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What lives in the soil?

Teaching and Learning Focus

In earlier investigations in this soil unit, students mostly focused on the inorganic parts of the soil profile. In this investigation, students will observe some of the living things in soil.

Materials Needed

For each group of four students:

- hand lenses
- plastic tweezers
- flat wooden sticks
- small plastic cups
- 3 foam trays
- markers to label trays
- non-latex disposable gloves
- newspapers to cover tables
- posterboard to make a soil organism web
- samples of freshly dug garden soil containing earthworms and other organic items

Safety

This investigation is considered generally safe to do with students, but they should wear non-latex disposable globes and must wash their hands when they finish. As always, please review the investigation for your specific setting, materials, students, and conventional safety precautions.

Setting the Scene

To set the scene, bring in a soil sample that includes several earthworms and other visible organisms (including plant material such as roots). While students look at the new sample, tell them that their task will be to find clues that there are both living things and recently living things in the sample.

Presenting the Investigation Question

After the scene is set, introduce your students to the investigation question: "*What lives in the soil?*"
Tell your students that they will be investigating this question and that at the end of their investigations, they will be able to provide reliable answers.
Have your students brainstorm ideas about how this investigation question could be investigated.

1. Design an experiment that could be used to test the investigation question.
2. What materials would be needed?
3. What would you have to do?
4. What would be measured?
5. How long would the experiment take?

Assessing What Your Students Already Know

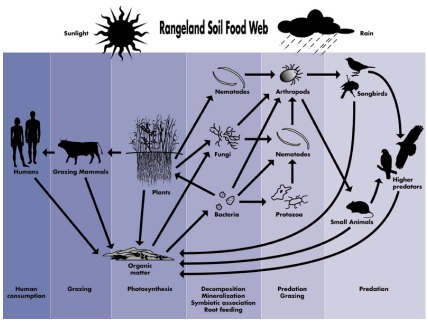
Have students think about the material that floated on the top of the water when they separated soil in an earlier investigation.

What did they notice when they observed the floating material? [*It looked like pieces of wood, leaves, etc.*]
Ask students to suggest the names of organisms that live in the soil. Plants will be the most obvious. Ask them if they have ever noticed other things growing in and moving around in the soil. What do they think animals moving in the soil would find to eat? Ask them if they think that the animals and plants that live in the soil are good or bad for the soil. [*Students might think that insects and worms harm the plants growing there.*]

Exploring the Concept

1. Hand out a set of supplies to each student group. Ask them to label their foam trays as “Animal”, “Plant” and “Not Sure”.
2. Cover each work table with newspapers, and place a mound of freshly dug soil from a mature garden or woodlot in the center of the table.
3. Tell the students that they will have a certain amount of time (20 minutes or more, if possible) to examine the soil sample and remove traces or actual living things from the sample. As they take out each item, they should place the item on the foam tray on which they think the item belongs.
4. Demonstrate by teasing out a bit of soil in which you find a bit of leaf material. Place it on the tray marked “Plant”. If living animals are present in the sample, students may place them directly on the animal tray, or the may capture them in the small plastic cups for temporary viewing.
5. When students are finished investigating their soil samples, ask them to bring their findings to a front table and group the trays. Ask students to help each other to move “Not Sure” items to either the plant or animal trays. What category is represented by most of the material? [*plants*]
6. On a journal page, ask students to describe the activity. Ask them to write down what features helped them to identify small bits of material as either plant or animal.

Applying Students' Understanding



Suggest that students make a poster display showing the web of living things that they found in their soil samples and how they think these are related to one another. To do this, they will need to find more information about the various types of life found in the soil community. You might assign research topics to each group, e.g. “Find out what kinds of insects live in the soil and what they do for the soil community.”

Revisiting Investigation Question 5

Complete this investigation by asking your students to reflect on the investigation question and how their answers may have changed as a result of what they have learned. Ask them why they think it’s important to know what living things are in soil. Remind the students that many different soil organisms benefit the soil by aerating it and adding nutrients.

Digging Deeper

Soil organisms come in all shapes and sizes—microscopic forms include varieties of bacteria, fungi, algae, and protozoa; macroscopic forms include insects, worms, and even burrowing mammals and reptiles. Students will be surprised to hear that there are many more living things in the soil than those they found while examining their samples. In fact, healthy soil is loaded with life. One estimate is that a hectare of soil supports about 20,000 kilograms of living things, approximately equal to the weight of 40 horses. (Non-living organic matter is present at about 20 times this amount!)
But if we can’t see these living things, how do we know they are there? In fact, their presence can be detected by many of the clues they leave behind as they go about their activities. Like nearly all living things, soil organisms provide an important

chemical clue that they are alive and breathing. They exhale or simply give off the chemical carbon dioxide—a chemical that is easily detected in water by use of an *indicator*. The more carbon dioxide present, the more living things are present in the soil.

Soil Unit Sections
