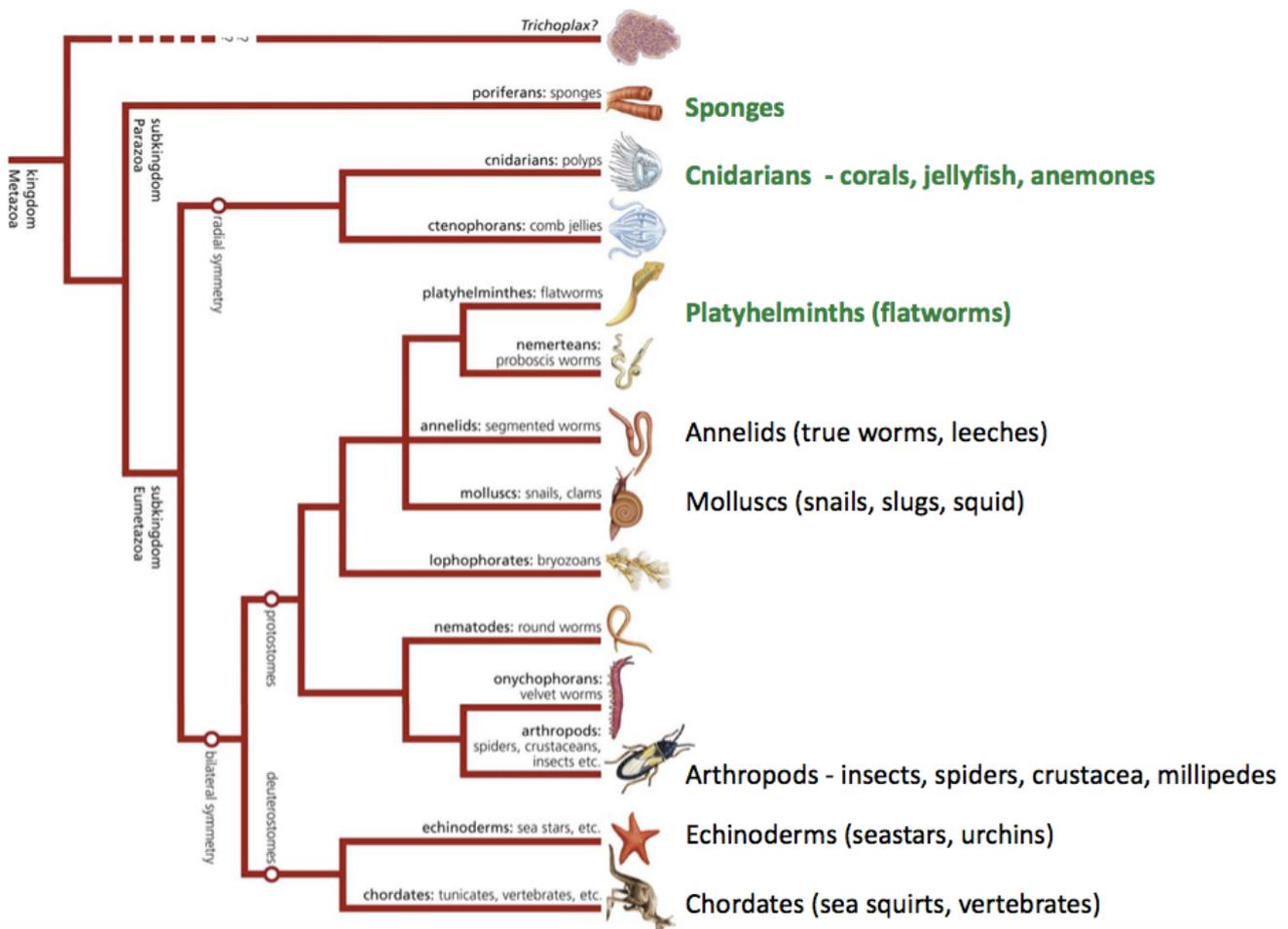


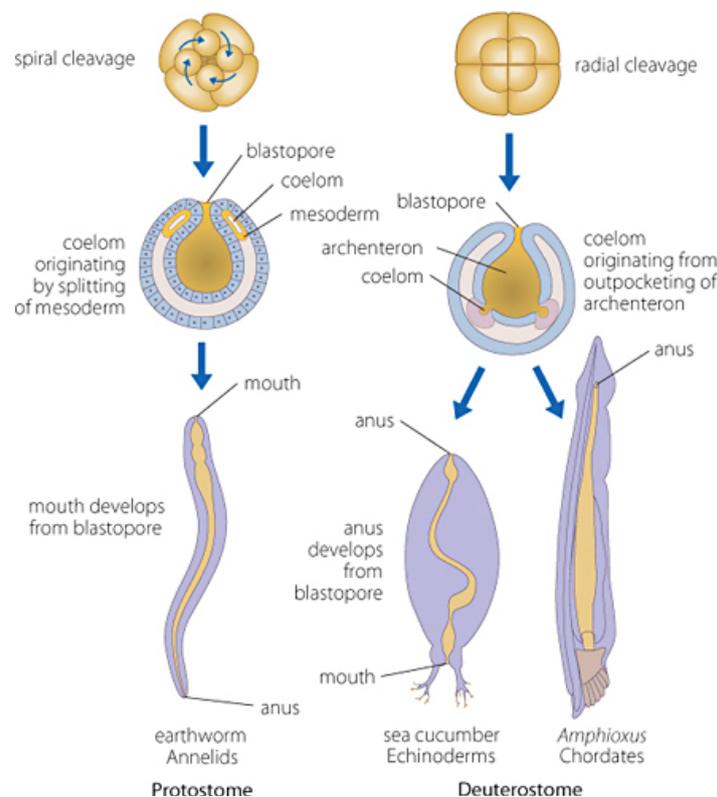
Phyla

- There are 1.7 to 2 million 'living' animal species 'described'.
- 75% are insects, 6% are molluscs, 3% are crustaceans, 0.4% are mammals and 0.02% are primates.
- The animal kingdom is divided into 30+ phyla.
- **PHYLUM** (plural = phyla) is the highest unit of classification after 'Kingdom'.
- Animals grouped into phyla based on shared characteristics.
