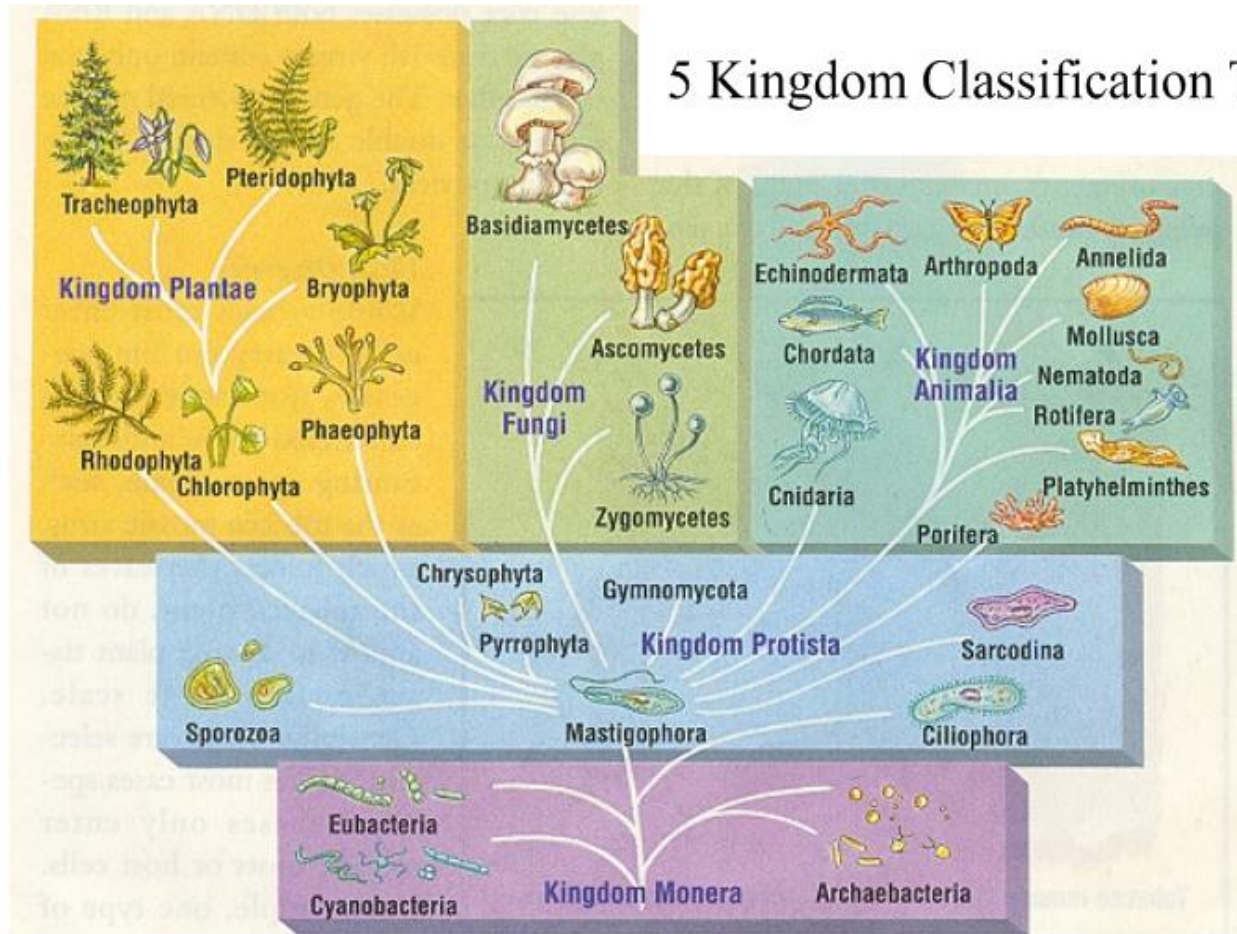


# 26-1 Introduction to the Animal Kingdom



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# 5 Kingdom Classification Tree



# What Is an Animal?



**Animals are multicellular, eukaryotic heterotrophs whose cells lack cell walls.**



**Animals carry out the following essential functions:**

- **feeding**
- **respiration**
- **circulation**
- **excretion**
- **response**
- **movement**
- **reproduction**

Many body functions help animals maintain homeostasis, or a relatively stable internal environment.

Homeostasis is often maintained by internal feedback mechanisms called feedback loops.

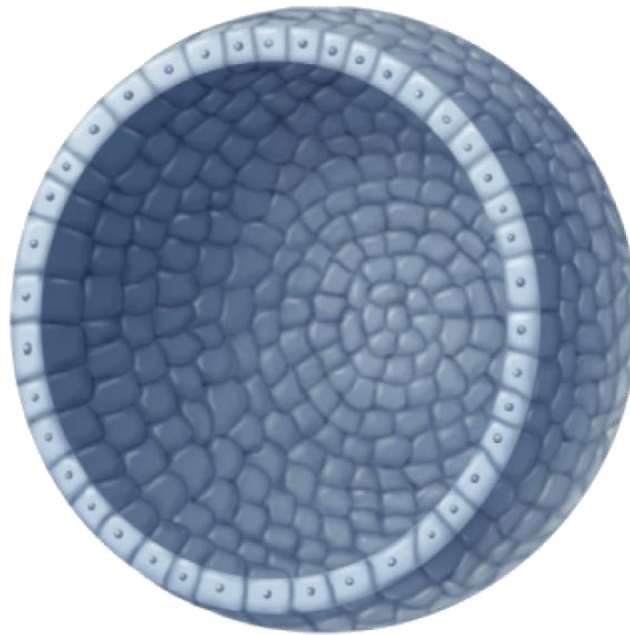
Most feedback loops involve **feedback inhibition**, in which the product or result of a process stops or limits the process.



