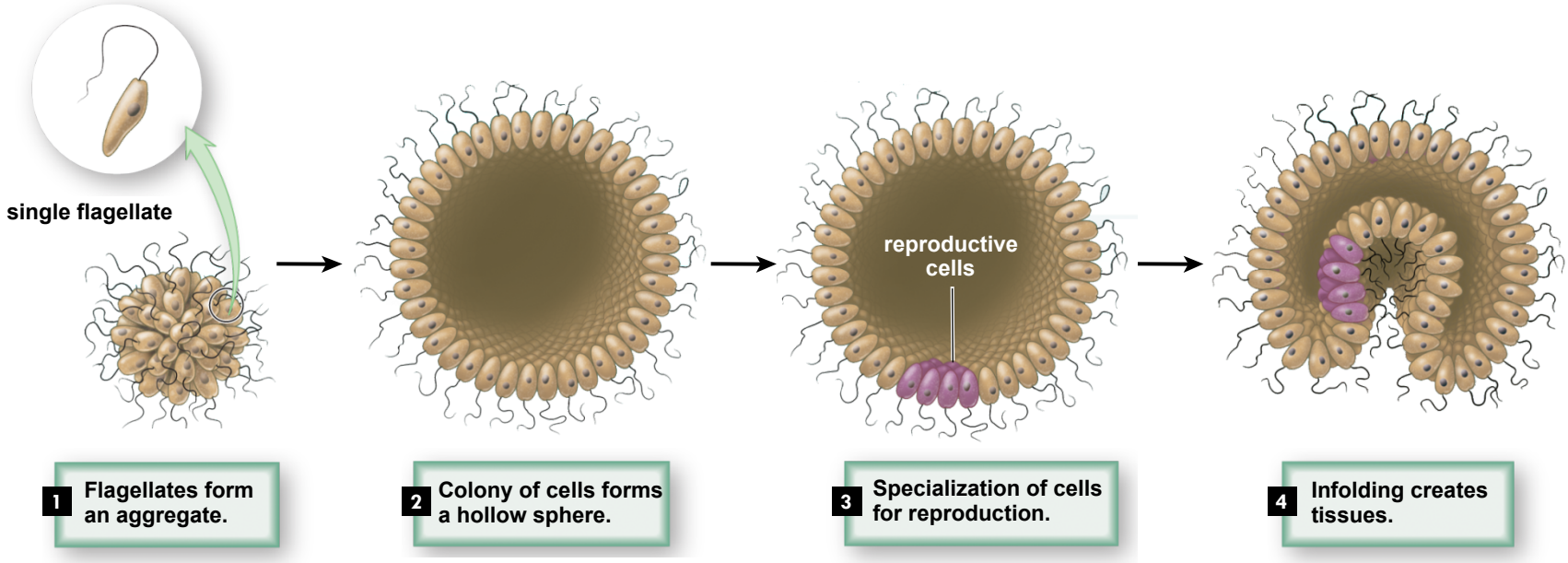
INTRODUCTION TO ANIMALS

Characteristics of animals

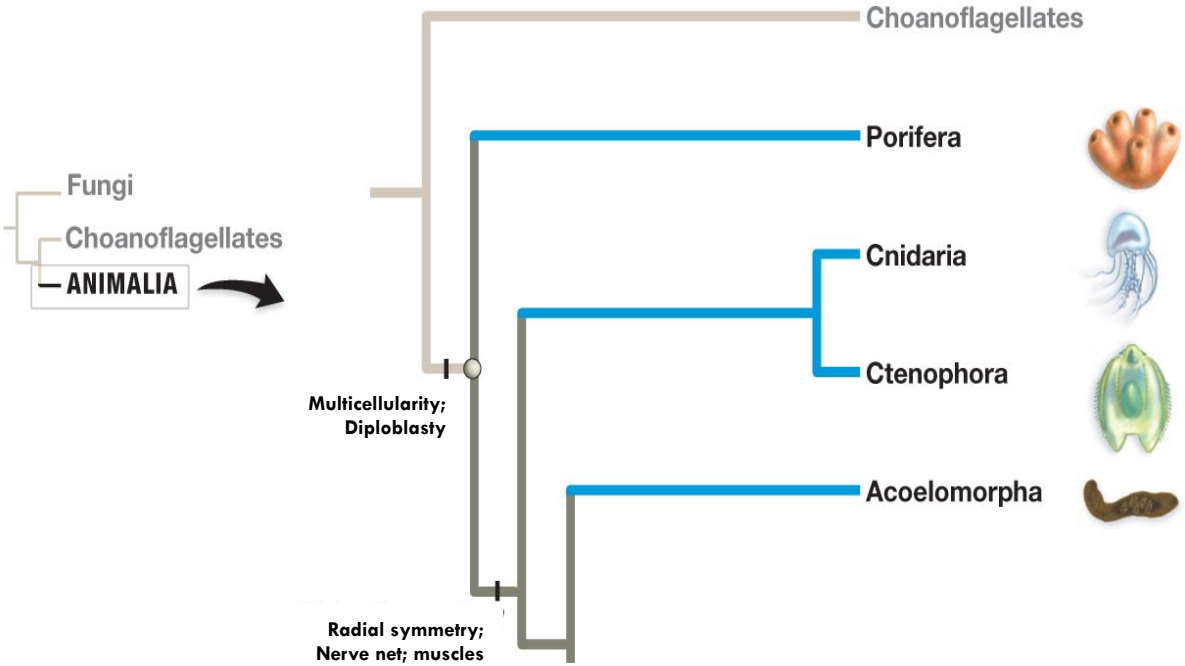
- Monophyletic
- Characteristics
  - Multicellular
  - *Heterotrophic*
    - Ingest food
  - Move under their own power