- Animals are heterotrophs with no cell 'wall'.
- The order is:
 1. Kingdom
 2. Phylum
 3. Class
 4. Order
 5. Family
 6. Genus
 7. Species
- Together with traditional morphological and developmental studies, phylogenetic analyses based on sequencing multiple genes are providing new insights into the relationships between modern animal phyla.



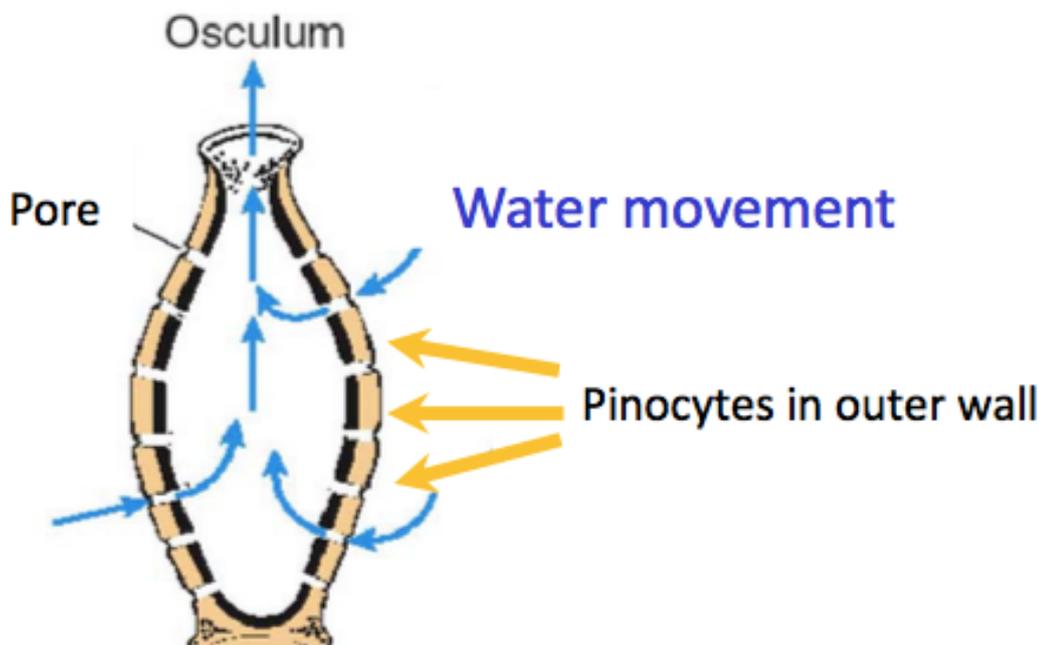
- Of the simple animals living today, sponges are an early lineage, classified as subkingdom **PARAZOA**.

