

# The Earthworm

*Harken to me, you that know what is just, my people who have My law in their heart:  
Fear not the reproach of men and be not afraid of their blasphemies.*

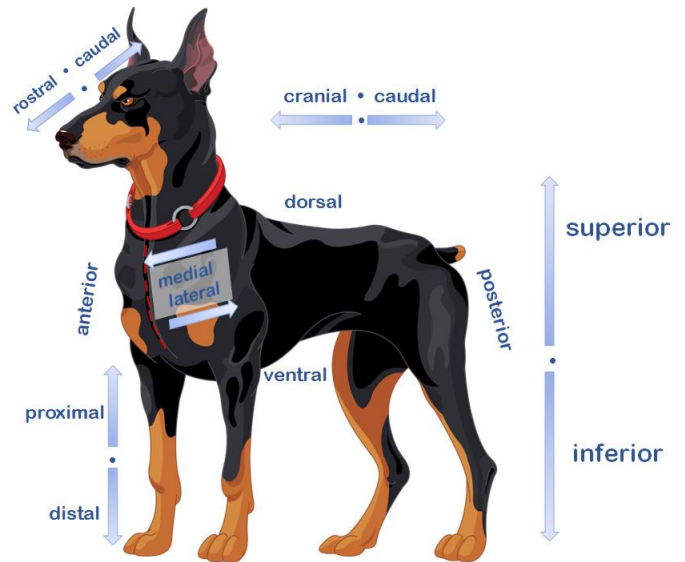
*For the worm shall eat them up as a garment...:*

*But My salvation shall be forever, and my justice from generation to generation.     **Isaiah 51:7-8***

## Introduction

The earthworm is an animal belonging to the phylum Annelida and characterized by a tube-like body which contains over 100 segments. There are several thousand types of earthworms. The *Lumbricus terrestris* is widely distributed and the most familiar species as it is frequently found on the surface of the ground. The *L. terrestris* has an average life span of about 6 years and typically grow to between 10 and 30 centimeters in length. The *L. terrestris* is mostly herbaceous, eating plant material such as dead leaves, roots and stems. However, they also feed on microorganisms in the soil and decaying animal tissue. They primarily feed at night, thus earning them the common name, “night crawlers”.

A set of terms have been developed over the decades for scientists to discuss the anatomy of an organism. These **anatomical terms** refer to the relative position of one body part to another. For example, **inferior** means one body is below another part. We relate two body parts by these directional terms such as: “the nose is **inferior** to the forehead”, and; “the knee is **superior** to the toes”. Table 1 contains a list of anatomical terms and directions. As you view the video, keep these terms and directions in mind. The figure to the right should assist you.



## Learning Objectives:

- Learn the organs that comprise the various systems of the earthworm
- Describe the external anatomy
- Utilize anatomical terms and directions

## Materials Required:

From Biology Kit	Student Supplied
Introductory Dissection Kit	
Earthworm Dissection Guide	
Earthworm	

## Safety

- Dissection tools are very sharp. Use appropriately and do not leave unattended in the presence of children.

## Experiment

An “*Earthworm Dissection Guide*” has been provided in the kit for you. Follow the instructions in the guide for dissecting the earthworm. Use the guide and your text to locate the features indicated below.

### 1. External Features

- Follow the instructions in the Guide on the “**External Anatomy**”
- Identify the structure and function of the following:
  - Somites
  - Genital openings
  - Prostomium
  - Cuticle and epidermis
  - Anus
  - Setae
  - Clitellum
  - Septum

### 2. Follow the instruction in the Guide on the techniques for dissecting the internal organs

### 3. View the labeled picture in order to:

- Determine how the dissected earthworm should look
- Assist you in locating the following anatomical features

### 4. Digestive System

- Identify the structure and function of the following:
  - Alimentary canal
  - Crop
  - Mouth
  - Gizzard
  - Buccal cavity
  - Intestine
  - Pharynx
  - Anus
  - Esophagus
  - Coelem

### 5. Excretory System

- Identify the structure and function of the following :
  - Nephridia
  - Nephridiopore

### 6. Circulatory System

- Identify the structure and function of the following:
  - Dorsal vessel
  - Aortic arches
  - Ventral vessel

