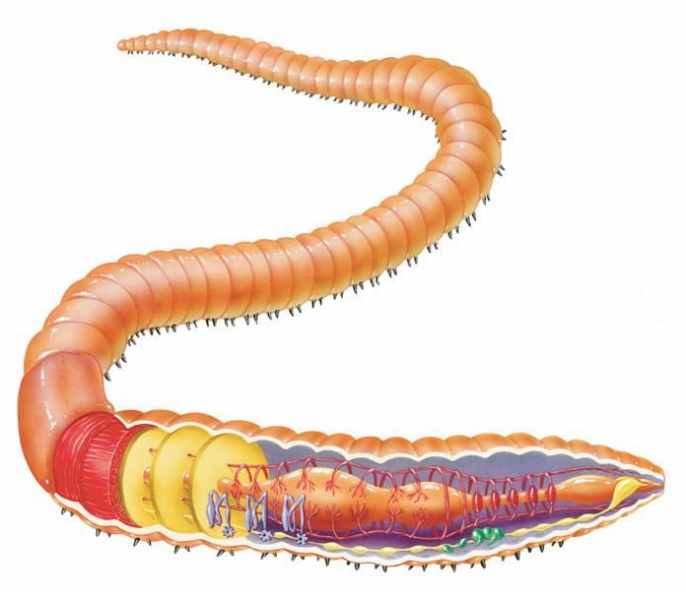
What Is an Annelid?

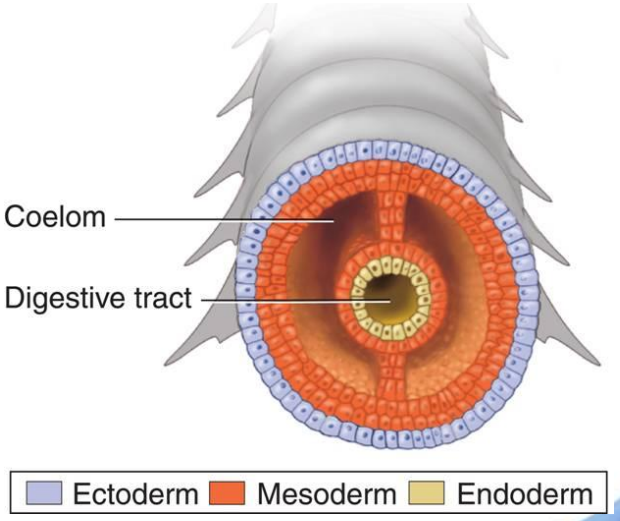
Phylum: Annelidae



Annelids are worms with segmented bodies. They have a true coelom that is lined with tissue derived from mesoderm.

The body of an annelid is divided into segments. Each segment is separated by **septum**, which are internal walls between each segment.

Three Germ Layers of an Annelid



Body segments may carry eyes, antennae, other sense organs, or be specialized for functions such as respiration.

Bristles called **setae** may be attached to each segment.

Annelids have a tube-within-a-tube digestive tract that food passes through from the mouth to the anus.

Form and Function in Annelids

Annelids have complex organ systems. Many of these systems are unique because of the segmented body plan of this group.

Feeding and Digestion

In carnivorous species, the pharynx usually holds two or more sharp jaws that are used to attack prey.

Annelids that feed on decaying vegetation have a pharynx covered with sticky mucus.

Other annelids obtain nutrients by filter feeding.

In earthworms, the pharynx pumps food and soil into the esophagus.

The food then moves through the crop, where it can be stored.

It then moves through the **gizzard**, where it is ground into smaller pieces.

The food is absorbed farther along in the digestive tract in the intestine.