Beginnings of multicellularity



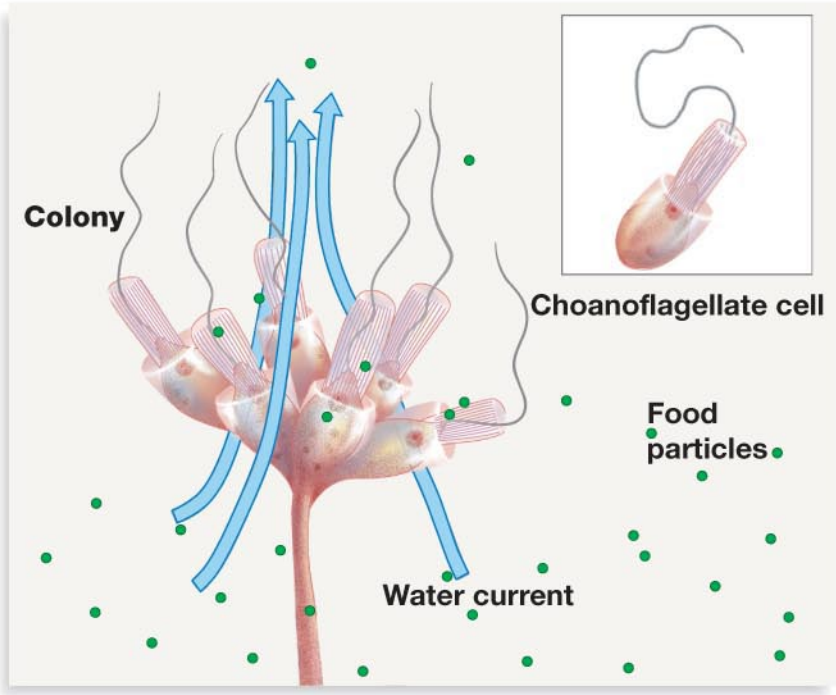
Animal phylogenetics

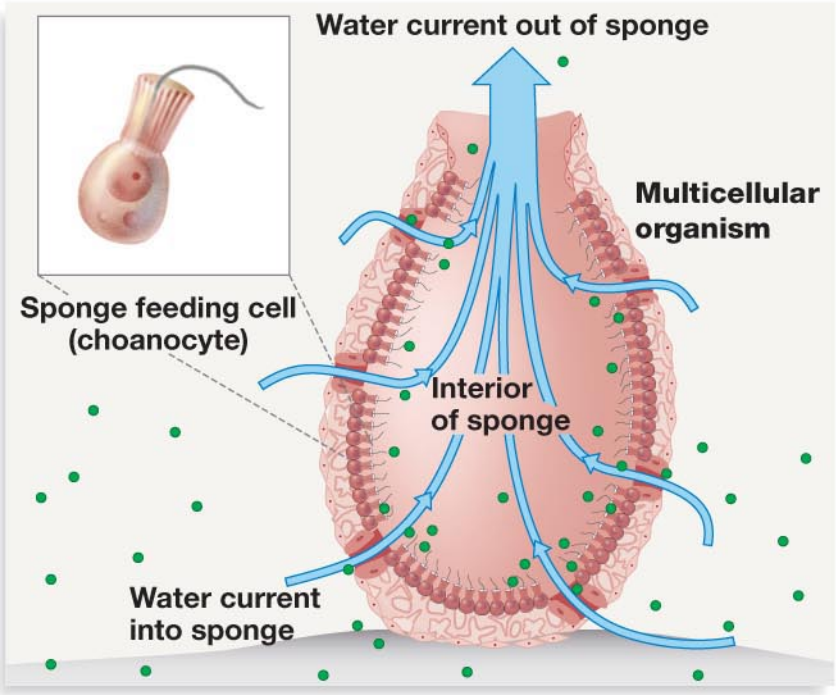
- Protists known as choanoflagellates
  - Closest living relatives of animals