- All other animal phyla are related as a group in the subkingdom **EUMETAZOA**.
- Eumetazoans diverged, with one branch leading to radially symmetrical animals (jellyfish, anemones, corals and comb jellies; Cnidaria, Ctenophora) and the other branch to animals that have bilateral symmetry (from flat worms to vertebrates; Bilateria).
- Among the animals with bilateral symmetry, called **BILATERIA**, a major evolutionary split led on the one hand to a number of phyla characterised as protostomes (flatworms, segmented worms, molluscs, arthropods) and deuterostomes (echinoderms, chordates).
- The criteria for determining Phyla includes:
 1. Symmetry - what kind?
 2. Germ layers - how many?
 3. Coelom (body cavity) - present or absent?
 4. Blastopore - does it form mouth or anus?
 5. Segmentation - present or absent?
- **PROTOSTOMES** are animals in which the blastopore becomes the mouth.
- Cell division of the early embryo of protostomes also has a spiral form that means that at the eight-cell stage the four upper cells (blastomeres) of the embryo are rotated 45° relative to the four lower blastomeres.
- Many protostomes show determinate development, in which the type of tissue each embryonic cell will form in the adult is determined or fixed at a very early stage in cleave.
- If the coelom (body cavity) develops it is **SCHIZOCOELIC**, produced by splitting of the mesoderm.
- **DEUTEROSTOMES** are animals in which the anus forms at the site of the blastopore, the mouth forming at a secondary opening.
- Cell division of the early embryo has a radial form (radial cleavage) that means that the upper blastomeres of the embryo at the eight-cell stage are directly below the lower blastomeres.
- The fate of individual cells is not fixed until a stage in cleavage much later than in protostomes so that they show indeterminate development.
- In deuterostomes, the coelom arises from out pockets of the embryonic gut (archenteron).



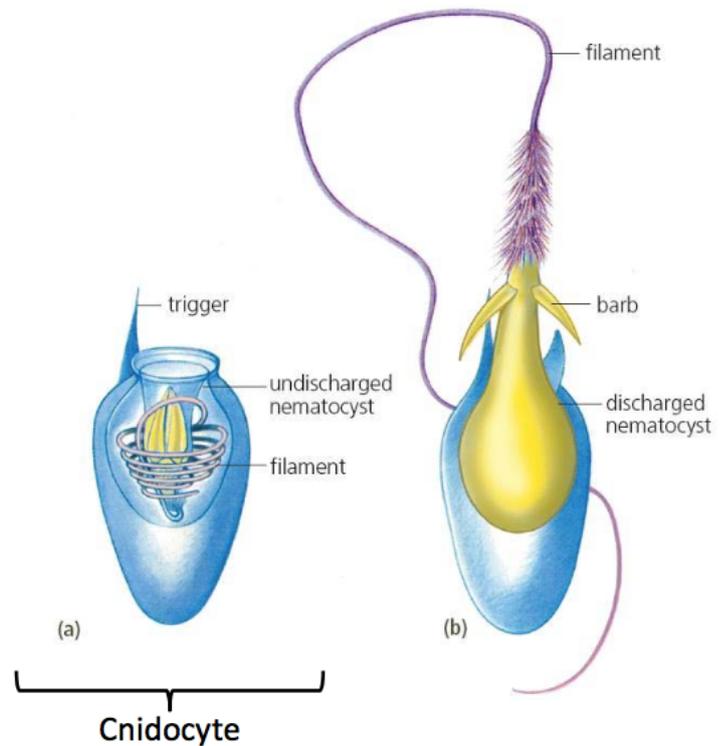
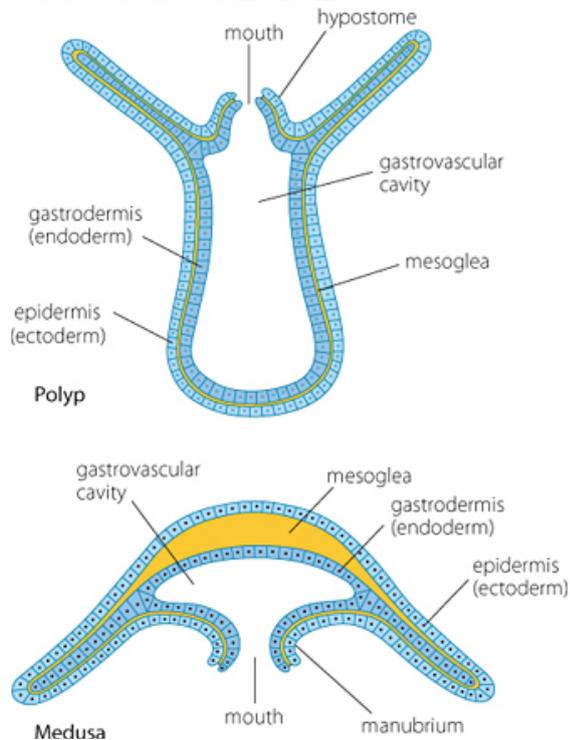
Phylum Porifera