### 7. Respiratory System

- Identify the structure and/or function of the following:
  - Cuticle and epidermis
  - Gas exchange

### 8. Reproductive System

- Identify the structure and function of the following:
  - Testes
  - Ovaries
  - Seminal vesicles
  - Coelomic cavity

9. Nervous System

- Identify the structure and function of the following:
  - CNS and PNS
  - Brain
  - Fused nerve cords
  - Ventral nerve cord

10. Complete Table 1:

- For each anatomical term or direction, relate two structures of the earthworm
- The first two have been done for you as an example
- Note: Although two terms may mean the opposite of each other, do not merely turn the structures around
  - For example: anterior is the opposite of posterior
  - In the first set, we said, “*The prostonium is anterior to the clitellum*”
    - However, we did NOT give for an example for posterior -- “*The clitellum is posterior to the prostonium*”
    - But, a different set of structures was utilized

11. Perform Data Analyses and Conclusions

Lab Report for: \_\_\_\_\_

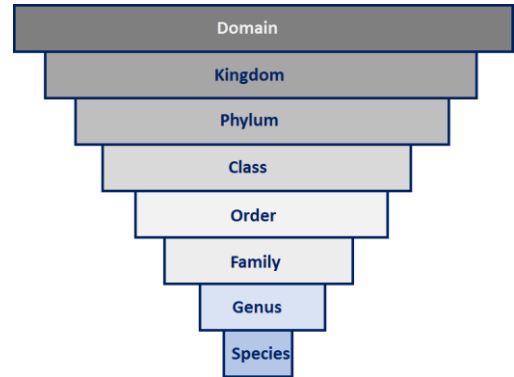
**Table 1: Anatomical Terms and Directions in the Earthworm**

Anatomical Term	Relative Position	Example from the earthworm
<b>Anterior</b>	Toward the front	The <b>prostonium</b> is <u>anterior</u> to the <b>clitellum</b>
<b>Posterior</b>	Toward the tail	The <b>anus</b> is <u>posterior</u> to the <b>clitellum</b>
<b>Superior</b>	Part is above another part	
<b>Inferior</b>	Part is below another part	
<b>Dorsal</b>	On the top side	
<b>Ventral</b>	On the belly side	
<b>Proximal</b>	Part is closer to the point of attachment to the trunk	(Not applicable in the earthworm)
<b>Distal</b>	Part is farther from point of attachment to the trunk	(Not applicable in the earthworm)
<b>Superficial</b>	Near the surface of the organism	
<b>Deep</b>	More internal parts of the organism	
<b>Medial</b>	Part is closer to the midline of the body	
<b>Lateral</b>	Part is more toward the side of the body	
<b>Bilateral</b>	Paired parts, one on each side	

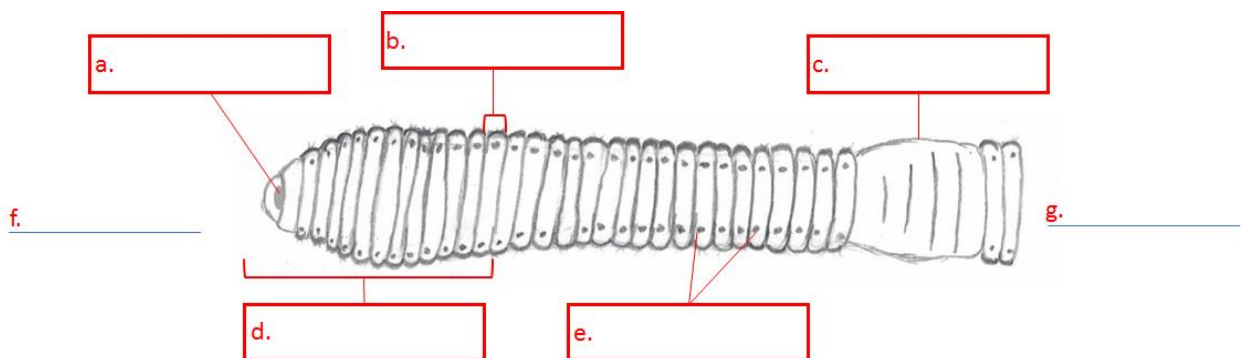
**Data Analysis and Conclusions**

Fill out the classification scheme for the earthworm, *Lumbricus terrestris*:

- a. Domain: \_\_\_\_\_
- b. Kingdom: \_\_\_\_\_
- c. Phylum: \_\_\_\_\_
- d. Class: \_\_\_\_\_
- e. Order: \_\_\_\_\_
- f. Family: \_\_\_\_\_
- g. Genus: \_\_\_\_\_
- h. Species: \_\_\_\_\_

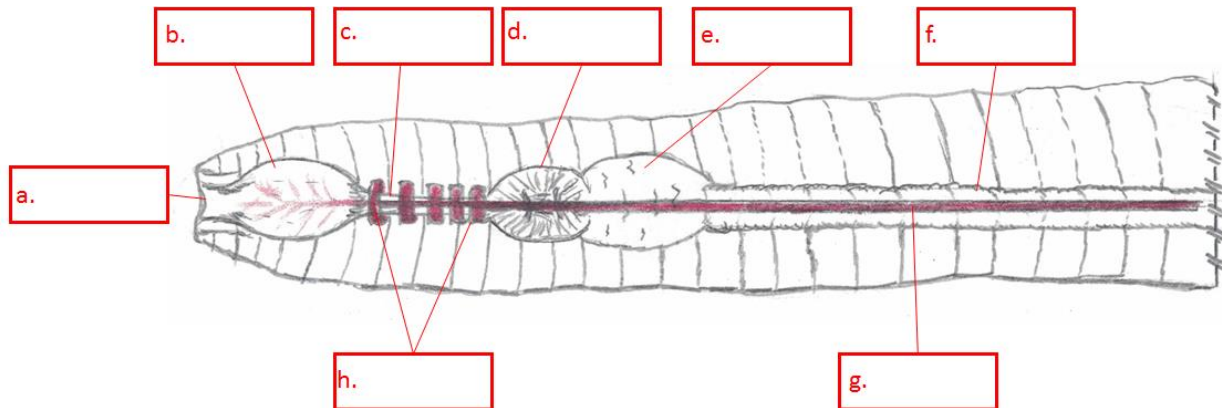


- 2. What is a coelom? Why is it significant in Annelids?
- 3. Name another characteristic sets the Annelids apart from other worms?
- 4. See the figure below:
  - a. Is this a dorsal view or a ventral view of the earthworm?
  - b. Identify the features of the external anatomy
    - a: \_\_\_\_\_
    - b: \_\_\_\_\_
    - c: \_\_\_\_\_
    - d: \_\_\_\_\_
    - e: \_\_\_\_\_
    - f: \_\_\_\_\_ (anterior or posterior?)
    - g: \_\_\_\_\_ (anterior or posterior?)



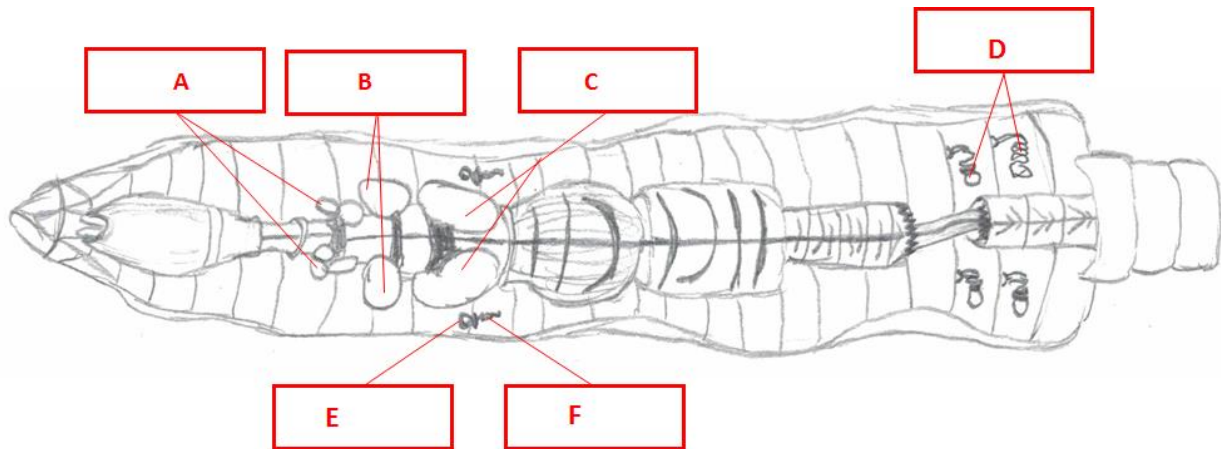
5. In the dissection, the earthworm is first cut from the clitellum to the mouth, and the outer epidermis is opened. See the figure below for a representation. (Some of the organs have been removed in order to visualize just the circulatory and digestive systems.)