- Sponges are sister group to all other animals



Choanoflagellates vs. sponges

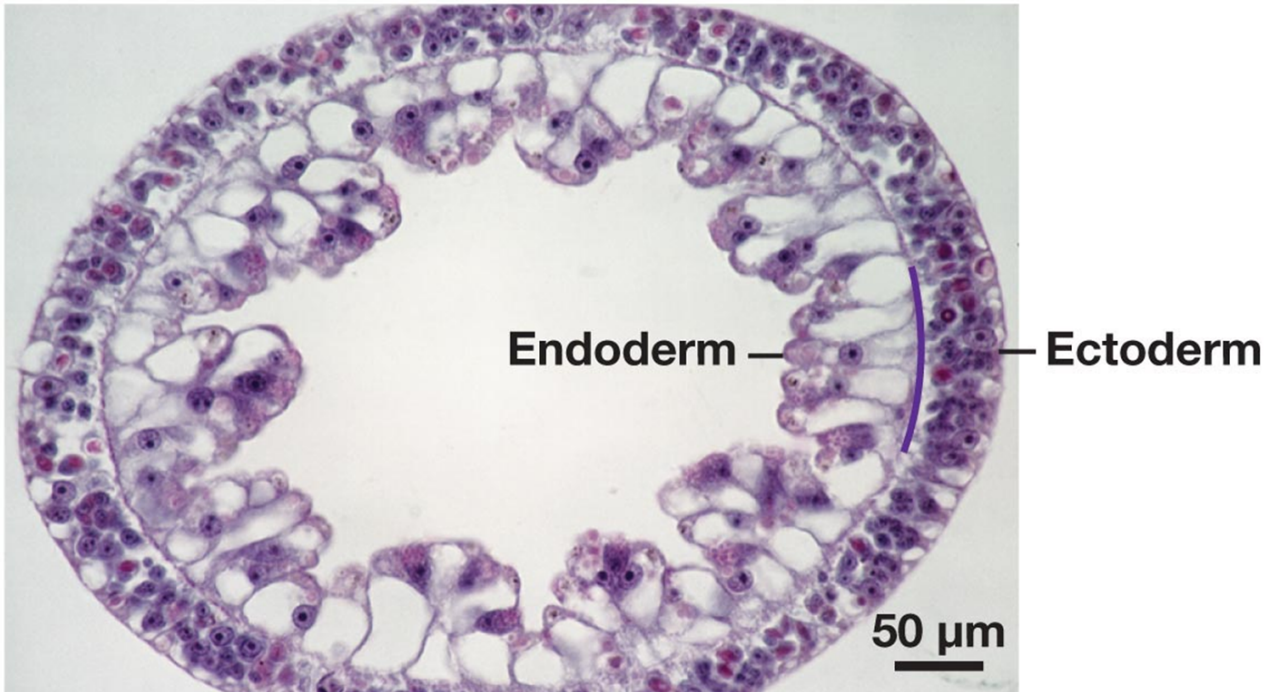
- Both are *sessile* (attached to substrate)
- Sponges feed using choanocytes
  - Similar to choanoflagellete cell





