LAB: EARTHWORM DISSECTION

Name _____

Date _____ **Per.** ____

PURPOSE: To locate various structures in an earthworm.

PROCEDURES:

1. Place earthworm on the tray with its dorsal side down and pin it in place as directed. Dorsal side is the darker side of the worm.

2. Make a small slit along the lower part of worm on the midline. Pin the worm open as you cut until reaching the mouth end.

   *** Be careful not to cut too deep or you will damage internal organs.**

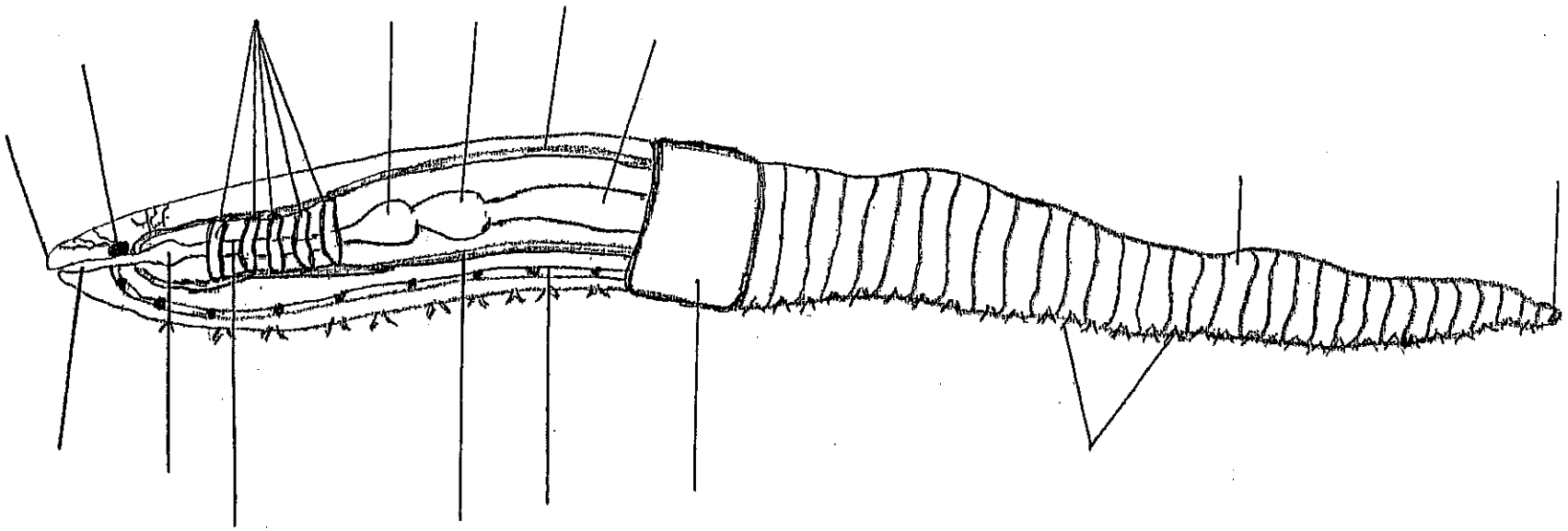
3. After you have pinned the worm to the tip of the head end, locate the following structures (numbers refer to the segment number of the worm where the part can be found):

   - prostomium
   - mouth
   - ganglia (3-4)
   - pharynx (5-6)
   - esophagus (8-9)
   - 5 pairs of aortic arches or "hearts" (7-10)
   - crop (15-16)
   - gizzard (17-19)
   - intestine (20-end)
   - clitellum (32-37)
   - anus
   - ventral blood vessel
   - dorsal blood vessel
   - ventral nerve cord
   - segment
   - setae

4. **Using the diagram of the worm, label <u>each part</u> listed in #3 above. (Remember that spelling of terms must be copied to diagram accurately.)**

EARTHWORM DIAGRAM

Label all structures in the diagram below.