Circulation

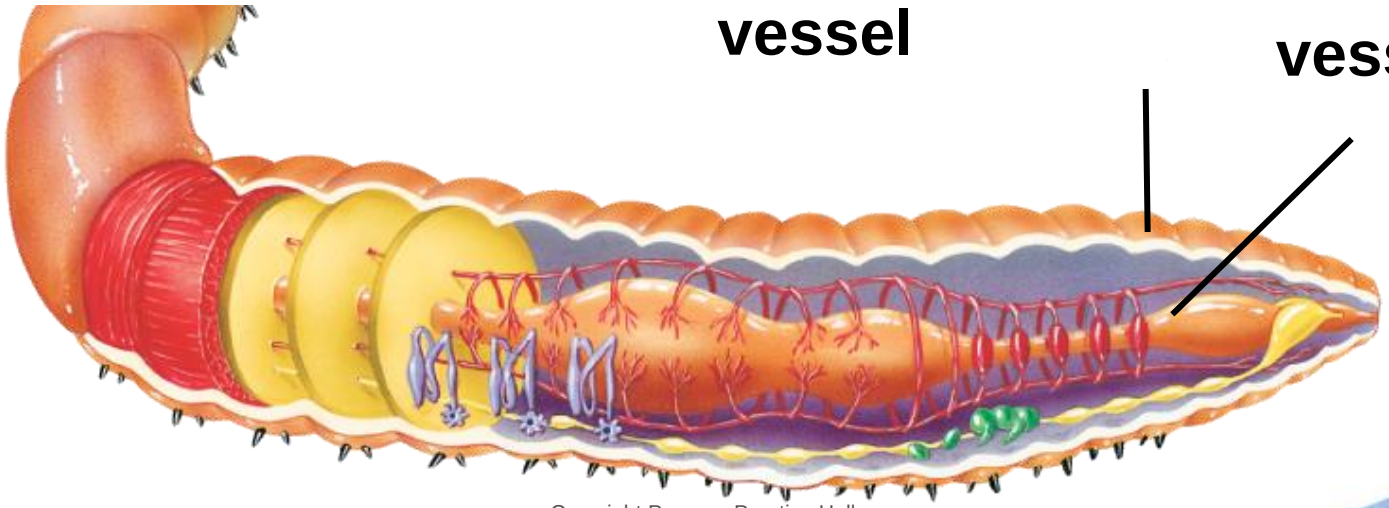
- Annelids typically have a closed circulatory system, in which blood is contained within a network of blood vessels.

Blood in the dorsal (top) vessel moves toward the head of the worm.

The dorsal blood vessel functions like a heart because it contracts rhythmically and helps pump blood.

Blood in the ventral (bottom) vessel runs from head to tail.

In each body segment, a pair of smaller blood vessels connect the dorsal and ventral blood vessels and supply blood to the internal organs.



Respiration

Aquatic annelids often breathe through gills.

A gill is an organ specialized for the exchange of gases underwater.

Land-dwelling annelids take in oxygen and give off carbon dioxide through their moist skin.

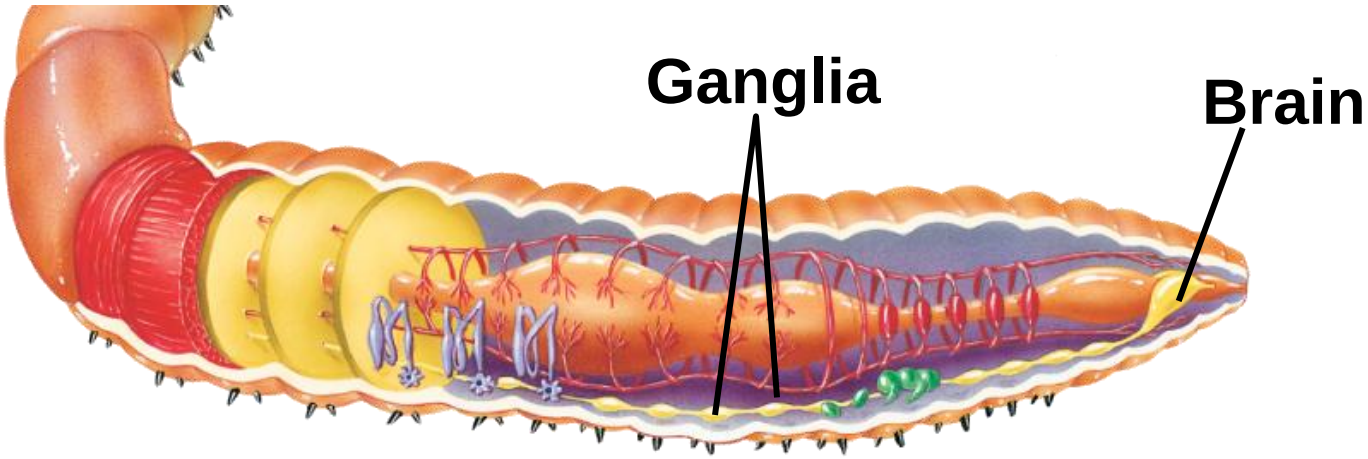
Excretion

Digestive waste passes out through the anus.

