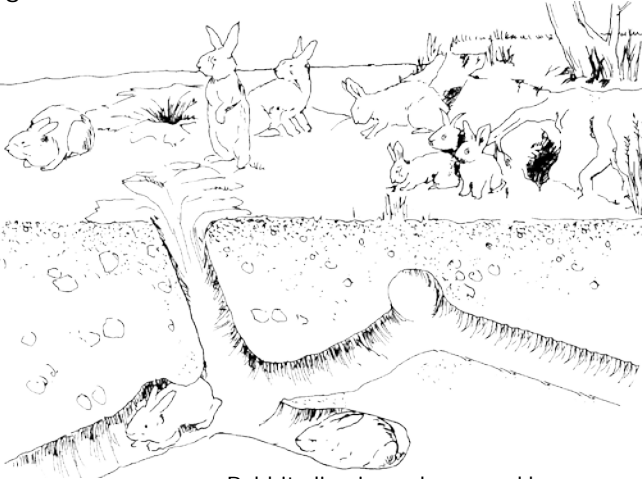


# SOIL LIFE Science Page

The soil is home for billions of living things. They are working all the time, helping to create healthy soil for growing plants.

## ANIMALS

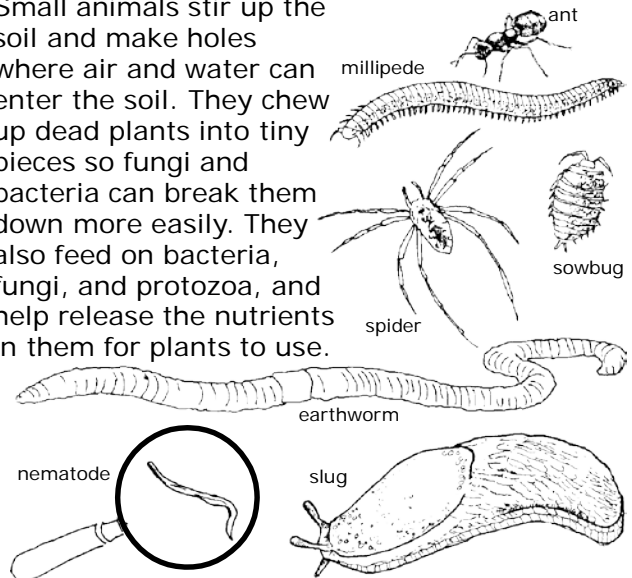
Animals, such as rabbits and moles, dig holes and help mix up the soil. Their tunnels let air reach plant roots, let water drain through soil, and provide spaces where plant roots can grow.



Rabbits live in underground burrows.

## SMALL CREATURES

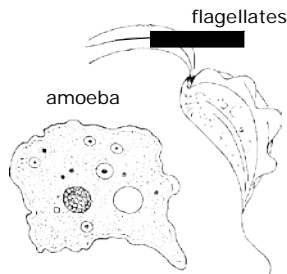
Small animals stir up the soil and make holes where air and water can enter the soil. They chew up dead plants into tiny pieces so fungi and bacteria can break them down more easily. They also feed on bacteria, fungi, and protozoa, and help release the nutrients in them for plants to use.



Nematodes are tiny worms that you can barely see. Their wastes are rich in nutrients that plants can use.

## PROTOZOA

Protozoa are tiny organisms that can only be seen with the aid of a microscope. When they feed on bacteria, fungi, and other protozoa, they release nutrients that plants can use.

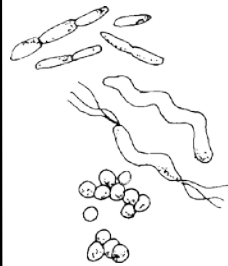


## BACTERIA

One teaspoon of topsoil may contain 50 million one-celled bacteria! They help to break down dead plant and animal matter. In doing so, they release nutrients for use by other microbes, small animals, and plants.

Bacteria are shaped like rods, spirals, and spheres.

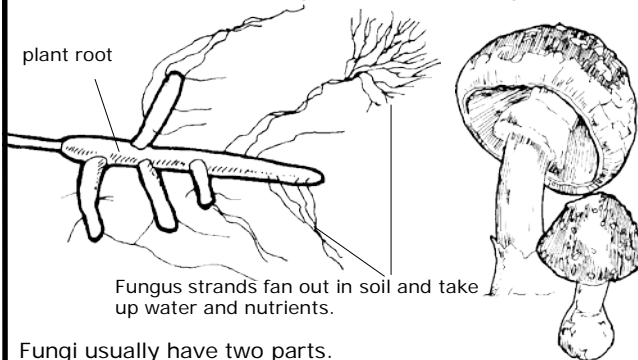
Nitrogen-fixing bacteria can take nitrogen gas from the air, and convert it into a form that plants can use to grow. Some of these bacteria live in nodules on the roots of beans, peas, and other plants called "legumes."



nodule on pea plant

## FUNGI

Fungi start the decay of fresh organic matter. They soften up plant matter, and make it easier for bacteria to join in the decay process.