## **Complex animals tend to have:**

- **high levels of cell specialization and internal body organization**
- **bilateral body symmetry**
- **a front end or head with sense organs**
- **a body cavity**

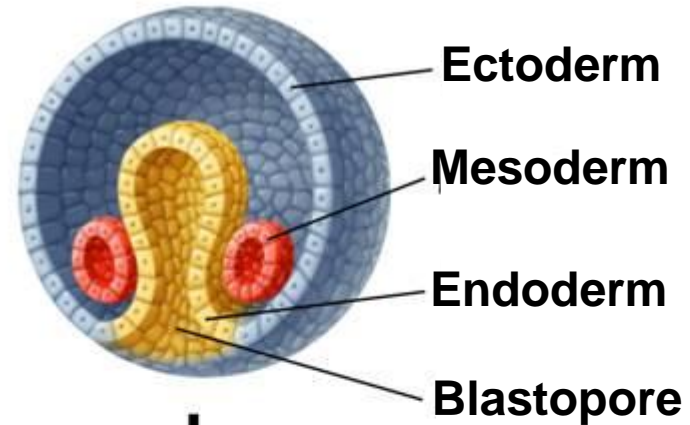
The zygote undergoes a series of divisions to form a **blastula**, a hollow ball of cells.



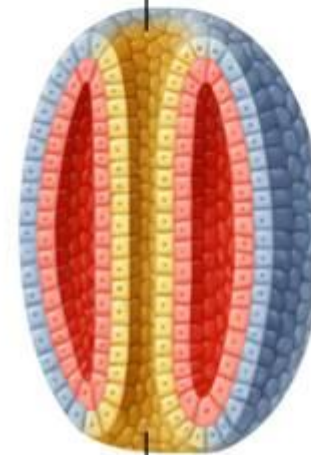
Blastula  
(cross section)

A **protostome** is an animal whose mouth is formed from the blastopore.

Most invertebrate animals are protostomes.



Anus

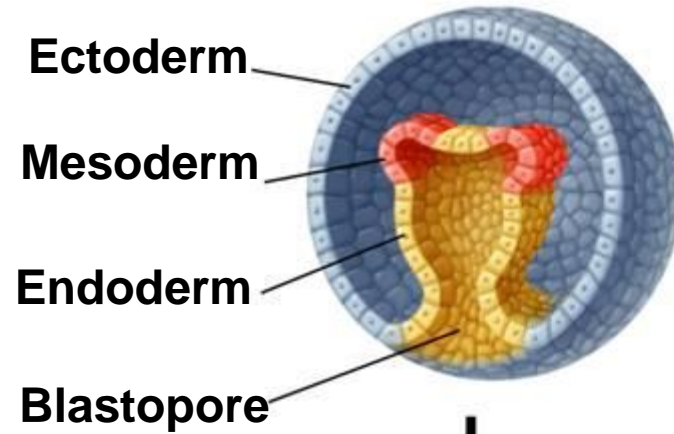


**Blastopore becomes mouth**

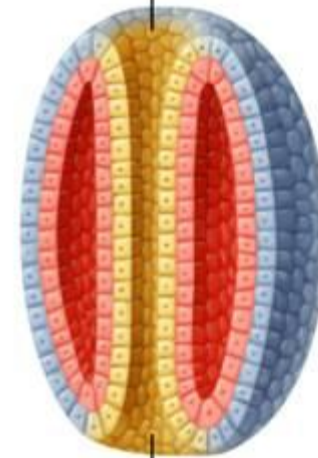


A **deuterostome** is an animal whose anus is formed from the blastopore.

The **anus** is the opening through which wastes leave the digestive tract.