Worksheet: Earthworm

Name _____
Date _____ Per. _____

1. What Phylum does the earthworm belong to? _____
2. Where are most of the worm's vital organs found? _____

   _____
3. What kind of soil must an earthworm live in? _____
4. Why are earthworms called "night crawlers"? _____
5. What are earthworm castings? _____
6. The band-like thickening in the body wall of the earthworm is the _____.
7. The bristle-like structures on the ventral surface of the earthworm that are used for crawling are called _____.
8. The earthworm has a sectioned or _____ body.
9. What is the longest organ in the worm's body? _____
10. How many pairs of "hearts" does the earthworm have? _____
11. Describe where in the body these pairs of "hearts" are located. _____

    _____
12. Where would you find the dorsal blood vessel? _____
13. Where would you find the ventral blood vessel? _____
14. The storage place for food is the _____.
15. The grinding organ in the digestive tract is the _____.
16. Solid wastes are released through the _____.
17. Liquid wastes are released through the _____.
18. The primitive brain-like structure in the earthworm is the _____.
19. What is the swallowing organ called? _____.
20. What helps to break down or digest the earthworm's food? _____
21. How long is the earthworm's digestive tract? _____
22. Explain how **oxygen and digested food** reach the cells of the earthworm's body. (4 pts)

    _____

    _____

    _____

    _____

The Segmented Worms: Phylum Annelida

The most familiar members of this phylum are the earthworm and the leech. In addition, there are many other kinds of segmented worms, or annelids. Most annelids live in the ocean. But a few live in fresh water or on land. They may vary in size from microscopic to very large. The Australian earthworm, for example, may grow to a length of more than two meters.

The name *annelid* means "ringed" and refers to the series of segments that make up the body of the worm. Because of this *segmentation*, some species resemble beaded bracelets. Partitions divide the body on the inside so that the segmentation occurs on the inside as well as on the outside. Each segment contains muscles, digestive tube, nerve cord, blood vessels, and excretory organs.

Segmentation is an advantage because there can be division of labor among segments. Segments can specialize in different tasks. For example, several segments might pump blood and contain a heart. Other segments might contain a brain and direct the activities of the other segments.

Overall, annelids are more complex than flatworms and roundworms. Specialized muscles in the body wall and digestive tract allow an annelid to move in many ways. And a much larger nervous system makes an annelid able to learn more than a simpler invertebrate animal is able to learn.

Structure

Annelids have a tube-within-a-tube body plan. The inner tube is the digestive tube. Surrounding the digestive tube is a closed circulatory system. The blood stays in tubes, or vessels, as it travels throughout the body.

In annelids and in all the animals that you will study later, the space between the body wall and the digestive cavity is the coelom (sē'lem). The coelom is generally a fluid-filled cavity lined with mesoderm. Recall that, in flatworms, this space is solid mesoderm. And in roundworms the space between the body wall and the digestive cavity is an open cavity that contains organs.

The Earthworm

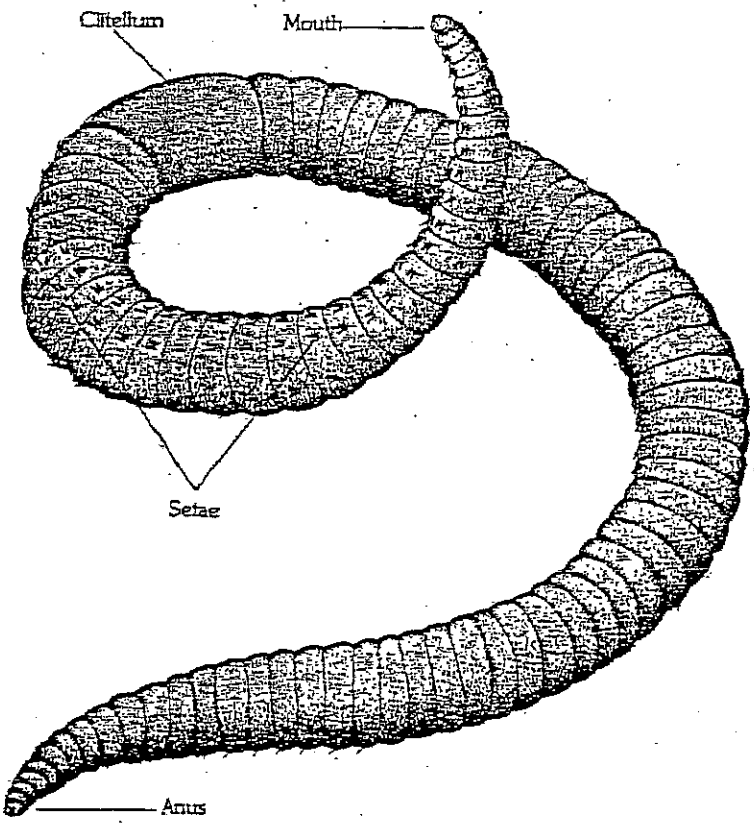
Most of the traits of annelids can be observed by studying the earthworm. You can see the external structure of an earthworm below. Note that a transparent cuticle is secreted by the outer layer of the body wall. This keeps the skin moist. A moist skin surface is necessary for gas exchange to occur through the skin during respiration. A slimy mucus secreted by skin cells also helps keep the skin moist. And it helps with locomotion as well.