Cellular waste containing nitrogen is eliminated by nephridia - organs that filter fluid in the coelom

Response

Most annelids have a well-developed nervous system consisting of a brain and several nerve cords.



Movement

Annelids have two groups of body muscles that function as part of a hydrostatic skeleton. Longitudinal muscles run from the front of the worm to the rear and can contract to make the worm shorter and fatter.

Circular muscles wrap around each body segment and can contract to make the worm longer and thinner.

The earthworm moves by alternately contracting these two sets of muscles.

Reproduction

- Most annelids reproduce sexually.
- Some species use external fertilization and have separate sexes.
- Other annelids are hermaphrodites. Two worms attach to each other, exchange sperm, and then store the sperm in special sacs.

Groups of Annelids

Annelids are divided into three classes

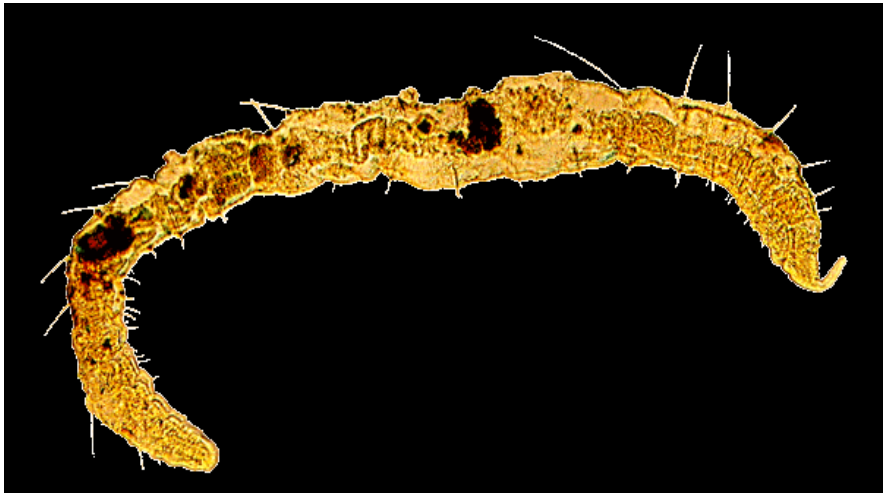
- Oligochaetes - earthworms and their relatives
- Hirudinea - the leeches
- Polychaetes - sandworms, bloodworms, and their relatives.

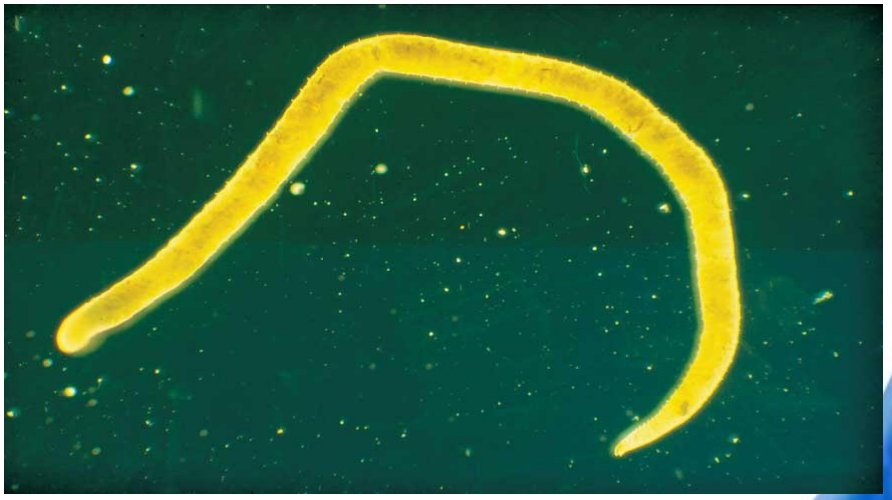
Ecology of Annelids

Earthworms and many other annelids spend their lives burrowing through soil, aerating and mixing it. Earthworms help plant matter decompose. Earthworm castings are rich in nitrogen, phosphorus, potassium, micronutrients, and beneficial bacteria.

