

Name _____

Date _____ HR: _____

Lab: Dissection of the Earthworm

Introduction: The earthworms are segmented worms and are 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. The adult worm may have more than 100 of these segments. The earthworm is well adapted to its terrestrial way of life. Its streamlined body helps it to burrow through the soil and it secretes a covering of mucus to help it slide through the soil. The wet and slimy coating of mucus is also necessary for the exchange of gases that occurs through the skin of the earthworm. As the earthworm moves through the soil, a muscular pharynx aids in sucking in the dirt in its path. As this dirt moves through the worm internally, organic matter is digested and used as a source of food.

Procedure: The External Earthworm:

Directions: Rinse the earthworm with tap water and place in the dissection tray. Find the **anterior (head)** end by locating the **prostomium** (lip), which is a fleshy lobe that extends over the **mouth**. The anterior end is more pointed and the **posterior (rear)** end is blunt. Near the anterior end is a segment of the worm called the **clitellum**, which extends from segment 33 to segment 37. The clitellum helps during reproduction by secreting the cocoon into which eggs are deposited. The other end of the worm’s body is the posterior end, where the **anus** is located. The mouth and the anus are the two openings of the tube-like digestive system.

The **dorsal (back)** side is more rounded and is darker in color. The **ventral (stomach)** side is flatter and is lighter in color. Turn the worm so that the ventral side is facing you. Run your finger down the ventral surface. You should be able to feel small, whisker-like structures called **setae** along the ventral surface. They help to anchor the worm in the soil and aid in locomotion. There are two pairs of setae on each segment.

Carefully examine the ventral surface. Try to locate the **seminal receptacles**, which are located in the grooves between segments 9 and 10 and between segments 10 and 11. The seminal receptacles receive sperm from another earthworm during reproduction. Next, locate the openings of the **oviducts**, which are located at segment 14. The oviducts are pores through which eggs are released. Finally, at segment 15, locate the openings of the **sperm ducts**. The sperm duct openings are pores through which sperm is released. (Note: These openings are very difficult to locate.)

How long is your worm (in cm)? _____ How many segments does it have? _____

Are all of the segments exactly alike? Explain.

In the space below, make a drawing of your earthworm. Locate and label all of the following:

dorsal
ventral
anterior
posterior
prostomium
mouth
segments
clitellum
setae
anus

External Initials: _____

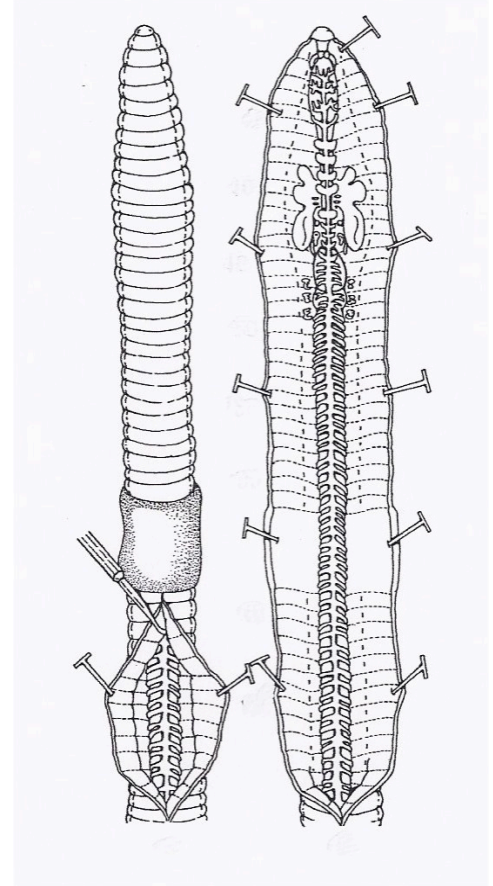
Procedure: The Internal Earthworm:

Directions: Place the worm in the dissecting pan with the dorsal surface facing up. Stretch out the worm's body and pin it to the dissection pan using dissecting pins.

