

The requirements needed by earthworms to survive and how their bodily functions a...

[Psychology](#), [Behaviorism](#)



Acknowledged by Charles Darwin as one of the most important animals to have played such a crucial role in the development of the ecosystem, Earthworms are studied by scientists all over the world to discover the impact of they have on the environment they inhabit. Earthworms are a group of Annelid Worms, also known as segmented worms which belong to the widely populated animalia kingdom, they possess a long thin body coated in transverse rings. These special types of worms aid in the development of soil structure, they allow better access to the nutrients to travel closer to the plant root through opening up ‘ pores’ for quicker and easier access, they also decompose organic matter into materials and nutrients plants can use. An interesting factor to keep in mind about the development of these worms over time is that they were born without eyes, however, located on top of its head is a special tissue which allows it to detect light. Annelids are found worldwide in a range of habitats. Worms are most frequently found in the ground hidden away from light to stay alive. During summer most worms will enter hibernation and will bury themselves deep in the soil away from predators, high temperatures and exposed environments. In this report I will talk about the requirements needed by Earthworms to survive and how their bodily functions and behaviors are affected by the environment.

Nervous system

The earthworm brain is a bilobed mass lying above the pharynx in the third body segment it is connected to the first ventral ganglion, if the brain is removed the worm will move continuously however if the first ventral

ganglion is removed the Earthworm will stop consuming food and digging, this will lead to its death due to exposure to heat if it is outside, loss of food and nutrients and many more reasons. Each segment of the body has a ganglion that receives sensory information from only a certain region of the Earthworm and is able to control the muscles in that region. The nerve system is composed of ganglion cells (two in the case of an Earthworm) which aid in receiving the visual information from photoreceptors, sensory cells which aid to detect information through receptors that will then travel to the brain and several sensory and motor nerve fibers that will travel to other areas in the composition of the Earthworm's body. The nervous system is split into central, peripheral and autonomic. The central nervous system is made up of a nerve ring and a nerve cord. The peripheral nerves supply all other body structures. Lastly the autonomic nervous system controls the involuntary activity in the body

Digestive system

Earthworms feed on decaying organic material, particularly of plant origin. The digestive system of Earthworms consists of the alimentary canal and the digestive glands, the alimentary canal is a long tube with a variable diameter. The alimentary canal includes many parts such as: the mouth, the buccal chamber, the pharynx, the gizzard and the cecum. The pharynx is a thick walled muscular organ that is separated from the buccal chamber by a dorsal groove where the brain of the Earthworm resides. The roof of the pharynx is made up of muscle fiber, blood vessels, connective tissue and unicellular salivary glands called chromophilous cells. The mouth leads into a

short thin walled tube called the buccal chamber. The Buccal chamber helps in ingestion of food, it can protrude out and retract in due to the contraction of muscles. Earthworms feed on the nutrients in the soil, they also digest living organisms such as bacteria, fungi, nematodes and more, these worms are known to be able to consume one third of their body weight in a day. Inside the worm's mouth is a prostomium which aids the worm in pushing through soil or debris and push materials into the mouth, when the food is consumed, the pharynx will swallow it.

Worms do not have a stomach, therefore when digesting what they have consumed, the food will move into what is called the crop and will get stored, after being stored it continues into the gizzard where stones that the worm has swallowed will grind the food, the intestines release fluids to help the digestion process along. The body will cast out anything not converted into energy, this is known as worm casting. The intestine is long and tubular, it is divided into three parts: the pre-typhlosole region which helps the worm in digesting its food, the typhlosole region which holds the blood vessel and the post-typhlosole region also known as the rectum, the rectum helps to absorb liquids into the body.

Reproduction and survival

Earthworms are hermaphrodites, however most of them still need a mate to reproduce. The *Lumbricus Terrestris* has a specialized reproductive system. The female organs hold in them, a pair of ovaries, a pair of oviducts, a ciliated funnel that opens the oviducts, one egg sac beside each funnel and two seminal receptacles. The male organs consist of two pairs of minute

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testes, two ducts that that lead to a vas deferens and three pairs of large seminal vesicles that spread across six of the worm's body segments.

Earthworms have a clitellum that produces most of the material needed to form egg sacs or cocoons, the clitellum forms a ring around the worm, as the worm exits the ring its eggs are injected into the cocoon. When the eggs have been released and have taken a position in the soil, the ends of the cocoon will seal and the embryos are developed. During reproduction two worms lineup inverted from each other and exchange sperm. Fertilization takes place in the cocoon, the cocoon slides over the peristome and becomes completely sealed in the process. The sperm is temporarily stored in sperm receptacles while the clitellum secretes a mucus cocoon, the cocoon then grazes along the womb and gathers the eggs. The embryos develop within the cocoon, after a few weeks each cocoon produces approximately four baby worms if places in the correct environment. Earthworms have an average lifespan of eight years if kept in the suitable condition that will aid them in their survival over time.