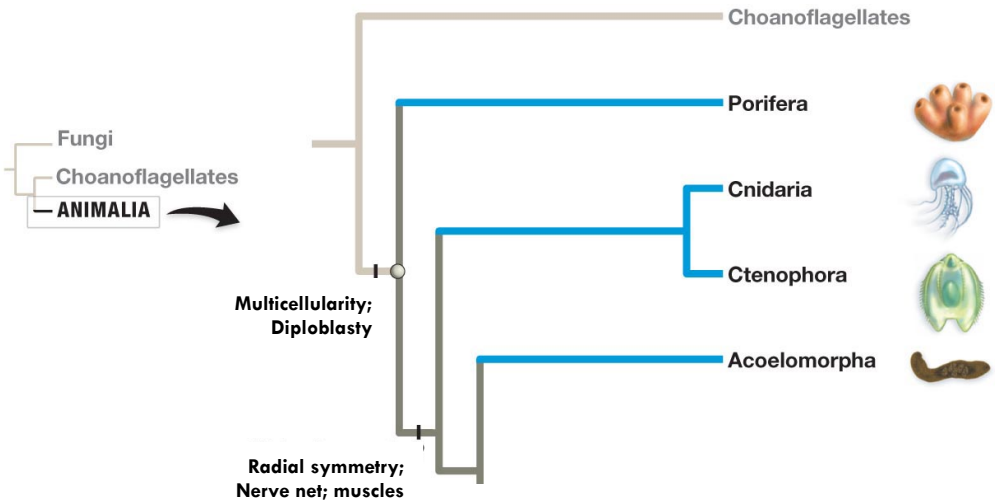
Diversification of tissues

- Tissue layers of embryos differ
- *Diploblasts*
  - Embryos have two types of tissues (*germ layers*)



Porifera (Sponges)

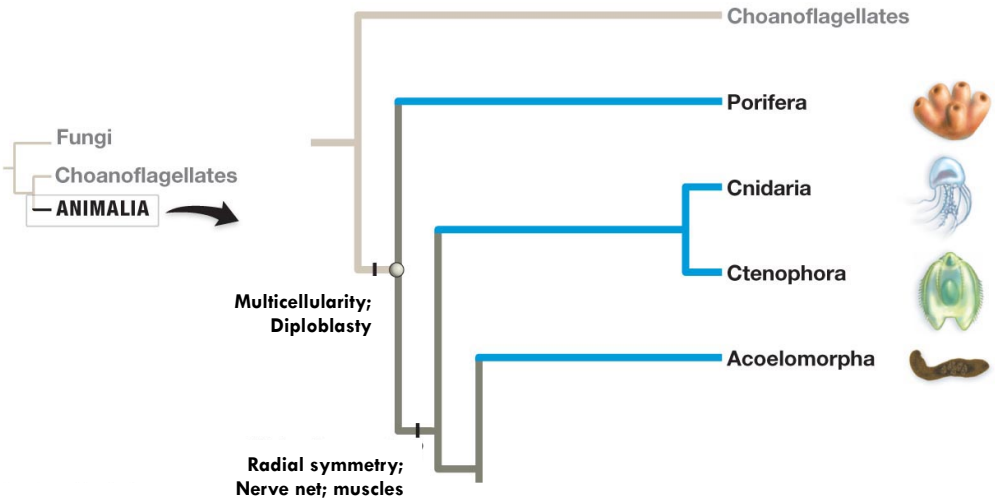
- Filter feeders
- Adult sessile
- Larvae motile
- Mostly asexual