Polychaeta

Oligochaeta





Hirudinea

27-3 Annelids

Phylum: Molluska

What Is a Mollusk?

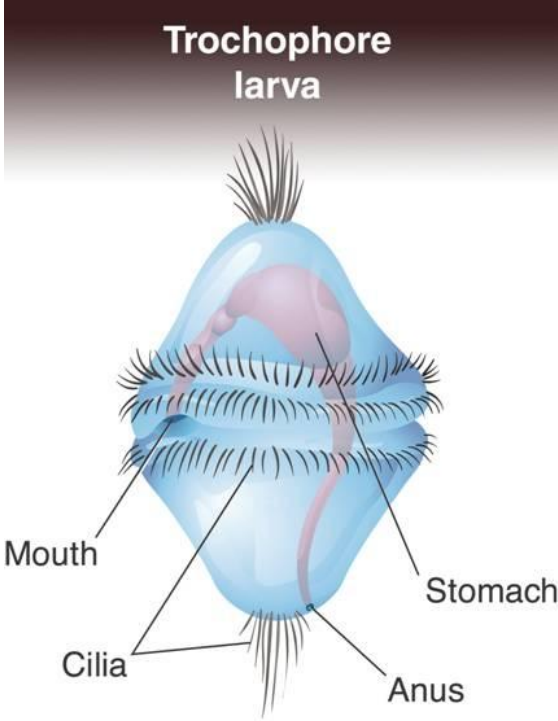
Mollusks are soft-bodied animals that usually have an internal or external shell.

Mollusks include snails, slugs, clams, squids, and octopi.

Many mollusks share similar developmental stages.

Many aquatic mollusks have a free-swimming larval stage called a **trochophore**.

The trochophore larva is also characteristic of annelids, indicating that these two groups may be closely related.



Form and Function in Mollusks

Mollusks have true coeloms surrounded by mesoderm tissue.

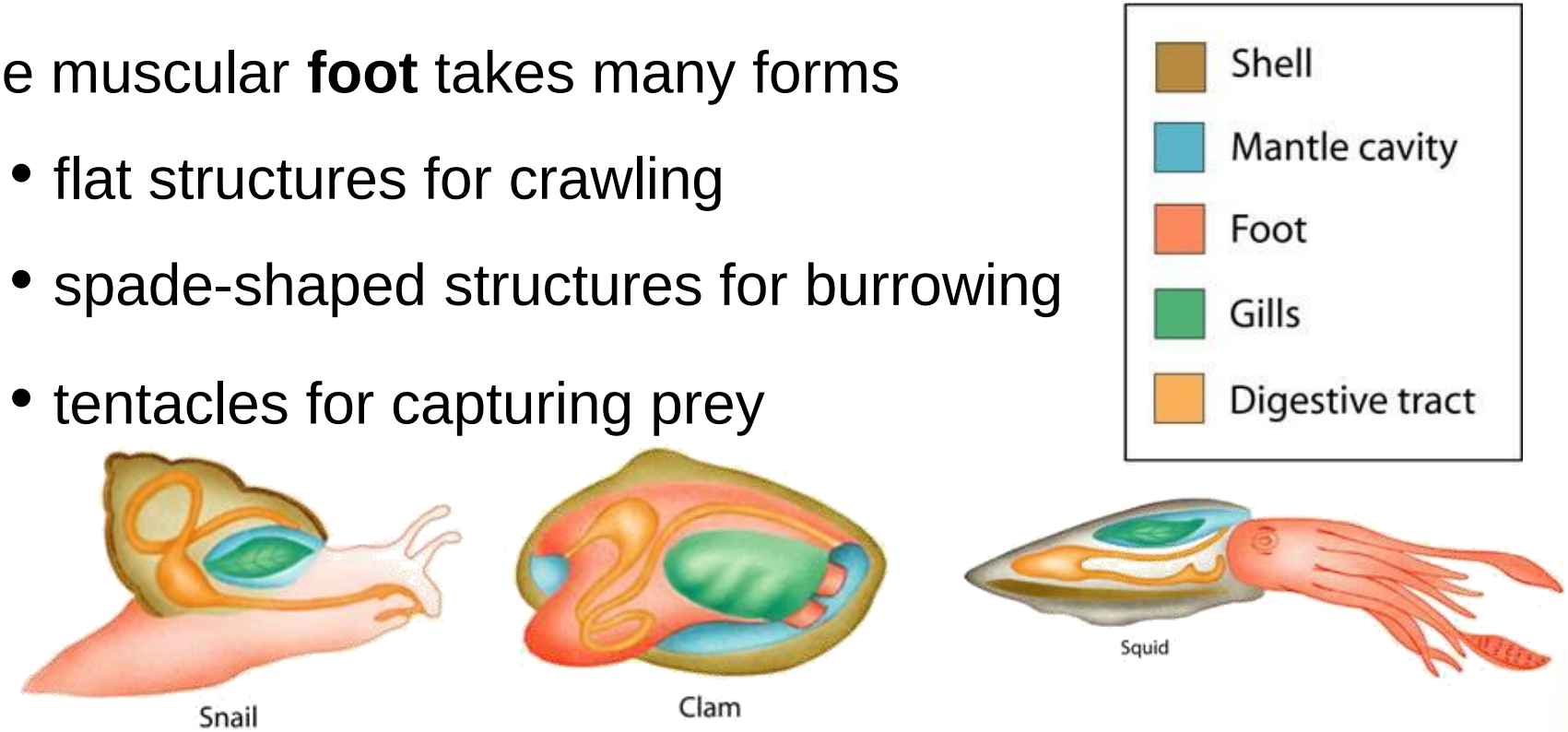
They have complex, interrelated organ systems that function together to maintain the body as a whole.