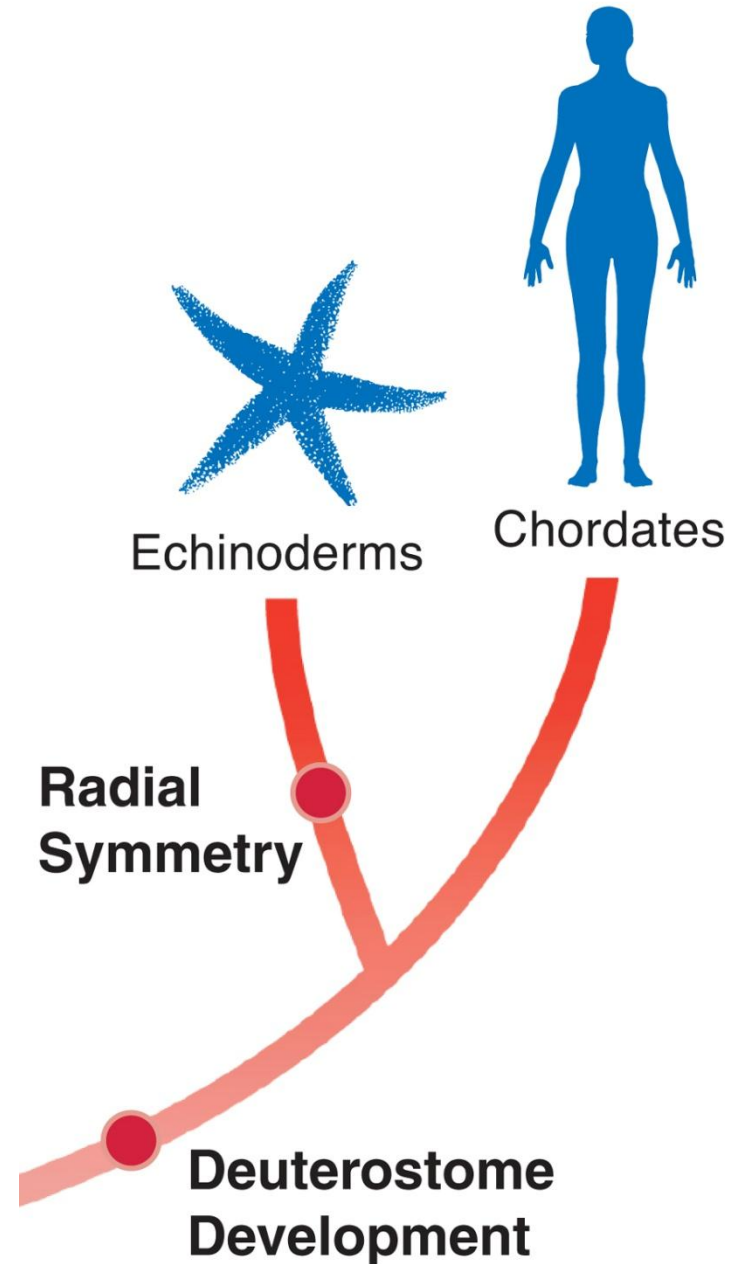


Mouth

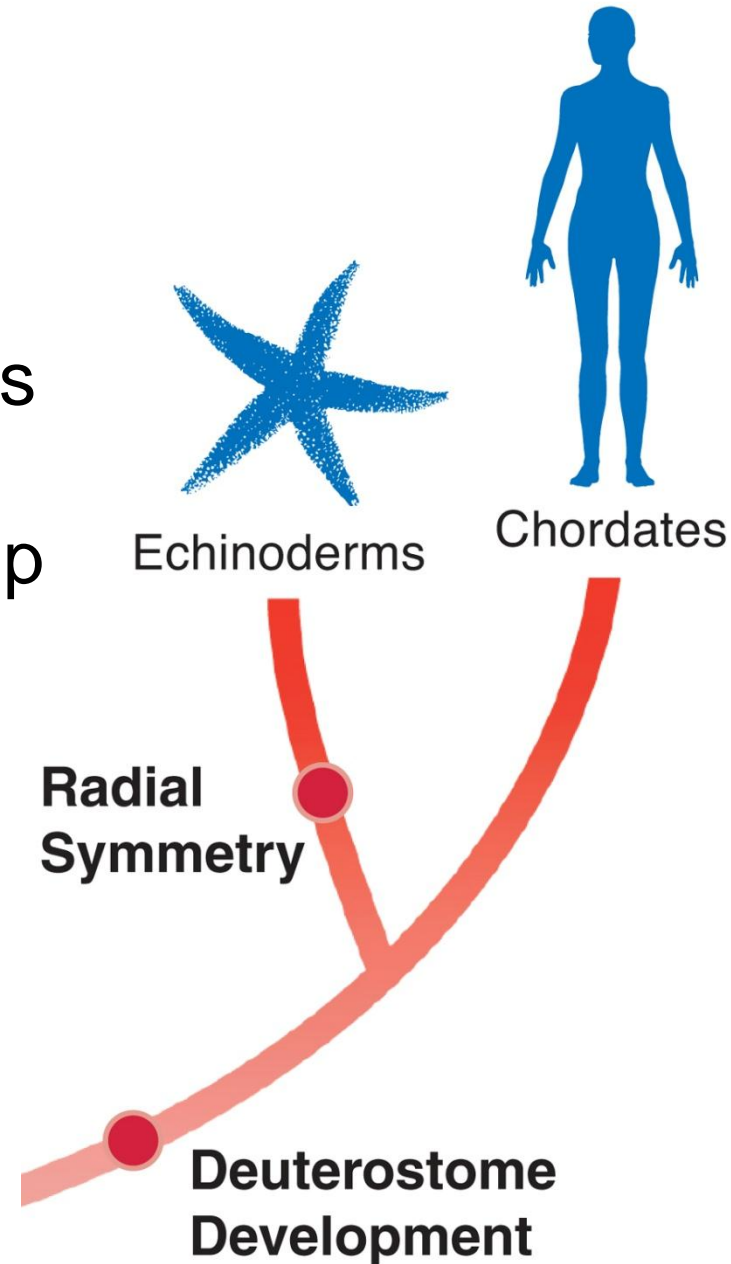


**Blastopore becomes anus**

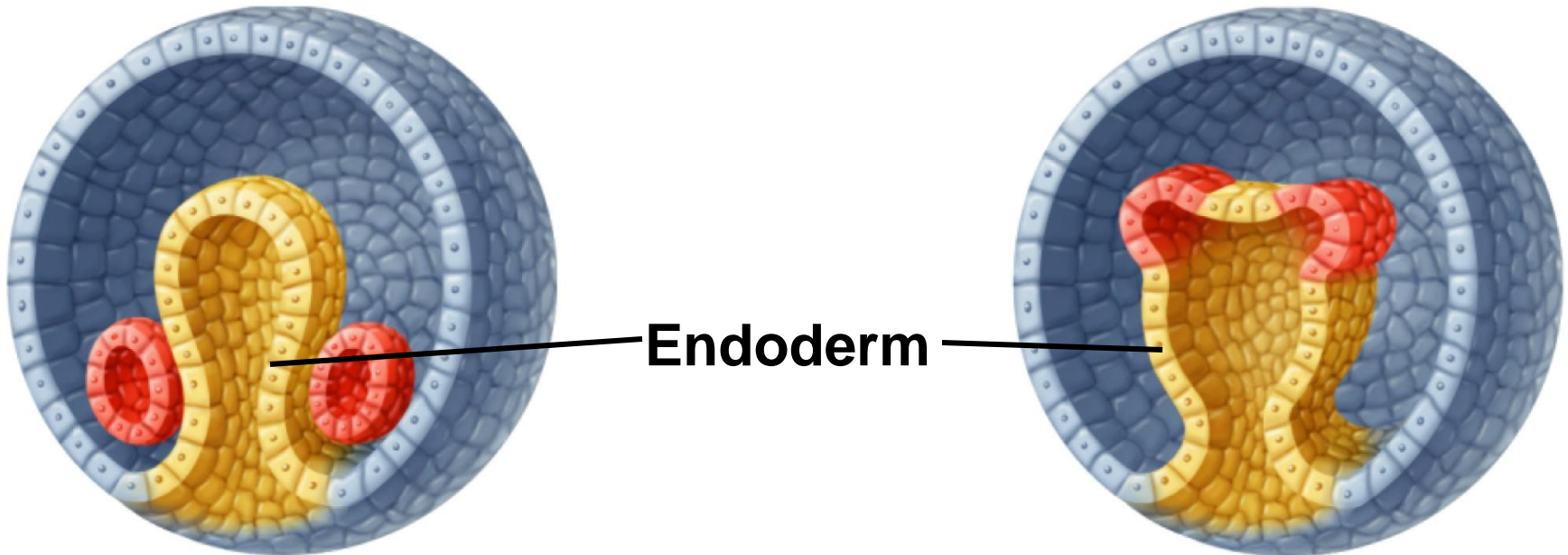
Echinoderms and vertebrates are both deuterostomes.