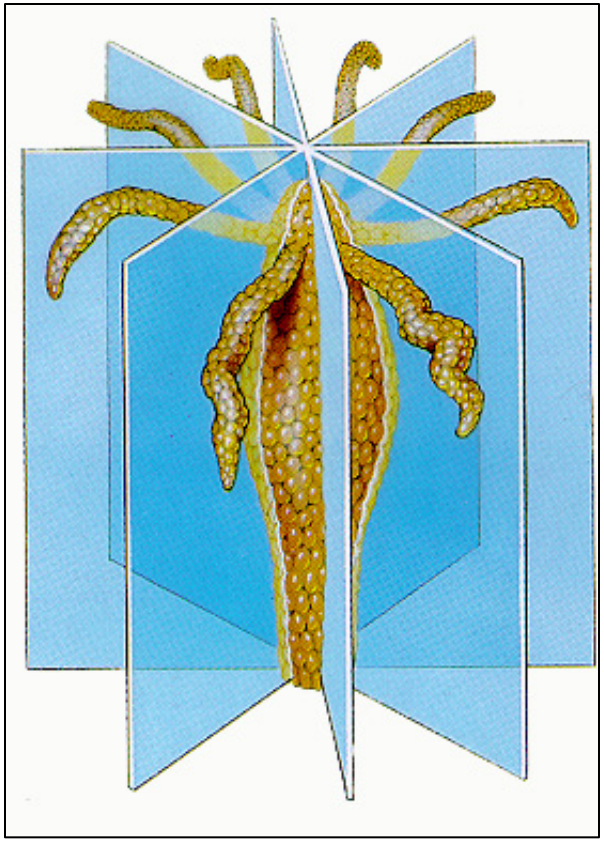


Yellow tube sponge

Body symmetry

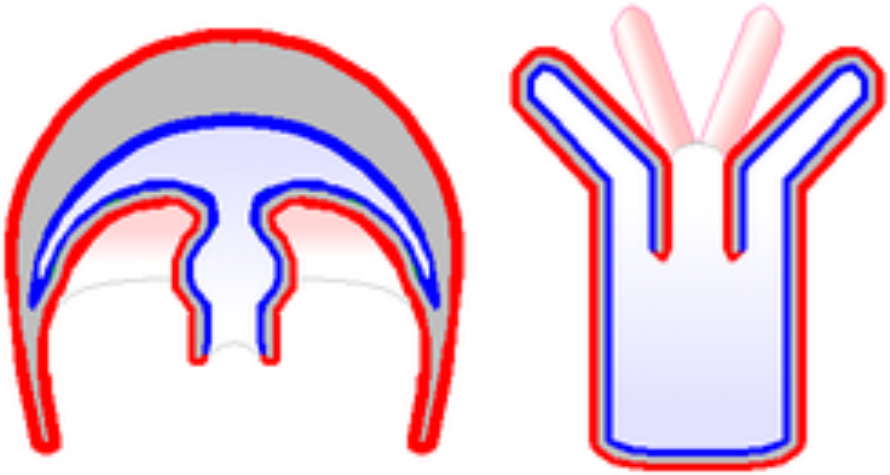
- Radial symmetry
  - Cnidaria, Ctenophora
  - Have more than one plane of symmetry
  - Equally likely to encounter environment in any direction

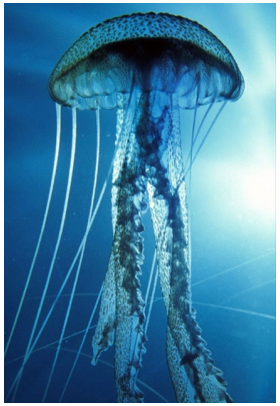


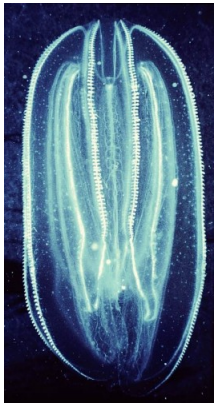


Diversification of tissues

- Diploblasts
  - Porifera
    - Sponges
  - Cnidarians
    - Jellyfish
    - Corals
    - Sea anemones
  - Ctenophore
    - Comb jellies
- Triploblasts
  - All other animals