Fungus strands fan out in soil and take up water and nutrients.

Fungi usually have two parts. Their thin, thread-like strands grow in soil, rotting logs, and roots. In some fungi, the strands spread from the roots through the soil. In this way, the fungi help plants get nutrients from the soil.

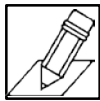
The underground strands are connected to the mushrooms you can see growing on top of the soil. The mushrooms contain the spores that reproduce the fungi.

## HELPING SOIL LIFE

You can help provide soil life with food, water, and air. When their needs are met, soil organisms will grow and multiply, and keep your soil healthy.

Add organic matter to the soil, and use organic mulch on the surface. Turn over soil as little as possible and do not compact the soil.





### WORD SEARCH

All the living things in the list below can be found in soil. Can you find them in this word search?

nematodes protozoa millipedes bacteria ants earthworms slugs fungi spiders sowbugs

S	H	B	B	E	W	J	S	C	M	S	S
Z	M	F	A	H	A	O	K	G	Q	E	P
U	W	R	S	C	W	T	B	L	D	D	I
D	M	K	O	B	T	D	Y	O	S	E	D
D	A	M	U	W	Q	E	T	R	L	P	E
H	E	G	P	P	H	A	R	K	J	I	R
O	S	F	E	N	M	T	U	I	P	L	S
E	I	L	Y	E	J	S	R	A	A	L	P
W	I	G	N	U	F	R	G	A	I	I	S
P	R	O	T	O	Z	O	A	U	E	M	T
I	A	O	D	Y	G	Z	U	P	L	V	N
S	H	E	Z	S	D	I	Q	U	D	S	A



### TRY THIS

#### COMPARE SOIL LIFE IN DIFFERENT SOILS

What you need

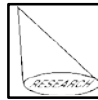
- \* an 8 ounce metal can with both lids removed
- \* plastic bags for soil samples
- \* small glass jars with lids
- \* newspaper
- \* magnifying glass
- \* paper and pencil

What to do

1. Collect soil samples of the same size from several different locations, such as a garden, lawn, a well-worn dirt path or playground, and a forest. A metal can with the lids removed may be used to collect soil samples. Gently tap the can into the soil, and carefully lift it out of the ground so that all the soil stays inside. Put each soil sample into a plastic bag, and label the bag with the location where the soil sample was taken.
2. Once you have collected all your samples, you are ready to examine them and compare the living things in the different soils. Spread out one soil sample at a time on a newspaper. Carefully sort through the soil and look for signs of plant and animal life. Do you see any thread-like strands of fungi? These are often found on pieces of

rotting wood. Put living organisms you discover into glass jars and look at them more closely. Use the magnifying glass to help find very small creatures. Make a chart like the one below to record your results.

3. Repeat step 2 for each soil sample. Then compare your results. Does the number of soil creatures vary? How does the type of the soil affect the amount of soil life it contains?



### SPOTLIGHT ON RESEARCH

#### Are Earthworms Changing Forests?

Earthworms are plentiful in garden and farm soils in the northeastern U.S. But they are not native species. They were accidentally brought into the country with plants and soil from Europe and other countries. Earthworms are valuable in cultivated soils, because they help decay wastes and improve the soil.

But now these non-native earthworms are invading remote forests in the Northeast. Where they are present in forest soils, the leaf litter on the forest floor is decaying so rapidly, the soil is becoming bare. Nitrogen released from the rapidly decaying plant matter is being washed away before forest plants can take it up. Because there is no protective cover of leaves, animals easily find seeds and eat them. Where there used to be young trees, now there are only tall trees and bare dirt.

But is the presence of earthworms the cause of these changes? To find out, scientists conducted experiments in a lab. They collected soil without worms. They added worms to some of the soil, and compared it to soil with no worms added. Their evidence was overwhelming. Earthworms can change soils, and they may be changing the forest ecosystem as well.

Sources: Alban, D. and Berry, E. (1994). Effect of earthworm invasion on morphology, carbon, and nitrogen of a forest soil. *Applied Soil Ecology* 1, 243-249.

Nixon, W. (1995). As the worm turns. *American Forests*, Autumn 1995, 34-36.

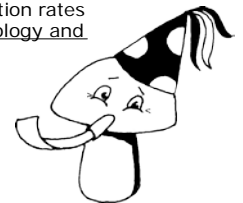
Steinberg, D., R. Pouyat, R. Parmelee, and P. Groffman. (1997). Earthworm abundance and nitrogen mineralization rates along an urban-rural land use gradient. *Soil Biology and Biochemistry* 29, 427-430.



### RIDDLE

Why is the mushroom always the life of the party?

Answer: He is a fungi! (fun guy)!



Soil Sample	Name or description of living things	Quantity	Possible effect on soil