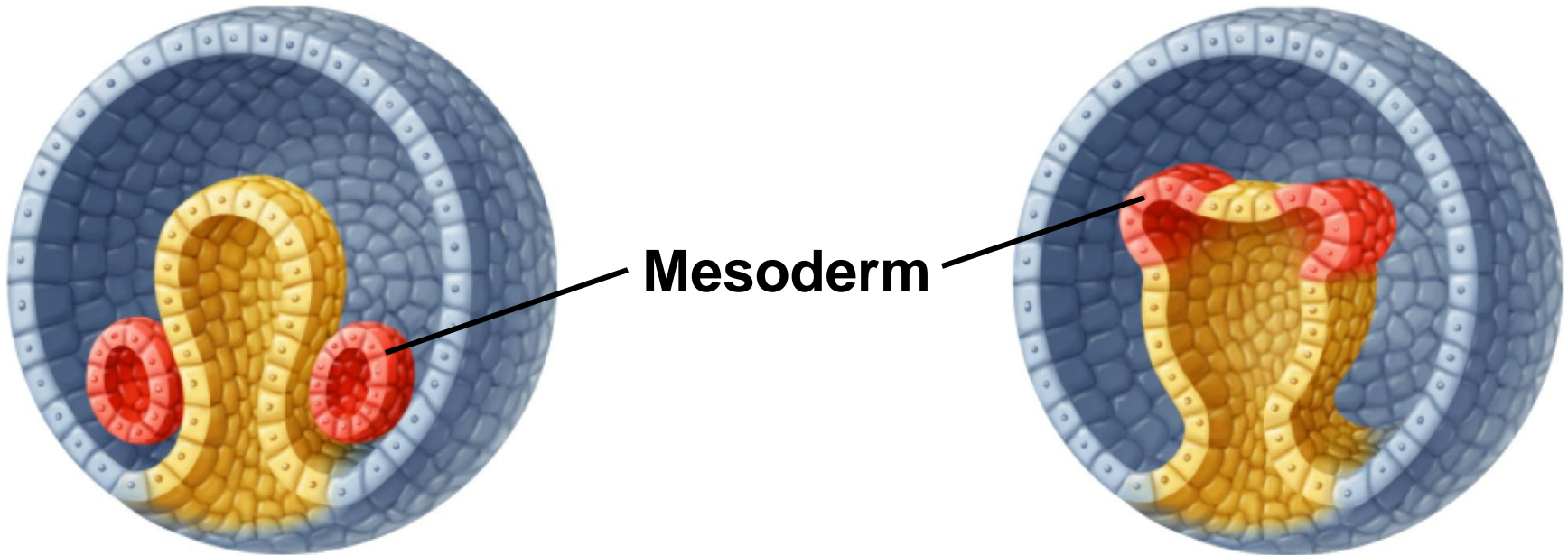
This similarity in embryology may indicate that vertebrates have a closer evolutionary relationship to echinoderms than to other invertebrates.