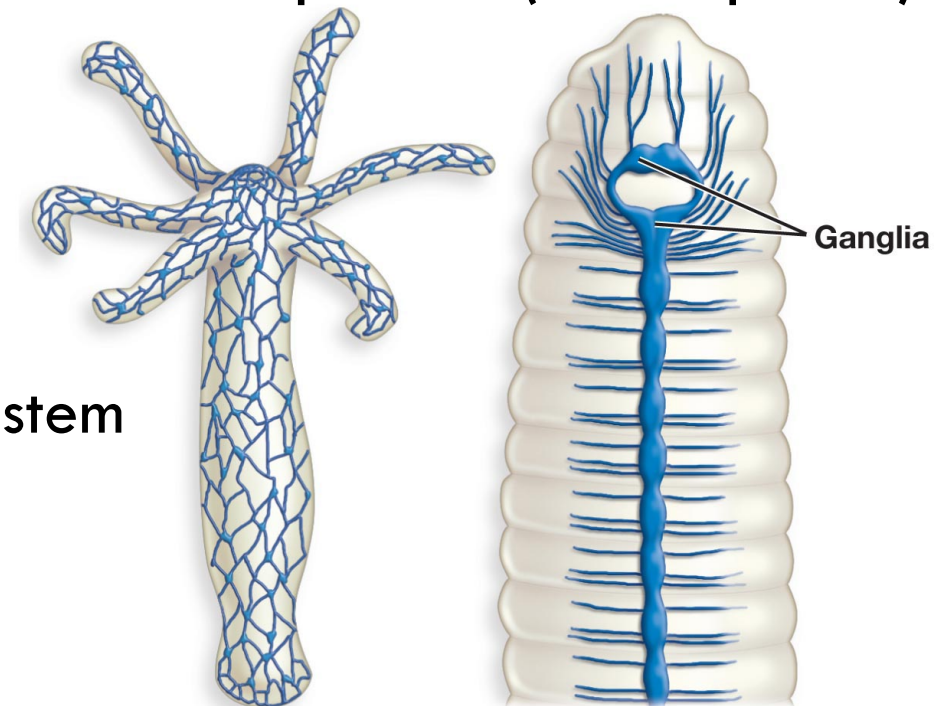






Nervous systems

- Sponges are only animals that lack nerves
- Cnidarians (Jelly fish) and ctenophores (comb jellies)
  - *Nerve net*
    - Organized nerve cells
    - No specialization
- All other animals
  - Centralized nervous system
  - Neurons clustered into
    - Tracts (*cords*)
    - Masses (*ganglia*)