At the sides of the body on the ventral surface of each segment are four pairs of short, stubby bristles, or setae (sē'tē). The setae provide traction for movement. Earthworms also use the setae to hold them in their burrows when something is trying to remove them.

The anterior end of the body is darker and more pointed than the posterior end. Segments are usually numbered from the anterior end, starting with the mouth as segment one. A saddle, or clitellum (klitel'əm), which has a role in reproduction, is located from segment 32 to segment 37.

Did You Know?
When heavy rains soak the earth, oxygen cannot enter the soil. A low oxygen level in soil forces earthworms to the surface. Once above the surface of the soil, the skin of an earthworm can lose its moisture if the air becomes dry or if exposed to heat. So the earthworm may be unable to respire even when there is plenty of oxygen. And it may die from lack of oxygen.

External Features of Earthworm



Feeding and Digestion

The mouth of the earthworm is partially covered by an upper lip, or **prostomium** (prō stō'mē əm), and opens into a muscular pharynx. Soil, which contains organic materials and rock particles, enters the mouth. From the mouth, the soil is sucked into the digestive tract by the pharynx. From the pharynx, soil enters a narrow esophagus and then a **crop**, where it is stored briefly. Then the soil goes into a muscular **gizzard** where it is ground up. The hard particles in soil help grind up the organic particles of food. From the gizzard, food enters the intestine and is broken down by bacteria and enzymes. The blood in the walls of the intestines absorbs the food. Undigested materials in the soil pass out of the body through the anus in the form of castings. Piles of castings may be found on the surface of the soil. The organic material in the castings adds to the soil fertility. And the feeding action of earthworms keeps the soil loose by providing spaces for air and water.

Excretion

Excretion in the earthworm is handled by organs called **nephridia** (ni-frid'ē ə). Each segment of the earthworm has one pair of nephridia. The nephridia collect waste materials from blood and from fluids in the coelom. The wastes are eliminated through pores on the ventral side.

Circulation

The dorsal blood vessel is found on the dorsal side of the digestive tract. This vessel collects blood from the body and contracts to force blood toward the head. At segments 7 to 10, blood enters one of the five pairs of muscular tubes called "hearts" or **aortic arches**. The blood is pumped from the aortic arches to a ventral blood vessel. In the ventral vessel, blood flows toward the posterior end. It also flows to the skin to exchange carbon dioxide for oxygen and to the intestine to pick up digested food.

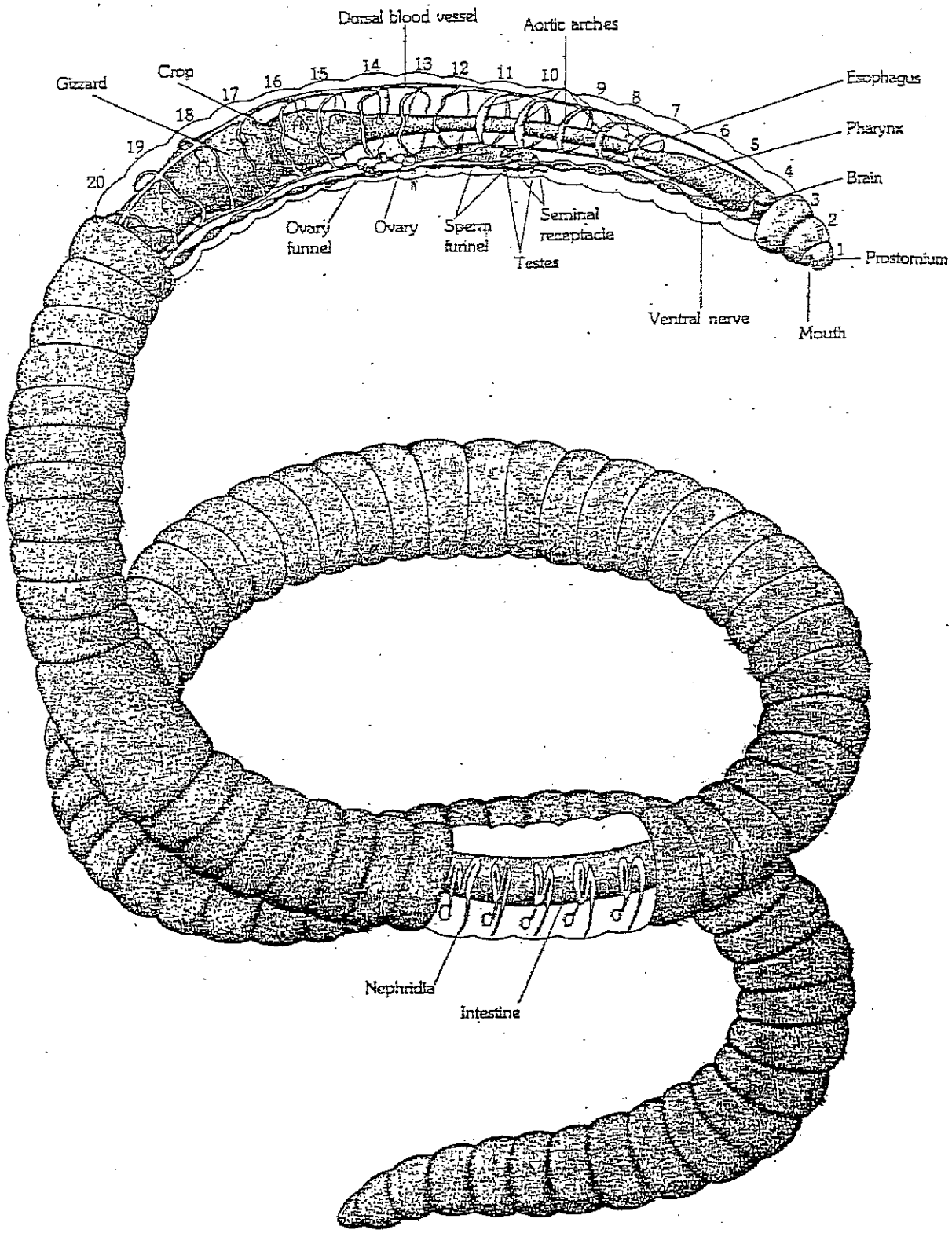
Challenge!
Earthworms often burrow deeply into the ground—especially during cold weather. Dig into the ground to find out how deep the earthworms have burrowed where you live.

