbugs in advance. Plan the number of groups you will have and have at least one pillbug and sowbug per group. If you have more than a 30-minute class, allow time at the start for students to locate pillbugs/sowbugs.
- At the start of the class, set up a dark container with dry leaves at one end and damp leaves at the other end. Place several pillbugs and sowbugs inside. Put a dark cover on top. You will refer to this during the activity and check inside at the end.
- Students will study garden crustaceans. What are some examples of crustaceans? Lobsters, crabs, and shrimp. Do they live in the garden? Students will study crustaceans called

isopods. We have two kinds in the garden, pillbugs and sowbugs. There are thousands of species of isopods. Some live in water. Some live on land.

- Where do our isopods live? In the ground. Do you think they prefer wet or dry soil or that it doesn't make any difference? We'll test this by using a bin of wet and dry leaves. Later in the class, we'll look inside to see which side has pillbugs or if both sides have pillbugs.
- First, we'll examine pillbugs and sowbugs to understand how their body parts help them live in the ground.
- Divide pillbugs and sowbugs among the student groups using bug boxes, plates, or Frisbees. Use the worksheet as the basis for your discussion.
- Draw a picture of a pillbug or sowbug as you discuss the parts and how the parts help the animal live.
- What shape is a pillbug/sowbug? Oval. Start with the shape, and then begin discussing the traits in the table. If there is a corresponding word for the trait in the diagram box, draw a line from the word to the body part.
- Can you see the mouthparts? Try a hand lens. Even if you can't see them, discuss them.
- Discuss the color. How does color help an animal live?

What are some traits that help pillbugs and sowbugs live in their environment?

Trait	How it helps pillbugs and sowbugs live
Exoskeleton	<p>The exoskeleton helps keep moisture in the body. Sowbugs and pillbugs have gills-like parts for breathing that are located on the underside of the abdomen. The gills must stay moist for them to breathe. Pillbugs and sowbugs often group together in moist areas underground to reduce evaporation of water from their bodies.</p> <p>Pillbugs and sowbugs molt their exoskeleton about every four weeks as they grow. Molting means that the exoskeleton is shed from the body as the body grows. The back half is shed first. Then, the front end sheds. Pillbugs and sowbugs eat the molted exoskeleton, which is filled with calcium. The calcium in turn helps to strengthen the new exoskeleton.</p>
Segments	Segments help pillbugs and sowbugs to move and bend
Antennae	Antennae help to sense what is nearby. Pillbugs and sowbugs have two pairs of antennae, which means they have a total of four. Only one pair can be seen.
Eyes	Two compound eyes result in blurry vision, but help pillbugs and sowbugs avoid predators by catching images in their field of vision.
Legs	Pillbugs and sowbugs have seven pairs of legs, which means 14 total. The legs are jointed and help the animals to avoid predators, dig, move, climb.
Mouthparts	Pillbugs and sowbugs have four pairs of mouthparts that are used for chewing and rasping (grating). Pillbugs and sowbugs eat mostly dead plants and animals and come out at night so they don't dry out, as they might during the day. Pillbugs and sowbugs are important in nature to help break down dead plants and animals and return their nutrients to soil. Their square shaped frass emerges soon after eating, and then they might eat the frass.
Gray or brown color	Pillbugs and sowbugs are generally the colors found in soil to avoid predators by blending with its environment.

How can you tell the difference between a pillbug and a sowbug?

Pillbug	Sowbug
Rounded body	Flatter shape
No visible tail-like parts	Two visible tail-like parts at end of body that act like feelers and may be used in defense
Rolls into ball	Does not roll into ball, but might make a "c" shape
Has a difficult time flipping from back to legs	Easily flips from back to legs
No foul substance	Bad-tasting and bad-smelling substance given off when threatened

- Discuss the differences and have students circle the kind of isopod drawn. If students are just noticing the tail parts, the tails should be drawn on the diagram.

More Facts about Pillbugs and Sowbugs

- Female pillbugs and sowbugs carry their eggs in a pouch on the underside of their body. Baby pillbugs and sowbugs are born in a burrow and look like small, white versions of the adults. The male stays to help collect food, clean the burrow, and protect the burrow.
- The babies only have six pairs of legs when they are young. After the first molt, the seventh pair of legs develops. In about a year, the pillbugs and sowbugs are adults. The pillbugs and sowbugs in our area live two to three years.
- High humidity helps them. When humidity is high, the air feels wet from water vapor. If the air is high in humidity (87%), pillbugs and sowbugs are able to absorb water vapor from the air.
- Pillbugs and sowbugs spend winters in a dormant state in protected areas around buildings, trees, and compost piles.
- Scientists believe that isopods that live on land are from Europe and that their spread across our country is helped by movement of lumber to different locations.

Sources

- Tokuda, Yukihsa. *I'm a Pill Bug*. La Jolla, California: Kane/Miller Book Publishers, Inc., 2003.
- Wright, Jonathan, PhD. "Pillbugs". Department of Biology, Northern State University. Reviewed Nels H. Troelstrup, Jr., Ph.D., South Dakota State University. 1997. 24 March 2013 <<http://www3.northern.edu/natsource/INVERT1/Pillbu1.htm>>.
- "Sowbug/Pillbug". Animal Fact Sheets, Woodland Park Zoo. 24 March 2013. <<http://www.zoo.org/page.aspx?pid=1924>>.
- Newton, Blake. "Kentucky Sowbugs". Kentucky Critter Files, University of Kentucky Department of Entomology. 21 April 2008. 26 March 2013. <<http://www.uky.edu/Ag/CritterFiles/casefile/relatives/sowbugs/sowbug.htm>>.
- Pillbug photo: Pestworld for Kids, National Pest Management Association, <<http://www.pestworldforkids.org/pillbugs.html>>, 09-27-09.
- Sowbug photo: W. Robert J. Funnell, Photographs of Invertebrates, <<http://audilab.bmed.mcgill.ca/~funnell/photos/>>, 03-14-09.



Crustaceans in the Garden – Grade One

Name: _____

Draw a picture and connect the body part.

exoskeleton	segments	antennae
tails	legs	eyes

Is your picture (circle one)



a pillbug



a sowbug

What condition did the pillbugs and sowbugs in the box prefer? Circle the result.

dry

wet

no difference

In science, we learn that animals only live in environments that meet their needs. Today, we learned that pillbugs and sowbugs are types of crustaceans. We studied them to understand how they are able to live in soil. Ask your student how their body parts help them live. Email granny@grannysgardenschool.org to join us for our next gardening experience!