TAKE A PILLBUG TO LUNCH!

Objectives

- To learn about a common backyard Arthropod.
- To consider the relationship between the needs of an organism and the components of its preferred habitat.
- To provide a memorable experience in "inquiry-based" learning.
- To use the experience of investigating a small, unusual-looking animal to promote a sense of wonder, appreciation, and respect.

Materials

- Pillbugs (can be obtained under logs and rocks in moist areas) or from some Universities, Zoos or Science Centers with living collections – often they can be found in the soil of moist, outdoor enclosures
- Open-topped container
- Soil
- large newsprint or mat board
- marking pens
- Small pieces of decaying wood
- Some pieces of potato
- Various other materials, depending on the scope of your project

Background

Pillbugs are Arthropods with ten legs of the same size. Their scientific group name is *Isopod*, meaning "same sized legs." Though often considered "bugs" or insects, these animals are actually Crustaceans. They are more closely related to *lobsters* than ants! Since they are terrestrial (live on land), there are some major differences between them and their marine cousins. But they still like moist, dark places. There are also aquatic Isopods. Some live in the fresh waters in New England.

Isopods do not bite.

Isopods are scavengers. This means they eat things they find laying around on the ground. They typically do not eat living animals, though they will feed on living plants sometimes. Usually, they wander around till they smell something good with their antennae (how many do they have?), and then they eat it. In captivity, Isopods like moist foods, such as various vegetables and fruits. They also need their diet supplemented with dog food or some other source of protein. In the wild, they get their protein from eating dead animals.

Scavengers play an important role in the natural ecosystems where they live. They are the *recyclers*. When an animal dies, or a tree falls, all of the nutrients it has converted into its food and its body are trapped. Trees growing nearby cannot reach out of the soil and get those nutrients to make more food. So the system needs a way for the nutrients to get out and back into the soil. This is where the recyclers come in.

When a scavenger eats a dead organism, it digests it. This reduces all the nutrients to usable sizes. The scavenger uses some of the nutrients while the others become waste. When the scavenger gets rid of the waste (poops!), the nutrients get back into the ground to be taken up by

a tree and made back into food (an apple, for instance!) This is a singularly important process for life to survive on Earth since the plants, using the nutrients from the ground, convert the sun's energy into food living things can use.

The following activities consider some of the things Isopods look for when choosing their habitat. These activities can be formulated into an effective, inquiry-based learning experience. Depending on the level of the students, it also can help encourage scientific thinking and procedures. With proper assistance, students will assume a scientific approach naturally and will find answers to many of their questions.

Procedures

Keep Pillbugs for Observation
If you chose to have some Pillbugs visit your classroom for a short while, you can easily set up a container to keep them as happy as a captive can be. You might want to vary the level of the soil and place a piece of bark or wood on top so they can chose from a variety of places to live. Add the food on the lid of a small jar, and mist the habitat every couple of days. Don't make it too wet!

After you have learned about the Pillbugs, take them back to their real homes. Be sure to formally "thank" them for visiting!

Isopod Science
Your Isopod observations should lead the students (with your guidance) to a number of different questions about these animals. Let them brainstorm a long (the longer the better) list of these questions on the board. No holds barred here. Every question is acceptable.

When the list is real long, go back through it with the class and determine which questions can be answered by simply observing the Isopods, which can be learned with an experiment, which can be found in a book, and which questions cannot be answered but merely speculated upon. Then only consider the list of questions which could be answered with an experiment. Discuss with the class one of the more unlikely ones to explore a method of designing an experiment. Some important considerations:

"How could we answer this question with an experiment?"
"What materials would we need?"
"How long would it take?"
"Could we be sure we answered the right question when we were done?"

You should be able to find the "intellectually honest" level of your class and tailor this part of the procedure to them. The idea is to get them thinking about how to set up a scientific test to try to answer a question. Here are some examples of reasonable questions to test:

Do Pillbugs prefer light or dark?
Do Pillbugs like dry soil or wet soil?
What type of cover do they prefer?
How fast can they move?

There are many others, but the idea is to have simple questions which have easy to understand answers. Usually a dichotomy (choice of two options) is the best type of question. ***Don't suggest***

questions! Give the students time and encouragement. They will think of plenty questions. You might want to pepper their suggestions with yours to keep the ball rolling.

Have the students work in groups of 2-4 and assign them (or let them choose) one of the experimental questions. *Remember to have them make predictions*! Have lots of materials available and tell them to work together and figure out an experiment that will answer their question. Some possible materials:

aluminum foil		soil
cotton		egg cartons
plastic wrap		fabric scraps
trays		pebbles
shoe boxes		sliced potatoes
paper towels		apples
water		other food-type stuff

Allow plenty of time for the students to set up their tests and collect data. You will need to guide younger students through the activity. If they are not ready to do this on their own, you might want to have them help you set up one or two simple designs. You can demonstrate the way scientists work to young students and, if you explain things in simple enough terms, they will get it.

Once everyone has completed their tests, have them write up their findings, including a description or drawing of their procedure, on a large piece of newsprint or mat board. Have the groups take turns presenting their projects to the rest of the class. You can play this part up a lot and make it into the *Isopod Scientific Conference*. What incredible feats have these animals achieved? It is important to have no more than 5 groups or the others will lose interest in the presentations. They learn as much from watching others as they do from their work!

After the presentations, compliment the students on their work and summarize the findings. Did any of the results surprise anybody?

Be sure you save time to clean up after the experiments and make some kind of arrangements for the Pillbugs - either set them free, or place them back in their terrarium.