Research has identified that annelids are possibly the most highly organized animals, they possess the power to completely regenerate, though leeches lack the ability to regenerate. The process of regeneration is as follows, firstly the wound seals over, then a structure (blastema) forms on the surface of the wound. New tissue probably arises from preexisting parent tissue, although mesodermal regenerative cells known as neoblasts, which migrate to the site of the injury, are found in polychaetes and lower oligochaetes. As healing begins, RNA (ribonucleic acid) accumulates at the

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wound site, first in the epidermal cells and later in mesodermal cells. The amount of glycogen, a complex carbohydrate that serves as an energy source in animals, in the oligochaete *Eisenia* decreases markedly near the point of injury, returning to normal only after regeneration is complete.

When taking care of an earthworm as a pet the temperature and environment they live in is very important. Though they can survive for a period of time underwater, Earthworms breathe through their skin therefore they are sensitive to light and will become paralyzed if left in it for more than an hour, they surface during the night to avoid getting dried out by the sun. Humid and wet weather tends to be the most suitable condition for Earthworms to live and travel in, since they breathe through their skin, they must stay wet to allow oxygen to effectively travel through. Temperatures such as 10, 15 and 20 are optimum for them to live in, in frozen environments Earthworms tend to be protected as their cocoon are more tolerant to cold weather. Most animals hibernate in the winter however for sensitive animals like earthworms hibernating is known as estivation and takes place in summer to avoid getting dried out by the light, during this process worms curl up into a tight ball and bury themselves deep in the soil, that slows down their metabolism and bodily function to allow them to survive the period of heat or drought.

Many animals tend to search for earthworms as a food source therefore over time they have adapted to the dark and come out at night when most

predators are sleeping or trying to avoid being eaten, this is also beneficial as they are sensitive to light and will easily dry out and die in the sun.

An earthworm's colony can double in size within 60 to 90 days therefore additional food will be needed as the population increases. Earthworms require wet environments at all times therefore if kept as a pet, the owner will need to make sure that the soil maintains a moist form. Earthworms do not require special tanks, they can be kept in a safe and shaded spot in the garden where the owner can be sure that no harm or exposure to light will come to it, if the owner wishes to build a wooden bin they will need to make sure that it is not exposed to direct sunlight, the ideal size for a bin is eight to twelve inches deep in the soil, this will allow the worm to move around and feed on the nutrients in the soil, the bin is required to have holes drilled into it for excess water to exit and for air to enter the soil. The soil will need to be watered every second day to maintain moisture and will need to be turned over once every week. If the soil is too wet the worms will get too hot and will not be able to stay alive therefore upholding the same amount of moisture in the soil is crucial. A benefit of raising earthworms in a natural environment is that there is a likelihood that worms native to that particular habitat will also gather. Earthworms feed on leaves, fruits and vegetables, therefore providing those nutrients for them is essential for their survival. Food will need to be supplied to them in a quantity once a week. The food placed in the soil should equal the size of a fist otherwise the owner may be risking overfeeding the worms.

Respiratory system and formation of the body

Much like many other things in the worm's body this particular organ is not present, lungs are non-existent in the biology of earthworms, to replace the lungs, there is a thin layer of cells which helps the oxygen diffuse in and carbon dioxide diffuse out. These cells are the reason worms are required to stay in a wet environment, to function these cells must be moist in order for them to enter and exit the plasma membrane. Earthworms have chemical receptors all along their body, these receptors are sensitive to vibration, light and touch. The oxygen absorbed by the hemoglobin dissolved in the blood plasma and carbon dioxide is released into the air. The exchange of gases in earthworms takes place between the blood capillaries of the outer epidermis and the surface of moisture made by mucus, excreted waste and fluids. The hemoglobin dissolved in the blood plasma acts as a respiratory pigment transporting oxygen to the body tissue. Earthworms discharge slimy secretion onto their skin to keep it moist and avoid drying out.

Heart Earthworms do not possess a heart, instead they rely on aortic arches. Each worm has five pairs of aortic arches which are crucial for circulation in the body, these arches function like a human heart. The aortic arches distribute blood to the worm's body.

Blood vessels Worms have two types of blood vessels in their body, the dorsal blood vessels that carry blood to the front of the body and the ventral blood vessels that carry blood to the back of the earthworm's body. The intestine contains blood vessels where the food is absorbed and transported to the rest of the worm's body.

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Body worms get rid of calcium that is not necessary for their survival through glands located in their esophagus, these glands release calcium carbonate to get rid of it when it exceeds the amount needed for them. The esophagus is a short thin walled tube which helps in the transportation of food materials. In order to move the earthworm will extend its body and grip the surface beneath it with setae and contracting body muscles, when the worm move forward, the body contracts and causes the head to extend forward. The setae of a segment of the body are controlled by a certain body muscles to prevent backward movement of the longitudinal muscle. Earthworms are able to reverse the direction of their movement.