- Sponges, subkingdom Parazoa are under phylum **PORIFERA** (animal phylum comprising the sponges) are aquatic (mainly marine) animals that are similar to other multicellular organisms in having three layers of cells.
- They are the simplest animals; have no mouth or gut, no nervous system, mainly filter feeders and have specialised cells called pinocytes that can engulf larger prey.
- Layers of cells with protein matrix; no tissues or organs.
- Adults are sessile, attached to a substrate such as rocks, but larvae are free-swimming.
- In the simplest sponges, the body is tubular and its wall has three functional layers.
- The inner layer, lining an internal cavity, consists of food-filtering flagellated cells called **CHOANOCYTES**, which are collar cells that have a distinctive collar of microvilli surrounding the flagellum.
- The outer surface of the sponge consists of a layer of flattened cells, pinacocytes, making up the **PINACODERM**, equivalent to the epithelium of other animals.
- Between those two layers is the **MESOHYL**, a gelatinous protein matrix containing amoeboid cells, **AMOEOCYTES**, dispersed collagen fibres.
- It has **POROCYTES** through which water enters.
- Some amoeboid cells are large and phagocytic, capable of engulfing and ingesting material.
- They are important in digestion but are also capable of giving rise to any other type of cell; that is, they are totipotent.
- The skeleton is composed of calcium carbonate or silica **SPICULES**, or fibres of a coarse collagenous proteinaceous material termed **SPONGIN**.
- Collagen fibres are secreted by amoebocytes as well as by fixed cells.
- For feeding, water is drawn in through pores, the **OSTIA**, in the external wall of the sponge into a central cavity called the **SPONGOCOEL**.
- This feeding and respiratory current then leaves through one or more large openings, the **OSCULA**.
- The current is propelled by the beating of the flagella of the choanocytes lining the passages.
- Both choanocytes and pinacocytes transfer food to amoebocytes, which appear to be the principal sites of digestion.



Phylum Cnidaria

- Phylum **CNIDARIA** is split into three classes: hydras (Hydrozoa), jellyfish (Scyphozoa) and corals and anemones (Anthozoa).
- The key characteristics of Cnidaria include:
 1. Radial symmetry (mostly)
 2. Diploblastic
 3. Acoelomate - no coelom
 4. Unsegmented (no segmentation)
 5. Nerve net
 6. Reproduction - usually sexual and asexual
- In radial symmetry, parts of the body are arranged around a central axis such that any plane cutting through the central axis divides the animal into equal halves.
- Although Cnidaria have distinct tissues, they do not have organs and have a simple structure.
- Cnidarians are constructed like sacs with a central **COELENTERON** (gastrovascular cavity lined with endotherm).
- The single opening to this cavity functions both as mouth and anus and is fringed with tentacles.
- The gastrovascular cavity is lined by endothermal cells forming a gastrodermis and is homologous with the alimentary canal of other metazoans.
- A **POLYP** is in attached tubular form with its mouth directed upwards, for example a sea anemone.
- A **MEDUSA** is a free-floating bell-shaped and its mouth points downwards, for example, a jellyfish.
- The mouth is borne on a projection called the **HYPOSTOME** in the polyp and the **MANUBRIUM** in the medusa.



- Also note how Cnidaria are **DIPLOBLASTIC**; two body layers are separated by a gelatinous layer called the **MESOGLEA** (endotherm, mesoglea and ectoderm).