- a. Is this a dorsal view or a ventral view of the earthworm?
  
- b. In this view, you can find most of the parts of the digestive system, and some components of the ciliary system. Identify the features by filling in the blanks:
  - a: \_\_\_\_\_
  - b: \_\_\_\_\_
  - c: \_\_\_\_\_
  - d: \_\_\_\_\_
  - e: \_\_\_\_\_
  - f: \_\_\_\_\_
  - g: \_\_\_\_\_
  - h: \_\_\_\_\_



6. The figure below shows some elements of the reproductive and excretory systems.

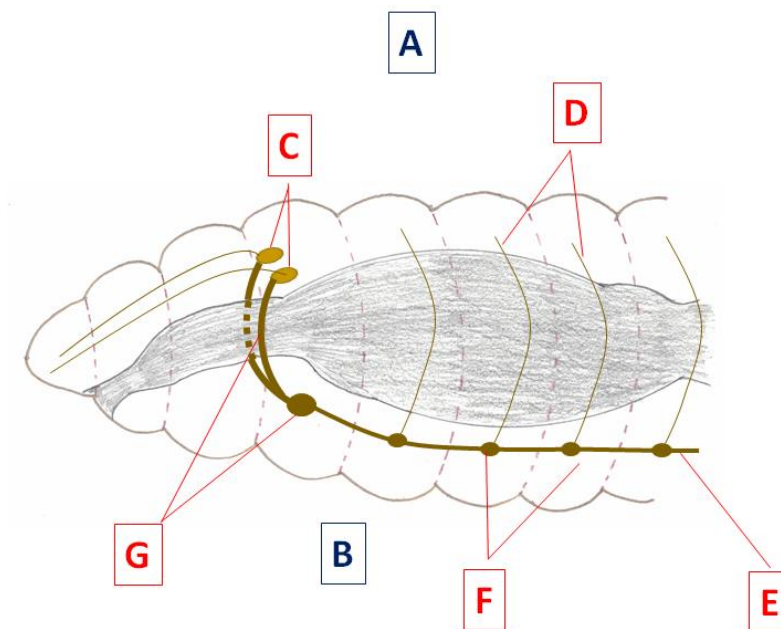
- a. Is this a dorsal view or a ventral view of the earthworm?
  
- b. Place the Letter in the Figure below that matches the name of the Structure:
  - \_\_\_\_\_ Nephridia
  - \_\_\_\_\_ Ovary
  - \_\_\_\_\_ Seminal vesicle
  - \_\_\_\_\_ Testes sac with testes
  - \_\_\_\_\_ Oviduct
  - \_\_\_\_\_ Seminal receptacle



7. This is a side (lateral) view of the earthworm with a view of the external segments superimposed on the internal organs.

a. Place the Letter in the Figure below that matches the name of the Structure:

- \_\_\_\_\_ Ventral side
- \_\_\_\_\_ Brain lobes
- \_\_\_\_\_ Fused nerve cords
- \_\_\_\_\_ Nerves branching to body parts
- \_\_\_\_\_ Dorsal side
- \_\_\_\_\_ Ventral nerve cord



8. This is a side (lateral) view of the earthworm with the first part of the digestive system drawn in. In this figure, you will identify parts of the circulatory system.
- What is the name of the kind of circulatory system that the earthworm has?

b. Place the Letter in the Figure below that matches the name of the Structure:

- \_\_\_\_\_ Aortic arches
- \_\_\_\_\_ Ventral blood vessel
- \_\_\_\_\_ Dorsal blood vessel
- \_\_\_\_\_ Anterior
- \_\_\_\_\_ Dorsal side
- \_\_\_\_\_ Ventral side

