

Earthworm Dissection Guide

Earthworms are ideal specimens to use for teaching basic anatomy and investigating simple organ systems. They also provide an economical and convenient opportunity for students to practice their dissection techniques before progressing to more complex specimens such as frogs or pigs. Use the following procedure and your students will be "digging into earthworms" in no time.

Earthworm dissection procedure

1. Observe the external anatomy of the earthworm. Earthworms are annelids, or segmented worms that have bodies made up of a series of ringlike segments. The earthworm has no head and no appendages, but does possess external characteristics to study. First, identify the anterior and posterior ends. The anterior end is somewhat larger than the posterior. Pin the earthworm to the dissecting pan and count and record the number of segments. There may be as many as 100.
2. Observe each segment closely. Note the tiny bristles on the ventral surface. These setae help the worm move through soil.
3. Each segment also contains a pair of small excretory pores called nephridiopores. You may need to use a hand lens or stereomicroscope to see these openings.
4. Openings to the oviducts are found at segment 14, counting from the anterior end. These female pores release the eggs. Sperm ducts can be found on segment 15. The clitellum is the enlarged structure that begins at segment 31. The clitellum secretes mucus that holds 2 earthworms together during mating. It also produces a cocoon in which eggs and sperm are deposited.
5. Place the earthworm on its ventral side. (The ventral side is more flattened than the dorsal side.) Using a scalpel, make a shallow incision anterior to the clitellum and continue the incision toward the mouth. Be careful not to cut too deep or you will slice into the digestive system. Using forceps, spread the incision open and pin the body wall to the dissection pan as shown in the illustration. You may choose to add some water to the specimen to prevent it from drying.
6. Identify the thin walls between each segment. These are called septa.
7. Identify the organs of the digestive system. Beginning at the mouth, locate the thick-walled pharynx. The esophagus extends from the pharynx. Next, 2 swollen structures can be seen, the crop and the gizzard. The crop temporarily stores food and the gizzard then grinds it. Leading from the gizzard is the intestine, which runs the length of the worm to its anus. The earthworm feeds on organic material in soil, pushing this material through its digestive tract and absorbing nutrients.
8. Locate the dorsal blood vessel, which is found along the dorsal surface of the digestive tract. Identify the 5 pairs of aortic arches, or hearts, which circle the esophagus.
9. Identify the cerebral ganglia, which are found along the dorsal surface of the pharynx. A ventral nerve cord can be seen beginning at the cerebral ganglia and extending the length of the worm.
10. Locate the excretory organs called nephridia. These paired organs are found in each segment. Nephridia remove nitrogenous waste.
11. Earthworms are hermaphroditic, meaning they have both male and female sex organs. Eggs are produced in the ovaries, which can be found in segment 13. Eggs pass through the female genital pores. Sperm are produced in the testes, found in segments 9 to 12. Sperm pass through the male genital pores. Study the segments containing the gonads and try to identify each sex organ.
12. During mating, sperm from one worm travel to the seminal receptacles of another worm. Once the 2 worms have separated, fertilization of the eggs occurs in the cocoon created by the clitellum. First the cocoon is moved over the outside body wall where eggs are deposited, and then it is moved over the seminal receptacles where sperm are deposited. Fertilization occurs outside the body.
13. Once you have observed the structures of the earthworm, dispose of the specimen in accordance with local guidelines and your teacher's instructions.