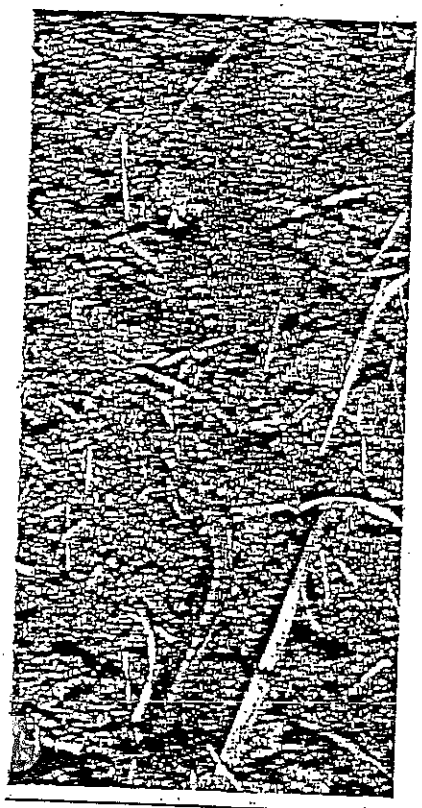
Nervous System

The brain of the earthworm lies above the anterior end of the pharynx. A ventral nerve cord runs on the ventral side of the intestine from the brain to the last segment. In each segment, the nerve cord is enlarged to form a small mass of nerve tissue called a **ganglion**. Short nerves from each ganglion run to muscles and sensory cells.

Although the earthworm has no eyes or ears, it responds to both light and sound. However, it is not sensitive to red light. People who fish with earthworms take advantage of this. They use a red flashlight at night when they collect their worms.

Structure of Earthworm





Earthworms Mating

Locomotion

The earthworm has circular muscles that wrap around both the body wall and the digestive tract. It also has longitudinal muscles that run between the anterior and posterior ends in both the body wall and the digestive tract. When the longitudinal muscles contract, they carry the earthworm forward by shortening its body length. When the circular muscles contract, bulges are formed along the length of the earthworm. The interaction of these two sets of muscles can produce a series of wavelike movements.

Reproduction

An earthworm has both ovaries and testes. But two individuals are necessary to produce fertilized eggs. When earthworms mate, two individuals come together. This usually occurs at night, following a rain. The two worms exchange sperm from their seminal vesicles and then separate. When the eggs are ready, the clitellum secretes a mucous ring. Eggs enter the ring before the ring begins to move forward. When the ring does move forward, the sperm stored in the seminal receptacles enter the ring to fertilize the eggs. Finally, the ring passes over the head of the earthworm and closes tightly, forming a cocoon. The young earthworms hatch from this cocoon.