Body Plan

The body plan of most mollusks has four parts: foot, mantle, shell, and visceral mass.

The muscular **foot** takes many forms

- flat structures for crawling
- spade-shaped structures for burrowing
- tentacles for capturing prey

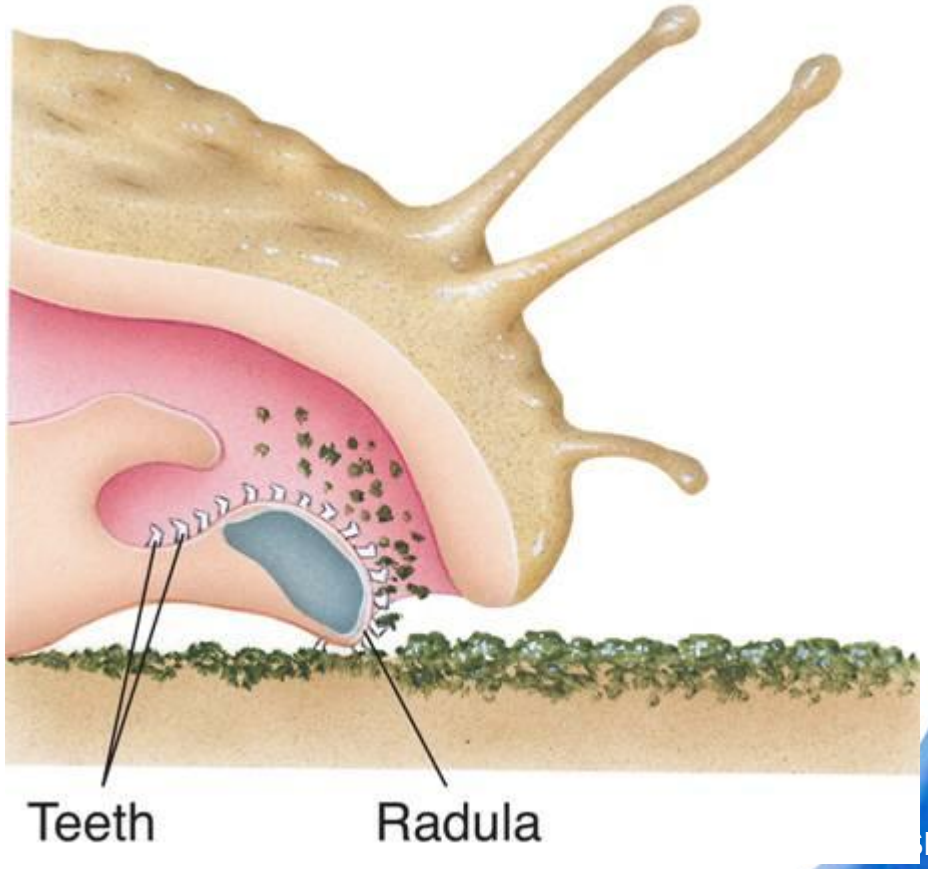


The **mantle** is a thin layer of tissue that covers most of the mollusk's body.
The shell is made by glands in the mantle that secrete calcium carbonate.
Just beneath the mantle is the **visceral mass**, which contains the internal organs.

Feeding

Mollusks can be herbivores, carnivores, filter feeders, detritivores, or parasites.

