Bilateria

- Bilaterian animals have bilateral symmetry and triploblastic development.
- The clade Bilateria contains Lophotrochozoa, Ecdysozoa, and Deuterostomia.
- Lophotrochozoa includes the flatworms, rotifers, ectoprocts, brachiopods, molluscs, and annelids.

Platyhelminthes: Flatworms

- Members of this phylum live in marine, freshwater, and damp terrestrial habitats. Some of them are parasites of both invertebrates and vertebrates including humans.
- They are flattened dorsoventrally and have a gastrovascular cavity.
- Gas exchange takes place across the surface, and **protonephridia** regulate the osmotic balance.

Rotifera

Rotifers, phylum Rotifera, are tiny animals that inhabit freshwaters, the ocean, and damp soil.

The word rotifer is derived from the Latin meaning "wheel-bearer," a reference to the crown of **cilia** that draws a vortex of water into the mouth.

Rotifers' size range between 50 µm to 2 mm. Some are smaller than many protists but they are **multicellular** and have specialized organ systems.

In contrast to cnidarians and flatworms, which have a gastrovascular cavity, rotifers have an alimentary canal, (=a digestive tube with two openings, a mouth and an anus).

Rotifers exhibit an unusual form of reproduction.
Some species consist of **only** females that produce more females from unfertilized eggs, a type of asexual reproduction called **parthenogenesis**. (NO MALES exist)

Some other invertebrates (for example some bees) and even some vertebrates (for example some fishes) can also reproduce in this way.

Some rotifers can also reproduce **sexually** under certain conditions, such as high levels of crowding. The resulting embryos can remain **dormant** for years. Once they break dormancy, the embryos develop into another generation of females that reproduce asexually.

Lophophorates: Ectoprocts and Brachiopods

- Lophophorates are animals that have a horseshoe-shaped, suspension-feeding organ with ciliated tentacles; called ***lophophore***. As the cilia draw the water towards the mouth, the tentacles trap suspended food particles.
- Lophophorates include two phyla: Ectoprocta (also called bryozoans) and Brachiopoda

Ectoprocts (from the Greek ecto, outside, and procta, anus) are colonial animals that superficially resemble clumps of moss. (In fact, their common name, bryozoans, means “moss animals”) .

In most species, the colony is encased in a hard exoskeleton with pores through which the lophophores extend. Most ectoproct species live in the sea, but also in lakes and rivers. They are generally sessile animals.

Brachiopods, or lamp shells, resemble tiny clams (bivalve molluscs), but the two halves of the brachiopod shell are dorsal and ventral rather than lateral, as in clams. All brachiopods are marine. Most live attached to the seafloor by a stalk, opening their shell slightly to allow water to flow through the lophophore.

Mollusca

Phylum Mollusca includes snails and slugs, oysters and clams, and octopus and squids. Most molluscs are marine, but some inhabit fresh water and some are terrestrial.

They are the second most diverse phylum of animals (after the arthropods) (100,000 known species).

All molluscs are soft-bodied, and most secrete a hard protective external shell made of calcium carbonate.

Slugs, squids, and octopus have a reduced internal shell or have lost their shell completely during their evolution.

Mollusc bodies have three main parts:

- a muscular foot, usually used for movement;
- a visceral mass containing most of the internal organs;
- and a mantle, a fold of tissue that covers the visceral mass and secretes a shell (if present).

Many molluscs feed by using a **rough tongue** called ***radula*** to scrape up food.

- There are four major classes of molluscs:
  - Polyplacophora (chitons)
  - Gastropoda (snails and slugs)
  - Bivalvia (clams, oysters, and other bivalves)
  - Cephalopoda (squids, octopuses, cuttlefish, and chambered nautiluses)

Phylum: Annelida

- Annelida means “little rings,” referring to the annelid body’s resemblance to a series of fused rings.
- Annelids live in the sea, in most freshwater habitats, and in damp soil. They can be carnivore, herbivore, scavenger, deposit feeders, and filter feeders.
- Since they have weak defense mechanisms, most of them remain in a burrow or secreted tube.

- On each side of the animal, there may a **parapod** (parapodia) consisting of fleshly lobes, which are supported by chitinous rods (called **setae**).
- There is one or more pairs of chitinous setae in each segment (on each parapod). Setae can be sharp.
- They are used for protection and/or locomotion.

In the past (and still in some sources), the phylum Annelida was divided into 3 main classes: **Polychaeta, Oligochaeta**, and **Hirudinea**. The names of the first two of these groups reflects the relative number of setae, bristles made of chitin on their bodies.

Polychaetes (from the Greek poly, many, and chaitē, long hair) have more chaetae per segment than oligochaetes.

Oligochaeta : Earthworms

- This class includes about 3,500 species of earthworms and freshwater worms. Most are burrowers in the soil, but this class also includes worms that inhabit wells, marshes, and swamps. Other species live under rocks on the seashore, in the leaves of tropical trees and vines.
- Like the polychaetes, oligochaetes have bodies divided into segments. However, they lack parapodia and, with a few exceptions, have relatively few and inconspicuous setae.

Polychaeta

- The majority of the polychaete worms are marine; some are also found in fresh or brackish water. The polychaetes, so named because of the numerous setae (chaetae) they bear. This class includes both sedentary and motile species.

Hirudinea = Leeches

- Members of the class Hirudinea are primarily freshwater annelids, but some live in the ocean. The majority of leeches are predators on small invertebrates; some leeches are parasites and suck the body fluids of their victims without killing them.

Ecdysozoa

- The clade Ecdysozoa includes animals that shed a tough external coat (**cuticle**) as they grow. The group derives its name from this process, which is called ***ecdysis***, or **molting**.

- The two largest phyla belong to Ecdysozoa are nematodes and arthropods.

Nematoda = Roundworms

- Nematodes, or roundworms, are found in most aquatic habitats, in the soil, in the moist tissues of plants, and in body fluids and tissues of animals. Some are decomposers, some are predators, and some of them are parasites (including plants).

- They are the most wide-spread animal group on earth.

- They have an alimentary canal, but lack a circulatory system.