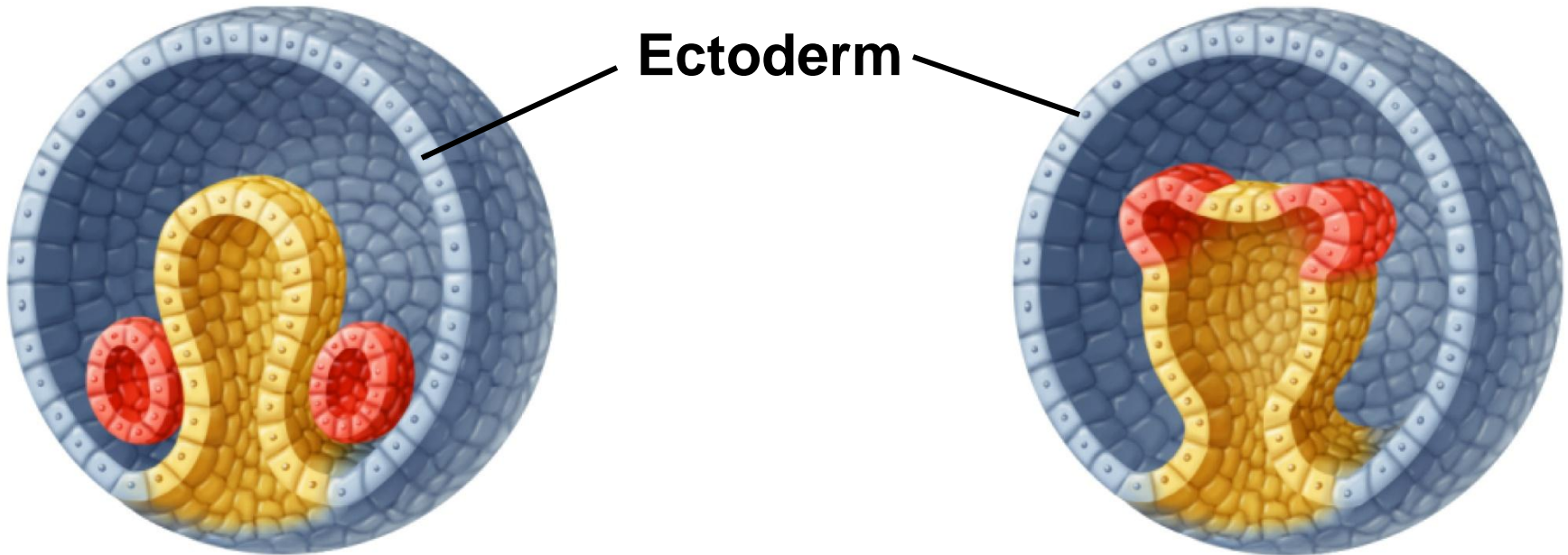
The cells of the **endoderm**, or innermost germ layer, develop into the linings of the digestive tract and much of the respiratory system.



The cells of the **mesoderm**, or middle layer, develop into muscles and much of the circulatory, reproductive, and excretory organ systems.



The **ectoderm**, or outermost layer, develops into the sense organs, nerves, and the outer layer of the skin.



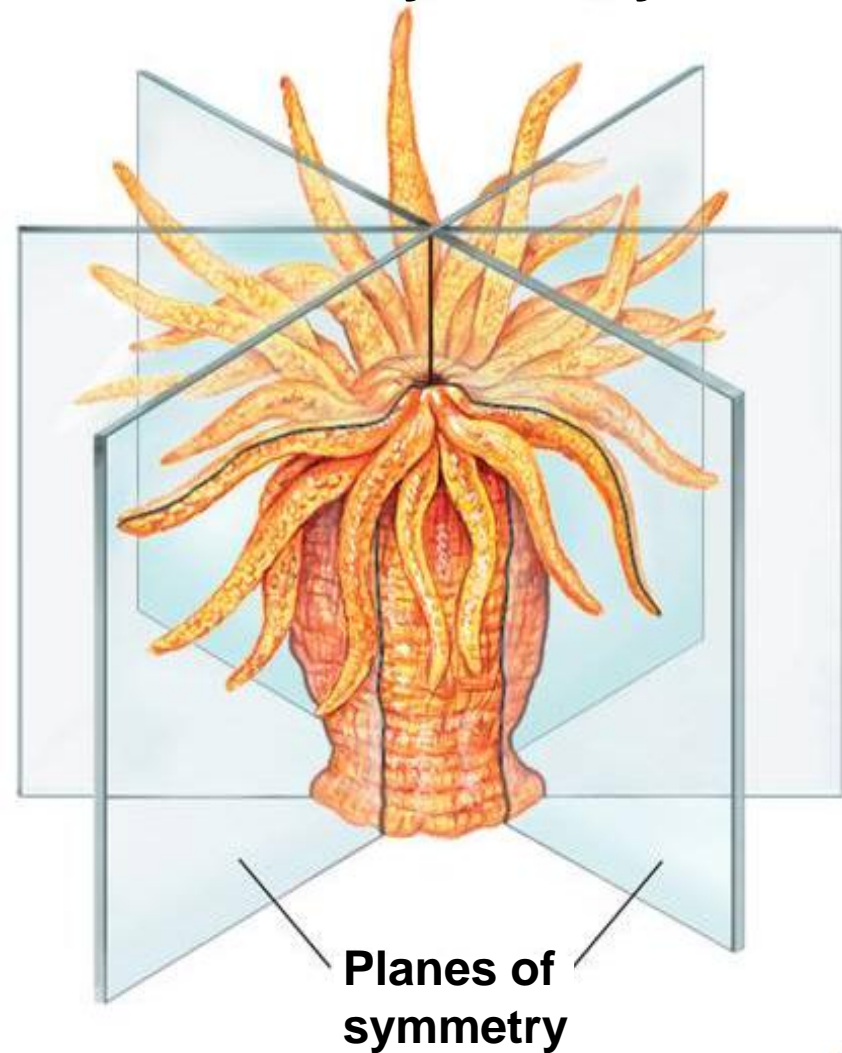
## Body Symmetry

Except for sponges, every animal exhibits some body symmetry in its structure.

Many simple animals, like the sea anemone, have body parts that repeat around the center of the body.

