

## Segmented Worms – The Earthworm

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. External segments are called **metameres**. **Label and color** the external segments of the worm in Figure 1 brown. **Label** the metameres on Figure 3. The **mouth** is located at the anterior (front) of the earthworm, while the **anus** is at the posterior (rear.) **Label** the mouth and anus on Figure 1. The mouth is covered with a lip that helps dig through the soil called the **prostomium**. **Label and color** the prostomium on Figure 2 pink. The underside of the earthworm has bristles called **setae** that help the earthworm move. **Label** the setae on Figure 2. Internally, **septa**, or dividing walls, are located between the segments. **Label** the septa on Figure 3. There may be more than 100 internal and external 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**. **Label** the clitellum and **color** it red in Figures 1 and 2.



The reproductive structures of the earthworm start at segment nine. Identify the **seminal receptacles** (bulb-like organs in segments nine and ten) where sperm received from another worm are stored, and three pairs or whitish **seminal vesicles** (segments 9-12). Sperm are produced within **testes** located inside the **seminal vesicles**. **Label and color** the seminal receptacles dark green and the seminal vesicles light blue. The female reproductive structures consist of a **pair of ovaries** (segment 13). Eggs are produced in the **ovaries** and pass out of the body through female genital pores. Sperm, which are produced in the **testes**, pass out through tiny **male genital pores**. **Label** the male genital pore on Figure 2. During mating, sperm from one worm travel along the **sperm grooves** to the seminal receptacles of another worm. **Label** the sperm grooves on Figure 2. 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. Since earthworms produced both eggs and sperm, they are called **hermaphrodites**.

The pumping organs of the circulatory system are **five aortic arches**. **Label** the aortic arches in Figure 3 and **color** them red. 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 blood stays within blood vessels at all times so it is called **closed circulation**. **Color** the ventral and dorsal blood vessels light green and **label** them on Figure 3.

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. **Label** the pharynx on Figure 3 and **color** the pharynx purple. The esophagus, in segments 6–13, acts as a passageway between the pharynx and the crop. The crop stores food temporarily. **Label** the esophagus in Figure 3 and **color** it violet. **Label** the crop in Figure 3 and **color** it yellow. The mixture that the earthworm ingests is ground up in the gizzard. **Label** the gizzard in Figure 3 and **color** it orange. In the intestine, which extends over two-thirds of the body length, digestion and absorption take place. **Label** the intestine in Figure 3 and **color** it brown. Soil particles and undigested organic matter pass out of the worm through the rectum and anus.

The nervous system consists of the ventral nerve cord, which travels the length of the worm on the ventral side, and the brain, which is a series of ganglia at the anterior (head) end. Ganglia are masses of tissue containing many nerve cells. **Label** the brain on Figure 3 and **color** it peach. The nerve collar surrounds the pharynx and consists of ganglia above and below the pharynx. Nervous impulses are responsible for movement and responses to stimuli. Each segment contains an enlargement, or ganglion, along the ventral nerve cord.

Excretory functions are carried on by **nephridia**, which are found in pairs in each body segment. **Label** the nephridia on Figure 3 and **color** it dark blue. They appear as tiny white fibers on the dorsal body wall. The earthworm has NO gills or lungs to get oxygen. Gases are exchanged between the circulatory system and the environment through the **moist skin**.

Figures are 1 (top picture), 2(middle picture) and 3 (bottom picture).

