Earthworm Dissection

Objectives:
• Describe the appearance of various organs found in the earthworm.
• Name the organs that make up various systems of the earthworm.

Materials:
Safety goggles, dissecting pins, gloves, forceps, lab apron, scissors, paper towel, scalpel, water, dissecting probe, preserved earthworm, hand lens, dissection tray.

Purpose:
In this lab, you will dissect an earthworm in order to observe the external and internal structures of earthworm anatomy.

Background:
Among the most familiar invertebrate animals are the earthworms, members of the phylum Annelida. The word annelida means "ringed" and refers to a series of rings or segments that make up the bodies of the members of this phylum. There may be more than 100 segments in an adult worm.

The clitellum is a swelling of the body found in sexually mature worms and is active in the formation of an egg capsule, or cocoon. Eggs are produced in the ovaries and pass out of the body through female genital pores. Sperm are produced in the testes and pass out through tiny male genital pores. During mating, sperm from one worm travel along the sperm grooves to the seminal receptacles of another worm. Fertilization of the eggs takes place outside the body as the cocoon moves forward over the body, picking up the eggs of one worm and the sperm of its mate.

The pumping organs of the circulatory system are five aortic arches. Circulatory fluids travel from the arches through the ventral blood vessel to capillary beds in the body. The fluids then collect in the dorsal blood vessel and reenter the aortic arches. The earthworm has no gills or lungs. Gases are exchanged between the circulatory system and the environment through the moist skin.

The earthworm takes in a mixture of soil and organic matter through its mouth, which is the beginning of the digestive tract. The mixture enters the pharynx, which is located in segments 1–6. The esophagus, in segments 6–13, acts as a passageway between the pharynx and the crop. The crop stores food temporarily. The mixture that the earthworm ingests is ground up in the gizzard. Digestion and absorption take place in the intestine, which extends over two-thirds of the body length. Soil particles and undigested organic matter pass out of the worm through the rectum and anus.
**Procedure**

**Earthworm External Anatomy**
1. Put on safety goggles, gloves, and a lab apron.
2. Place earthworm in the dissecting tray and rinse off the excess preservative. Identify the **dorsal** side, which is the worm’s rounded top, and the **ventral** side, which is its flattened bottom. Turn the worm **ventral** side up, as shown in the diagram below.

![Diagram of Earthworm External Anatomy](image)

3. Observe all parts of the worm.
4. Locate the conspicuous **clitellum**, a saddle-like swelling on the dorsal surface. The clitellum produces a mucus sheath used to surround the worms during mating and is responsible for making the cocoon within which fertilized eggs are deposited.
5. The **anterior** of the animal is more cylindrical than the flattened **posterior** and is the closest to the clitellum. Find the anterior end by locating the **prostomium** (lip), which is a fleshy lobe that extends over the mouth. The other end of the worm’s body is the posterior end, where the anus is located.
6. The **ventral** surface of the earthworm is usually a lighter colour than the **dorsal** surface. The **mouth** is located on the **ventral** surface of the first segment while the **anus** is found at the end of the last segment.
7. Look for the worm’s **setae**, which are the minute bristle-like spines located on every segment except the first and last one. **Run your fingers** over the ventral surface of the earthworm’s body. You should be able to feel bristle-like **setae** used for locomotion.
8. Locate and identify the external parts of its reproductive system. Find the pair of **sperm grooves** that extend from the **clitellum** to about segment 15, where one pair of **male genital pores** is located. Look also for one pair of **female genital pores** on segment 14. There is another pair of **male genital pores** on about segment 26. Try to find the two pairs of openings of the **seminal receptacles** on segment 10. **Note**: These openings are not easy to see.
Earthworm Internal Anatomy
Position your preserved earthworm **dorsal side up** and pin it down through the first segment and then again further back behind the **clitellum**. Cut a slit in the dorsal surface near the posterior pin. Using fine scissors extend the cut forward to the first segment. **Be careful not to cut too deep.**
Starting at the first segment, cut the septa (thin membranes) that internally divide the segments, so the skin can be laid flat. Use additional pins to hold the skin open and expose the organs. Continue to lay the skin back until you have uncovered a centimeter or so of the intestine.

9. Turn the worm **dorsal** side up. Using a scalpel and scissors, make a shallow incision in the **dorsal side** of the **clitellum** at segment 33. **CAUTION:** Scalpels and scissors are very sharp. Report any cuts to your teacher. Using the forceps and scalpel, spread the incision open, little by little. Separate each septum from the central tube using a dissecting needle, and pin down each loosened bit of skin. Continue the incision forward to segment 1.
10. Use the diagram below to locate and identify the five pairs of **aortic arches**, or hearts. Then find the **dorsal blood vessel**. Look for smaller blood vessels that branch from the dorsal blood vessel.

![Diagram of earthworm](image)

**Digestive System**
The earthworm is an example of a foraging herbivorous annelid, obtaining food by eating its way through the soil and extracting nutrients from the soil as it passes through the digestive tract.

**Hint:** Starting at the **anterior** end, locate the muscular **pharynx** (food ingestion). This is followed by a tube-like **esophagus**, which terminates in a **crop** (the wider organ), which serves as a storage stomach. After the **crop** you will find the **gizzard**. Gently press on the crop and gizzard to test their firmness. While the **crop** is soft and thin, the **gizzard** is muscular because soil is ground up and churned within the **gizzard**. A long **intestine** in which both digestion and absorption occur follows the **gizzard**. Undigested material is voided through the **anus**.

11. Locate the digestive tract, which lies below the dorsal blood vessel. Refer to the diagram above to locate the **pharynx**, **esophagus**, **crop**, **gizzard**, and **intestine**.
12. Dispose of your materials according to the directions from your teacher.
13. Clean up your work area and wash your hands before leaving the lab.
Earthworm Dissection Worksheet

1. What is the name of the pumping organs in the earthworm’s circulatory system?

2. List the parts of the digestive tract through which food passes.

3. How can you find out whether an earthworm eats soil?

4. Among the earthworm’s structural adaptations are its setae. How do you think the earthworm’s setae make it well adapted to its habitat?

5. How is the earthworm’s digestive system adapted for extracting relatively small amounts of food from large amounts of ingested soil?

http://www.biologyjunction.com/earthworm_dissection.htm