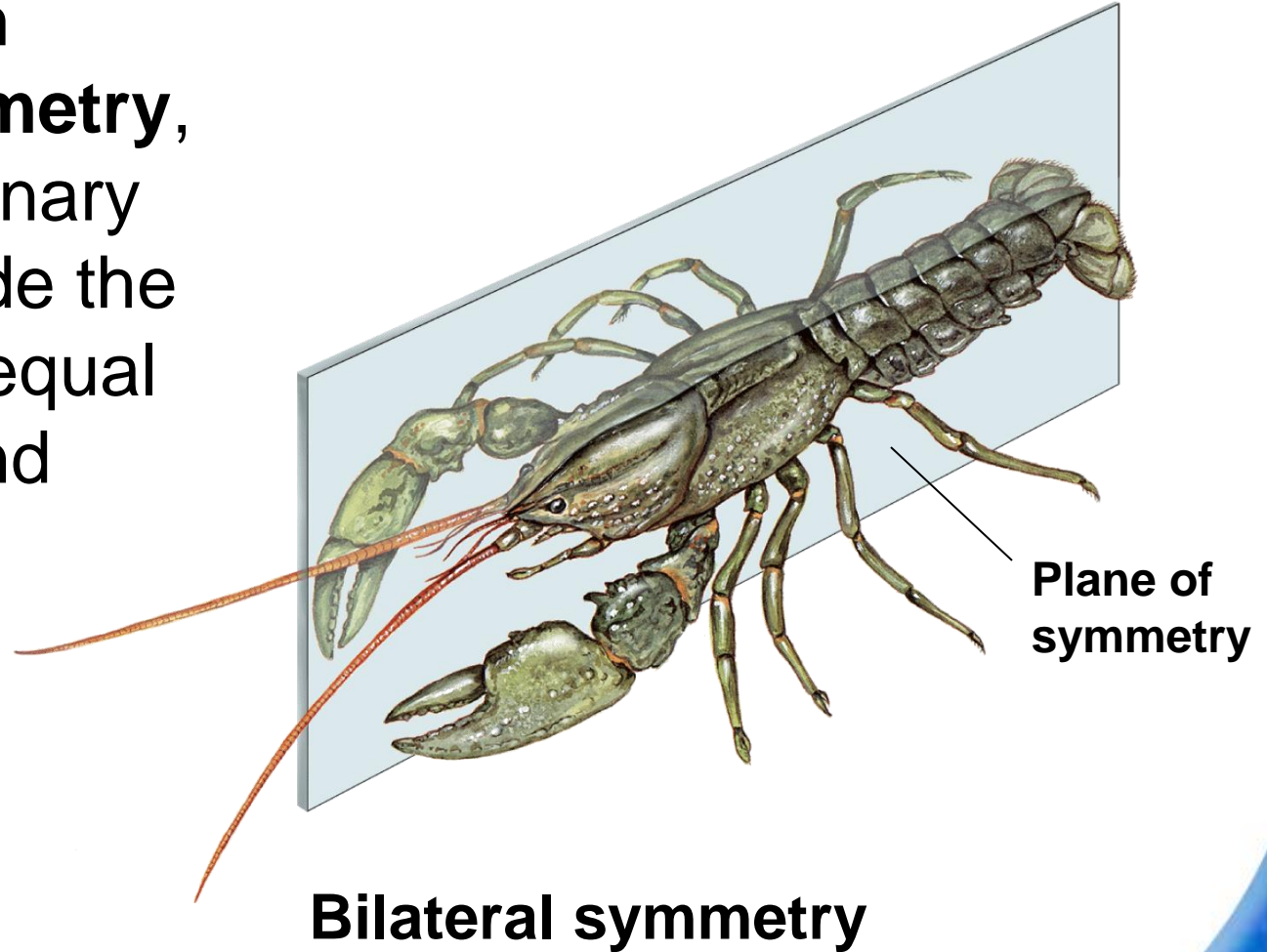
These animals exhibit **radial symmetry**, in which any number of imaginary planes can be drawn through the center, each dividing the body into equal halves.