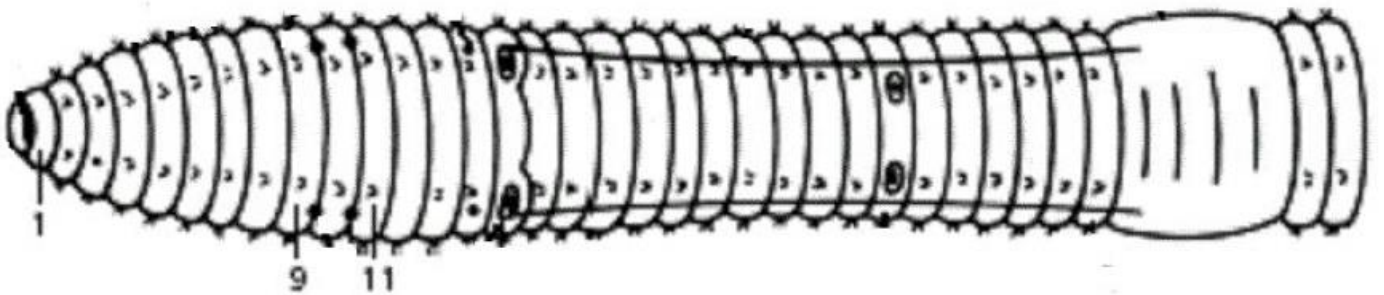
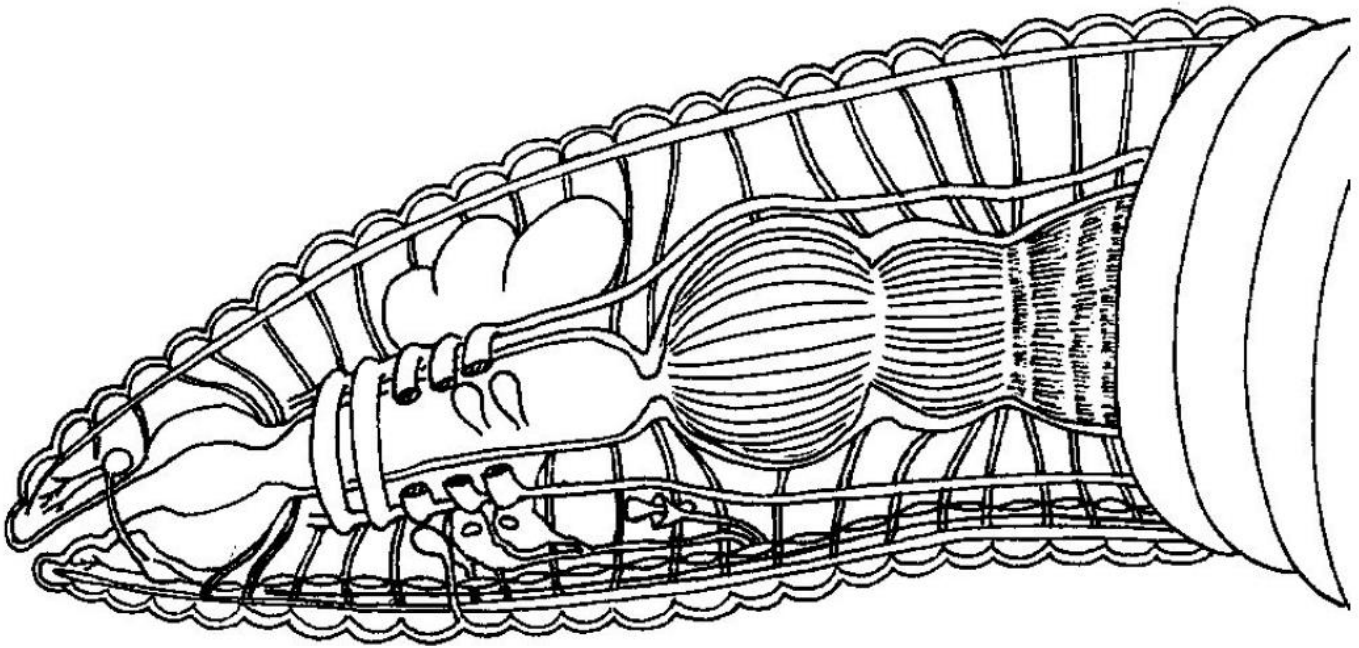
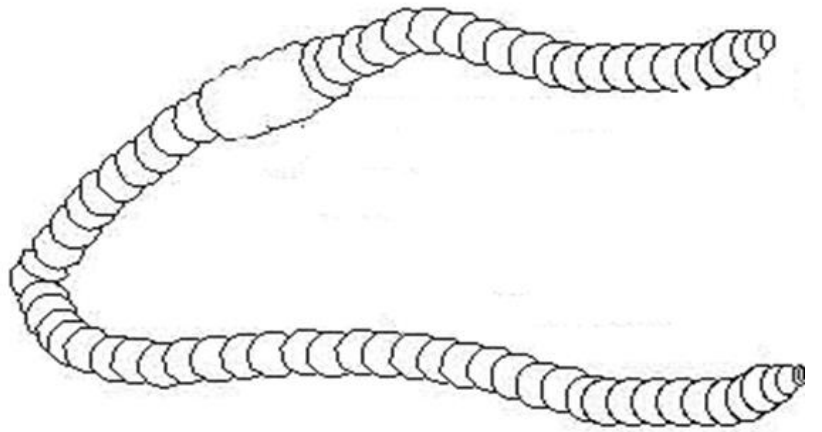
# Annelids

Name: \_\_\_\_\_

## Video: Shape of Life: Powerful and Capable Worms

1. How many species of annelids have been identified? \_\_\_\_\_
2. Name four habitats of annelids.
3. What is the white flower-like creature in the video?
4. Name three features of an annelid that are parallel with human features.
5. How are annelids adapted for digging?
6. What do the tubes built by *Diopatra* do for the estuary?
7. What is unusual about the habitat chosen by giant tubeworms?
8. How do spaghetti worms collect food?
9. What is the leech searching for on the person's foot?
10. How does the leech mask a potentially painful bite to the person's skin?
11. How soon after a blood meal can a leech last before eating again?
12. What service do annelids provide for planet Earth?

Coloring



## Conclusion Questions

1. What makes an organism an invertebrate?
2. Why are earthworms classified as annelids?
3. External segments of annelids are called \_\_\_\_\_.
4. How are annelids different than round worms? List as many differences as you can.
5. Give three pieces of evidence that annelids and mollusks have a common ancestor.
6. Are annelids protostomes or deuterostomes? What does this mean again about their embryonic development? (There are 3 things...look back at your unit 1 notes).
7. What is the advantage of segmentation?
8. Describe earthworm mating in detail.
9. Describe in order how food travels through an earthworm's digestive system.
10. What's the function of a crop?
11. What's the function of a gizzard? How is it different from our stomach?

12. What is the job of the excretory system in an animal? (see textbook)

13. What are nephridia and where are they found in the earthworm?

14. How do earthworms obtain their oxygen?

15. What are the hearts called and how many do earthworms have?

16. Name the two major blood vessels in earthworms.

17. Is circulation open or closed? Explain why.

18. There are three classes of annelids. What characteristic determines their classification?

19. What are the three classes of annelids? Name one structure in each annelid class that is unique to that class (as in you wouldn't find it in the other two classes). Then, describe the function of this structure.

<b>Class</b>	<b>Unique structure</b>	<b>Function of Unique Structure</b>