Snails and slugs feed using a flexible, tongue-shaped structure known as a **radula**.
Hundreds of tiny teeth are attached to the radula.
The radula is used to scrape algae off rocks or to eat the soft tissues of plants.

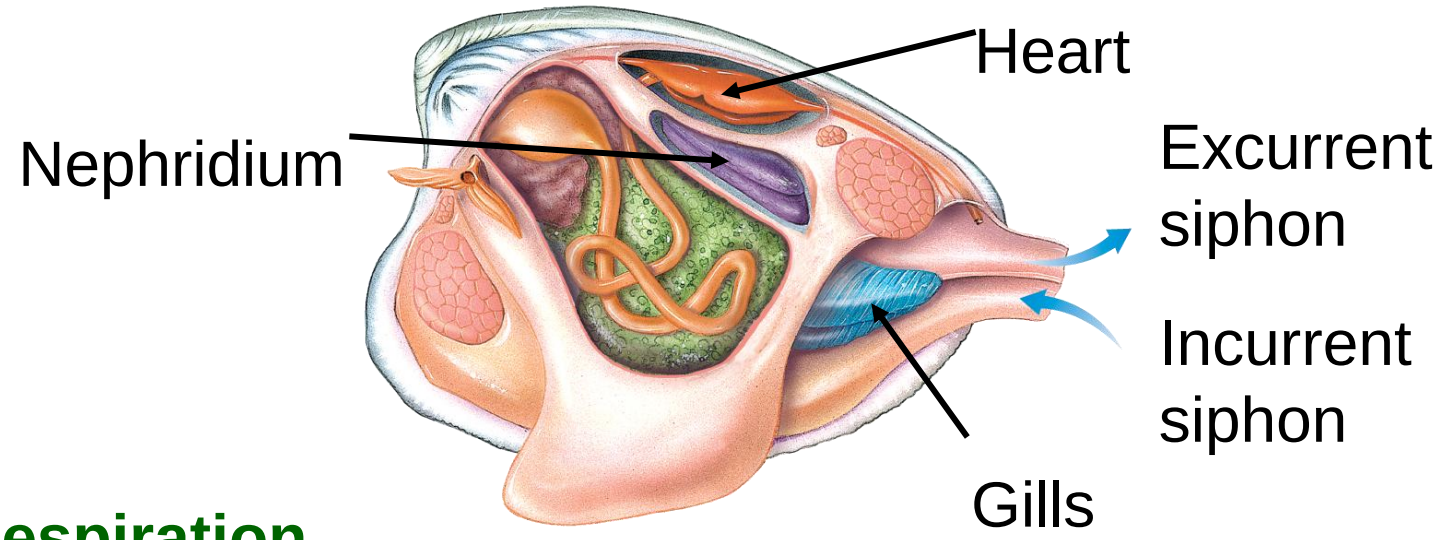


Clams, oysters, and scallops use gills.

Food is carried by water, which enters the incurrent siphon.

A siphon is a tubelike structure through which water enters and leaves the body.

The water flows over the gills and leaves by the excurrent siphon.



Respiration

Aquatic mollusks breathe using gills inside their mantle cavity.