Starting about one inch posterior to the clitellum, make a small cut, but be careful not to cut too deep. The major internal organs lie just inside and the body wall of the earthworm is very thin. Carefully continue to open the worm and fold back the skin flaps and pin them to the tray until you have worked all the way up to the tip of the anterior end, where the mouth is located, as seen in the diagram to the right.

Let's begin with the **digestive system**.

- The **mouth** is located in the first three segments.
- Just behind the mouth you should be able to locate a swelling, stringy looking muscle, the **pharynx**. This should be seen in segments 3 – 6. Soil is sucked into the earthworm body through the pharynx.
- Leading out of the pharynx is a thin walled and slender **esophagus**. Look for this in segments 6 – 14.
- The esophagus leads to the **crop**, located in segments 15 and 16. The crop is a thin-walled, temporary storage area for food and dirt. The crop will feel very soft.
- The crop empties into the **gizzard**. This should be found in segments 17 and 18. The gizzard is strong and muscular and is used to grind up organic matter. The gizzard will feel hard.
- Leading out of the gizzard, you should see the **intestine**. In the intestine, digested organic materials are absorbed into the bloodstream. This extends down the remainder of the worm, ending with the **anus**.



You will need to draw and label these on the next page!

Directions: Now try to locate the structures that compose the **circulatory system**. The earthworm has a **closed** circulatory system. The blood is contained inside a system of blood vessels. A closed circulatory is much more efficient in delivering food and oxygen to all cells of the body and in removing wastes and carbon dioxide from the cells.

- Find the **aortic arches**, located in the region in between the pharynx and the crop. You should be able to find 5 pairs of aortic arches that lie on top of the esophagus. The aortic arches are “pseudohearts”. They are pumping organs and pump blood throughout the body.
- Find the **dorsal blood vessel** that runs the entire length of the body. Look for any smaller blood vessels that branch out from the dorsal blood vessel.
- Gently move aside the intestine to locate the **ventral blood vessel**.

You will need to draw and label these on the next page!

Directions: Locate the structures of the **nervous system**. The earthworm can respond to basic stimuli, but they do not have any sense organs (eyes, ears, etc.)

- a) Move aside the organs of the digestive and circulatory systems to locate the parts of the nervous system.
- b) The **brain** is a white mass of tissue found in the third segment, just above the pharynx. It is very small and hard to locate, and you most likely cut through it opening the worm.
- c) Also look for the ventral nerve cord that extends out of the brain down the length of the body. See if you can locate the **ganglia** that are found in each segment of the body. A ganglion is a small mass of nervous tissue. They will be attached to the ventral nerve cord.

Directions: Locate the structures of the **excretory system**.

- a) Push aside the intestine in a region posterior to the clitellum.
- b) Look for the white colored **nephridia**. There should be a pair of nephridia in each body segment. Nephridia are excretory tubules found just under the skin. They eliminate wastes and excess water.

Directions: Locate the structures of the **reproductive system**.

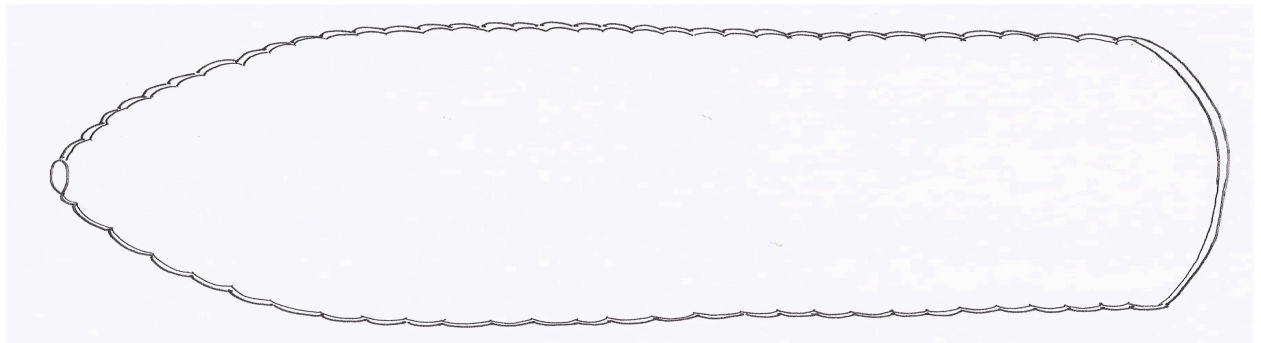
- a) An earthworm has both male and female reproductive organs. Many of these structures are very difficult to find, but you should be able to locate the large **seminal vesicles** in the area of segments 9 to 13. The seminal vesicles are three-lobed, light in color, and found along side the esophagus. The seminal vesicles carry the sperm for the earthworm. You should also be able to find 2 pairs of **seminal receptacles**. These will be similar to the seminal vesicles, but closer to the anterior end and much smaller and round.