## Radial symmetry



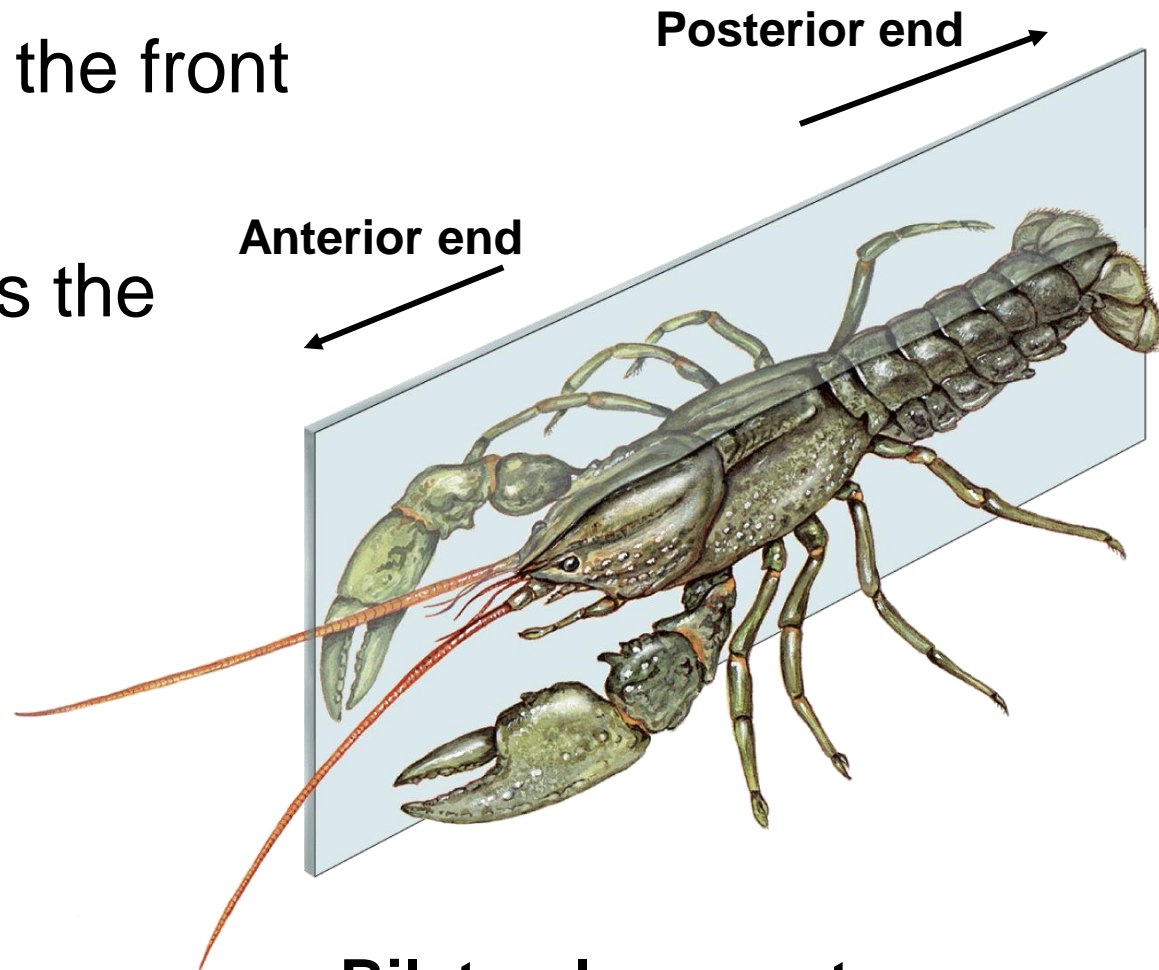


In animals with **bilateral symmetry**, only one imaginary plane can divide the body into two equal halves—left and right.



The anterior is the front end.

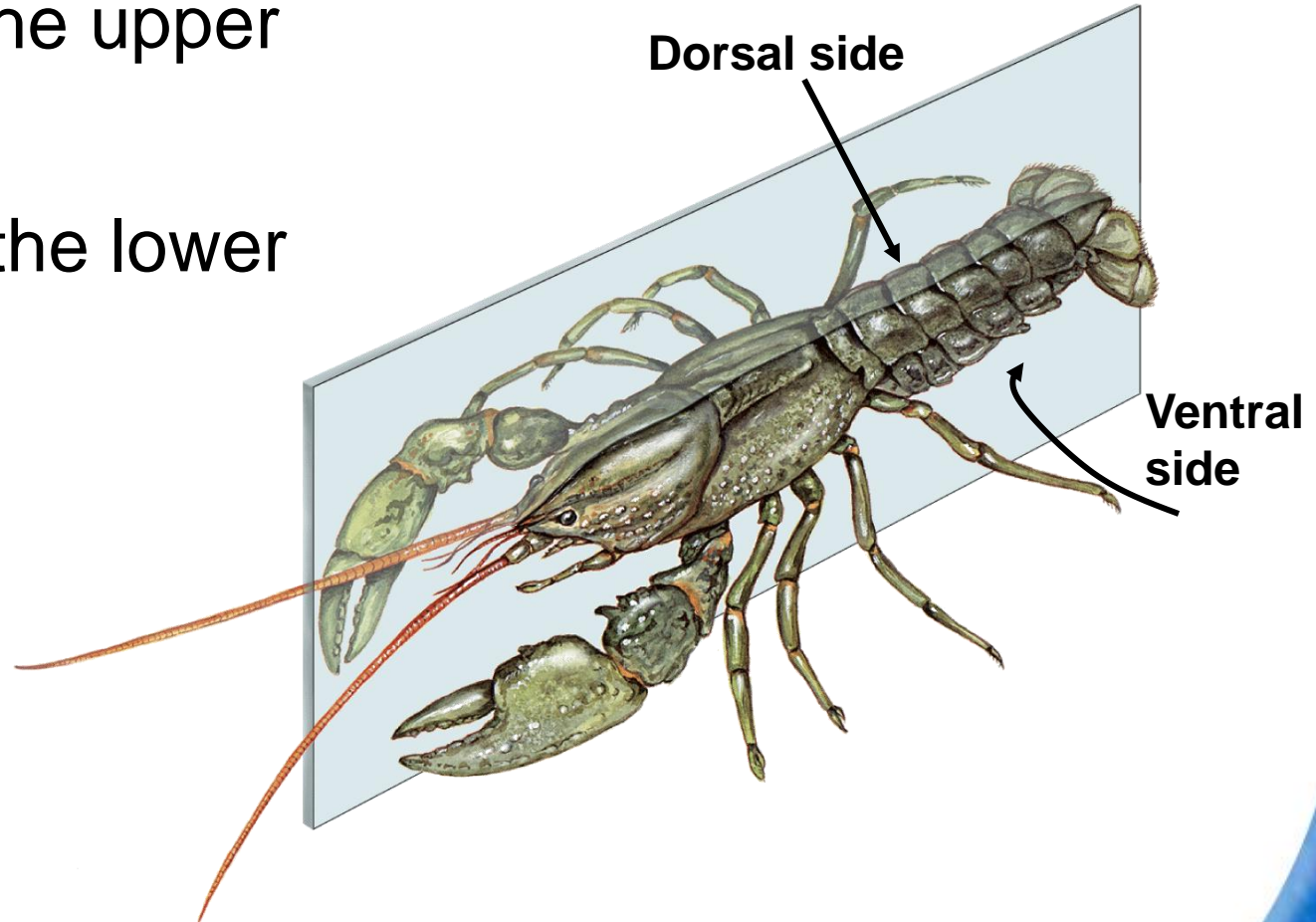
The posterior is the back end.



