

EARTHWORM INFORMATION

Redworms – *Eisenia foetida*, *Alloloborpha callignosa*

Nightcrawlers – *Lumbricus terrestris*



Background. Earthworms are members of the phylum Annelida, or ringed animals. They are fairly simple life-forms, put together from a number of disk-like segments stuck together like a long flexible roll of coins. Earthworms have no internal skeleton like a fish, no hard protective exoskeleton like an insect, and no shell into which they can withdraw. Worms are flexible, elongated bundles of muscle, uniquely suited for life underground.

The characteristic wriggling of earthworms is accomplished by the contraction of two kinds of muscles. When the short muscles that circle each segment (like lots of rings on a finger) contract, the worm gets thinner and longer. When the long muscles that connect all the segments contract, the head and tail are pulled toward each other, and the worm becomes short and fat. Depending on which end of the worm is anchored, the worm can move along the surface of the ground or through its burrow effectively in either direction, head first or tail first.

Earthworm organs are quite different from ours, making it possible for them to live their very different lifestyle efficiently. Earthworms have five pairs of simple hearts that pump blood throughout the body. They have no lungs. Instead the blood flowing close to the worm's surface absorbs oxygen and releases carbon dioxide directly through the moist skin (called the cuticle). For this reason earthworms can live for some time in water if the oxygen supply is adequate. They don't drown per se, but they may suffocate if the oxygen content is low. This is why worms leave the soil and crawl out on the sidewalk during a heavy rain—they are seeking oxygen. Earthworms are not adapted to feed in water, however, so they would starve to death in due course.

Instead of a nose, ears, and eyes, earthworms have a nervous system throughout their bodies that controls actions in response to environmental stimuli, such as vibrations, heat, cold, moisture, light, and the presence of other worms. They have no brain, however, so worms do not ponder their lowly lot in life, nor do they plan a strategy for obtaining their next meal or crossing the sidewalk safely.

Reproduction. Like all animals earthworms have effective strategies for begetting their own kind. With earthworms it is not a matter of boy meets girl, but rather a simpler matter of worm meets worm. All worms carry two sets of sexual organs, but they cannot fertilize their own eggs—mating is still a necessary part of reproduction. Mature earthworms have an enlarged band some distance from the head. This enlarged clitellum plays an important role in reproduction.

In mating, two worms approach each other nose to nose. With their bodies touching, they slide past each other until their heads are a bit past the clitellum. Both worms pass sperm through an opening located between the head and the clitellum, into a temporary holding receptacle in the other worm. The two worms separate. The clitellum secretes a liquid that solidifies into a flexible tube. As the tube lengthens, the worm backs out of it. Soon the tube covers the front part of the worm. The worm lays a few eggs inside the tube, deposits some of the stored sperm, and withdraws from the tube, leaving the eggs and sperm inside the tube. The ends of the tube pinch off to form a cocoon, and the whole thing shrinks to a tidy package about the size of a fat grain of

rice. The cocoon is left alone sitting on or just under the surface of the soil. The worm continues to produce cocoons until the sperm is used up. Cocoons are durable, can overwinter in cold climates, and can wait out hot dry spells in arid environments. After 3 weeks (ideal conditions) or longer the cocoon opens, and out sallies the next generation.

Earthworms feed on decomposing organic material, mostly vegetation, from the surface of the soil and within the soil itself. In the process of burrowing and feeding they process tons of soil in a typical pasture or garden, improving the quality of soil for plants and other animals.

Obtaining redworms and night crawlers. You can often obtain earthworms from local bait stores. You may be able to dig worms from your own garden, or you can order them from Delta Education. Redworms are used for worm composting and are sometimes available at garden supply stores.

Care of Redworms. Redworms can be kept in shipping container for short periods. Upon arrival, mist with water to moisten, but do not make soil wet. Worms can be kept in the refrigerator for short periods of time. To maintain worms for a longer period of time, keep at room temperature in diffused light, feeding crushed dead leaves or cornmeal sprinkled over the surface of the soil. Add rich soil (preferably humus) as needed, and remove any mold as it appears.

Worms will eat bits of lettuce, carrots, and other vegetable matter. Oatmeal and decaying leaves are also good food sources.

Use dry leaves that are already decomposing to feed the worms. There are a few types of leaves that you should not use as food for the worms—bay, eucalyptus, and magnolia leaves, and needles from pine, fir, and cedar trees. These types of leaves will kill your worms.

A good temperature for redworms is 15° to 26°C—good room temperatures. (Night crawlers need much cooler temperatures and will do fine in the refrigerator.) Red worms will slow down their activities in colder or hotter temperatures.

Care of nightcrawlers. Keep the night crawlers in the container they came in, or a 1/2 L container about three-quarters full of damp soil. Poke holes in the lid for ventilation. Store the worms in the refrigerator or a cool place for a few days before they are introduced to students.

Night crawlers prefer cooler temperatures and deep burrows so will not survive well in the terrarium with red worms over long periods of time. You can maintain night crawlers in a container with some moist, loose soil and food. Unlike red worms, night crawlers are hard to keep alive in the classroom and will soon die and become part of the soil. If you want to keep them alive for a month or so, keep them at a cool temperature by putting them in the warmest part of the refrigerator.

What to do with the earthworms when the investigations are completed. Redworms can be maintained in a terrarium, worm bin, or worm jar as long as food (dry leaves, weeds, fruit and vegetable scraps) is provided. The worms can be passed along to another class about to conduct the module, or released in a garden compost pile. Nightcrawlers survive best in the cool temperatures of your refrigerator. When observations are done, nightcrawlers can be released into a flower garden. These earthworms are also used as bait for fishing or as food for reptiles and amphibians.