Internal Initials: _____

Clean up initials: _____

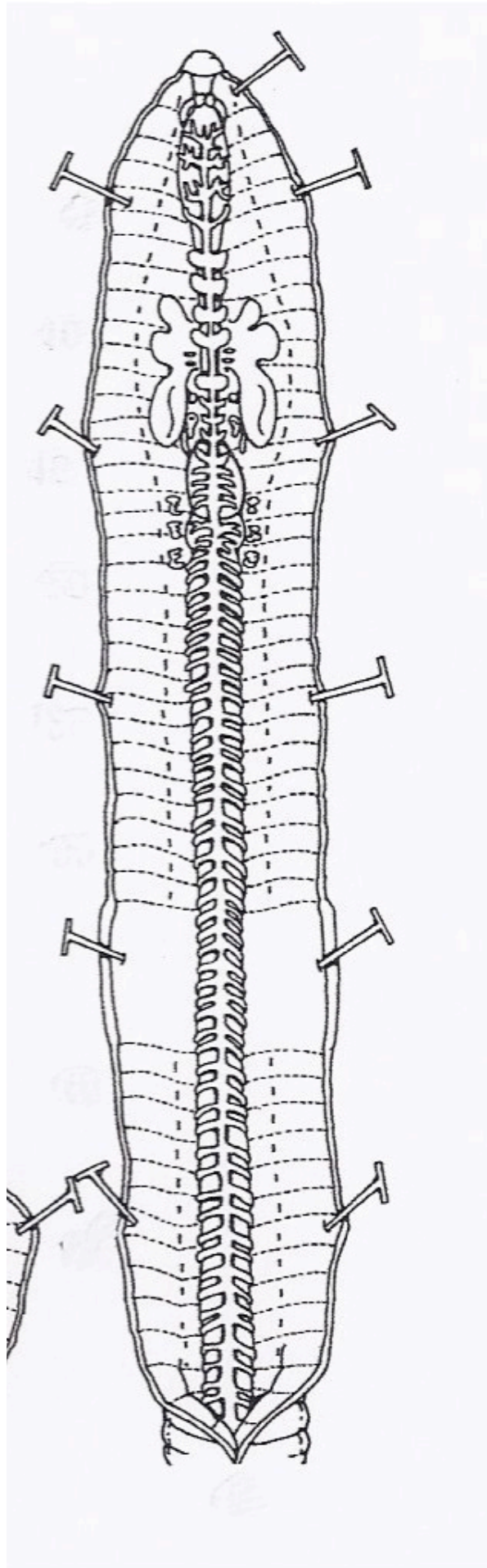
In the outline worm below, draw and label the listed structures of the digestive system of the earthworm.

- mouth*
- pharynx*
- esophagus*
- crop*
- gizzard*
- intestine*
- aortic arches*
- dorsal blood vessel*
- seminal vesicles*
- seminal recepticals*



Label the following on this illustration:

pharynx
esophagus
crop
gizzard
intestine
aortic arches
dorsal blood vessel
seminal vesicles
clitellum
segment



Name: _____

Date: _____

HR: _____

Final Observation Questions:

1. Why was it important not to make a deep cuts as you began to dissect your earthworm?
2. How is the earthworm digestive system beneficial to other organisms?
3. In what **two** ways is the earthworm body well suited for its terrestrial life?
4. In what way is the earthworm poorly adapted to life on land?
5. How does the earthworm breathe?
6. The earthworm is hermaphroditic. What does this term mean?