**Bilateral symmetry**

The dorsal is the upper side.

The ventral is the lower side.



**Bilateral symmetry**

Bilateral symmetry allows for segmentation, in which the body is constructed of many repeated and similar parts, or segments.

The combination of bilateral symmetry and segmentation is found in two successful animal groups—arthropods and vertebrates.

## Cephalization

Animals with bilateral symmetry exhibit **cephalization**, which is the concentration of sense organs and nerve cells at the front end of the body.

Animals with bilateral symmetry usually move with the anterior end forward, so this end comes in contact with new parts of the environment first.

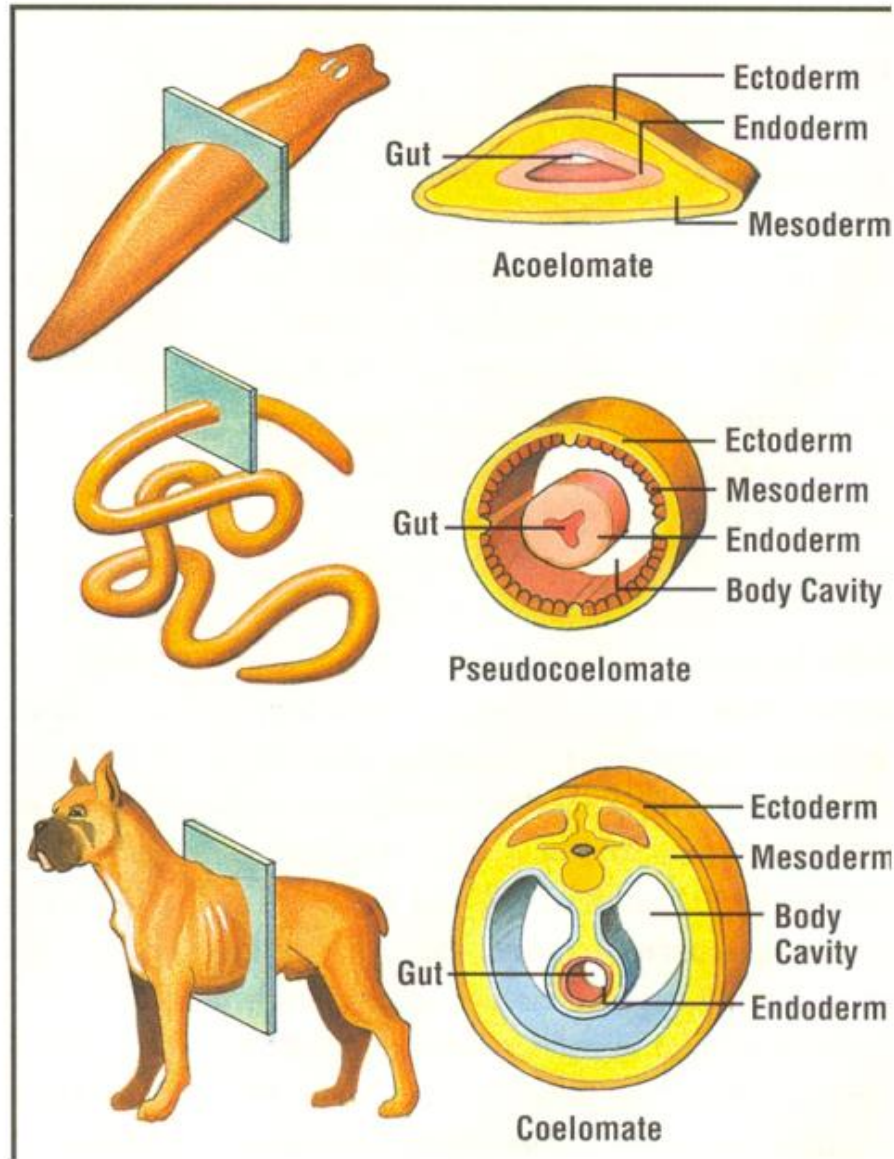
As sense organs have evolved, they have tended to gather at the anterior end, as have nerve cells that process information and “decide” what the animal should do.

## Body Cavity Formation

Most animals have a body cavity, a fluid-filled space between the digestive tract and body wall.

A body cavity provides a space in which internal organs can be suspended so that they are not pressed on by muscles or twisted out of shape by body movements.

# 26-1 Introduction to the Animal Kingdom → Body Cavity Formation





## 26-1 Section QUIZ

Continue to:

**Section QUIZ**

- or -

Click to Launch:



## 26-1 Section QUIZ

**1** Homeostasis is often maintained by feedback loops that involve

a. gastrulation.

**A** b. feedback inhibition.

c. spontaneous generation.

d. equilibrium.

## 26-1 Section QUIZ

**2** Animals respond to events in their environments using specialized cells called

a. muscle cells.

**A** b. nerve cells.

c. gametes.

d. blood cells.

## 26-1 Section QUIZ

**3** A characteristic that all animals share is being

**A** a. heterotrophic.

b. autotrophic.

c. prokaryotic.

d. anaerobic.

**4** Excretion is a function of all animals that involves

- a. exchange of oxygen and carbon dioxide.
- b. transport of material from one part of the body to another.
- c. digestion and absorption of food molecules.

**A** d. removal of metabolic wastes.

## 26-1 Section QUIZ

**5** One major trend in animal evolution has been

- a. the simplification of body organ systems.

**A** b. an increase in the degree of cephalization.

- c. a shift from bilateral symmetry to radial symmetry.

- d. disappearance of the blastula stage in early development.

**END OF SECTION**