As water passes through the mantle cavity, oxygen in the water moves into blood flowing through the gills.

At the same time, carbon dioxide moves in the opposite direction.

Land snails and slugs respire using a mantle cavity that has a large surface area lined with blood vessels.

Circulation

Some mollusks have open circulatory systems (no vessels); other mollusks have closed circulatory systems (blood vessels).

Blood leaves the vessels and works its way through different sinuses.

Blood passes from the sinuses to the gills, where oxygen and carbon dioxide are exchanged. Blood is then pumped back to the heart.

Slow-moving mollusks often have open circulatory systems.

Faster-moving mollusks have a closed circulatory system.

A closed circulatory system can transport blood through an animal's body much more quickly than an open circulatory system.

Excretion

Cells of the body release nitrogen-containing waste into the blood in the form of ammonia – through nephridia.

Response

The complexity of the nervous system and the ability to respond to environmental conditions varies among mollusks.

Two-shelled mollusks have a simple nervous system.

Octopi and their relatives have the most highly developed nervous system of all invertebrates.

Well-developed brains in these animals allows them to remember things for long periods.

Movement

Snails secrete mucus along the base of the foot, and then move over surfaces using a rippling motion of the foot.

The octopus draws water into the mantle cavity and then forces the water out through a siphon.

Water leaving the body propels the octopus in the opposite direction.

Reproduction

Some mollusks reproduce sexually by external fertilization.

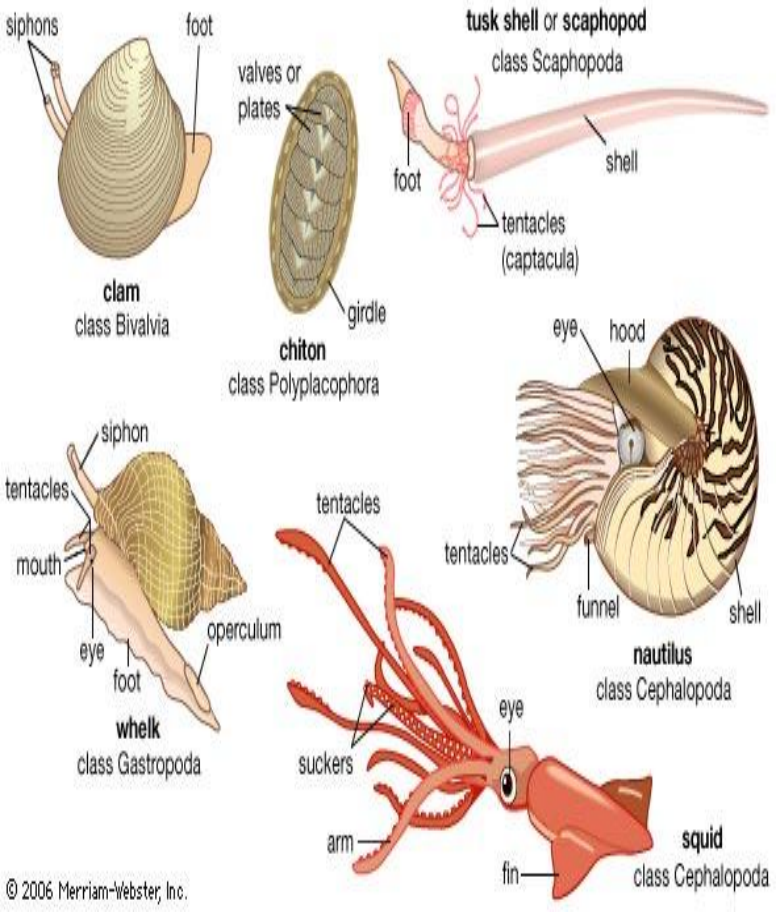
In other mollusks, fertilization takes place inside the body of the female.

Some mollusks are hermaphrodites and usually fertilize eggs from another individual.

Groups of Mollusks

The three major classes of mollusks are

- Gastropods - shell-less or single-shelled mollusks that move by using a muscular foot located on the ventral side.
- Bivalves - two shells that are held together by one or two powerful muscles
- Cephalopods - soft-bodied mollusks in which the head is attached to a single foot – with foot is divided into tentacles or arms



27-3 Annelids