

## Information for Students: An Introduction to the Decomposers

What happens to the litter so often found along our roadsides? How would an apple core or a Styrofoam™ hamburger carton change in appearance over time?

Many of the visible changes in an apple core lying on a roadside are the result of insects, birds, or other animals feeding on it. Other changes are the result of physical features of the environment. For example, sunlight will dry the apple and cause it to shrink.

Styrofoam™, on the other hand, will likely remain intact for a long time. Only physical events will have much effect on its appearance. It may get squashed flat and break into smaller pieces if a car runs over it, and eventually the ultraviolet light from the sun (the same form of light that gives people sunburns) will loosen some of the strong chemical bonds that make plastic so durable. This process takes years, however.

Meanwhile, the apple core, or what's left after the insects are through with it, is exposed to the air and is also in contact with soil. Both the air and the soil contain bacteria and fungi that feed on dead tissues. This is not surprising, because the bacteria and fungi are essential to preserving life on earth. One of their main jobs is to decompose dead or discarded biological materials, breaking them down into simple chemicals that can be used as plant nutrients.

The bacteria and fungi don't exactly *eat* dead plants or animals, but they do *digest* them, at least partly. Bacteria are one-celled organisms, and they can produce special proteins that will pass through their cell membranes. These proteins, called *enzymes*, come into contact with the dead materials and break them down into simpler, liquid components. Then the bacteria cells can take the liquid back into themselves, through the cell membrane, as a source of food.

The fungi do basically the same thing, although some of the details are a little different. Both the bacteria and the fungi get food from the dead material, which we describe as "rotting" once they have gone to work on it. (That's when the material gets slimy, smelly, and/or has fuzzy stuff growing on it.) What is especially useful, though, is that while the bacteria and fungi are getting their nutrition, some of the chemical parts of the rotting material are left behind in the soil. The parts left behind contain minerals that living plants can use to help them grow. So the decomposers are important ecologically because they cause natural recycling to occur. The minerals that were once in a living plant or animal get returned to the soil by decomposers when the plant or animal dies.

Many people take advantage of these organisms by composting their food scraps or yard waste. When a gardener makes a compost pile, he or she is providing good conditions for decomposition to occur, and the result is a dark, crumbly material that makes excellent fertilizer. And while the material may smell bad for a while along the way, the finished compost looks and smells like rich, moist earth.

There are many factors that can affect the decomposition process, and if you can imagine yourself as a fungus or bacterium living in the soil perhaps you can guess what some of these are. Like most living things, the decomposers usually do best when they have good supplies of

air and moisture, and without both of these they can't very well break down our trash and garbage. So no matter how biodegradable it is, trash and garbage that gets taken to a landfill is quickly buried deep underground, away from air and moisture. As a result, if your grandchildren were to go digging in your local landfill fifty years from now, they would probably be able to read the backs of the cereal boxes you ate from today!