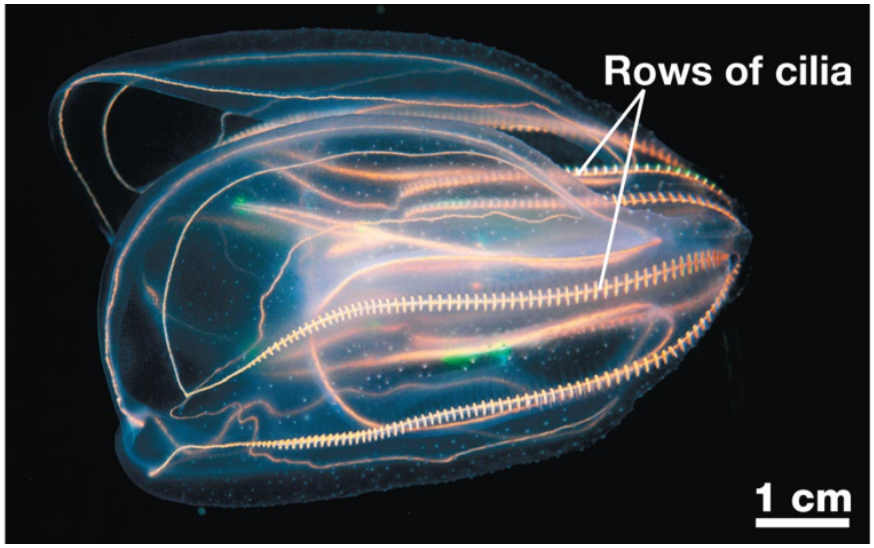


Cnidaria

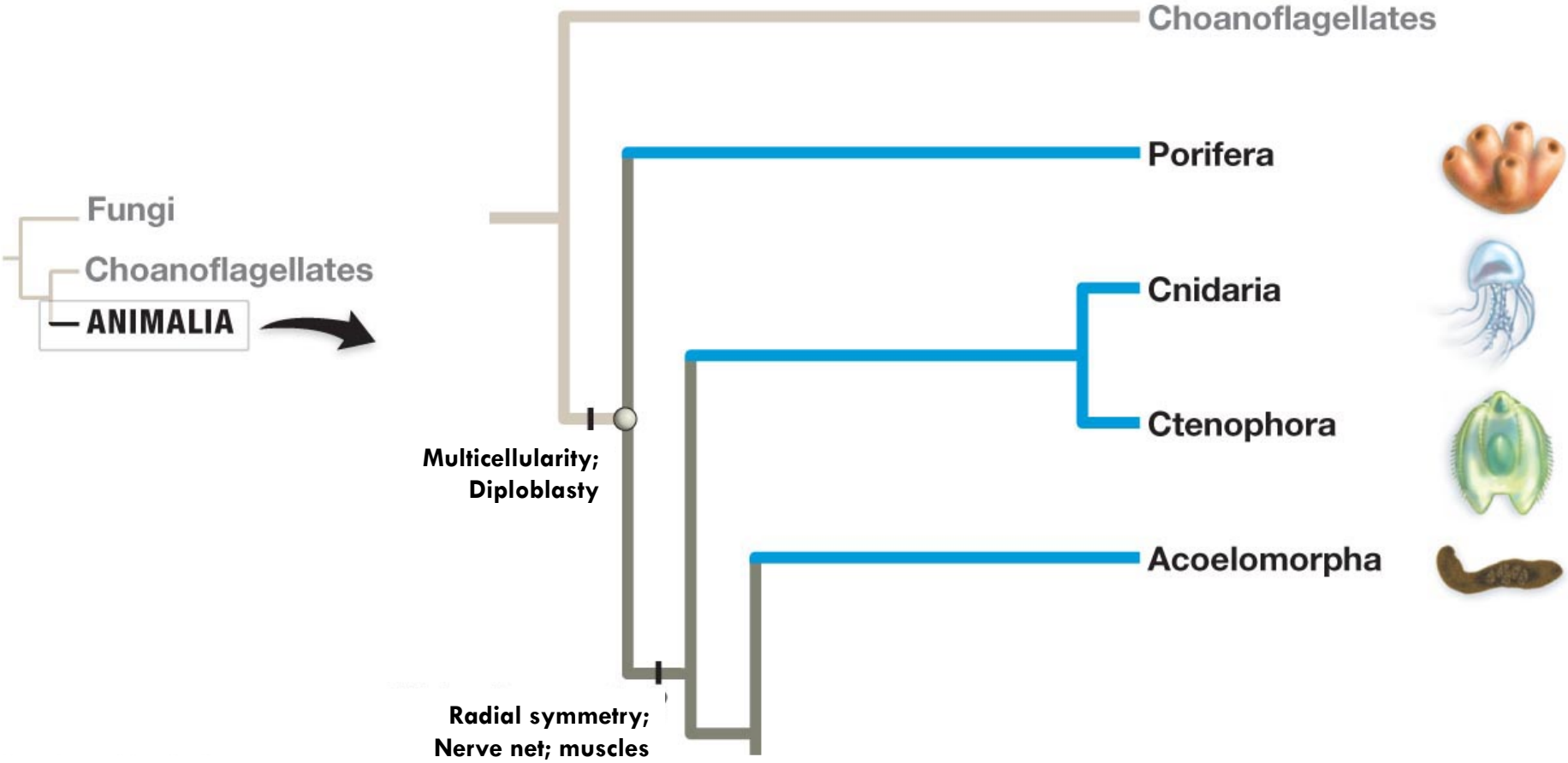
- Radially symmetrical diploblasts
- Three distinct body types
  - Larval stage
    - Jet propulsion
  - *Polyp*
    - Sessile, asexually
  - *Medusa*
    - Free-floating, sexual
- Jellyfish, coral, anemones

Ctenophora (comb jellies)

- Transparent, gelatinous diploblasts
- Planktonic predators
- Move via *cilia*
  - Comblike rows of hairs

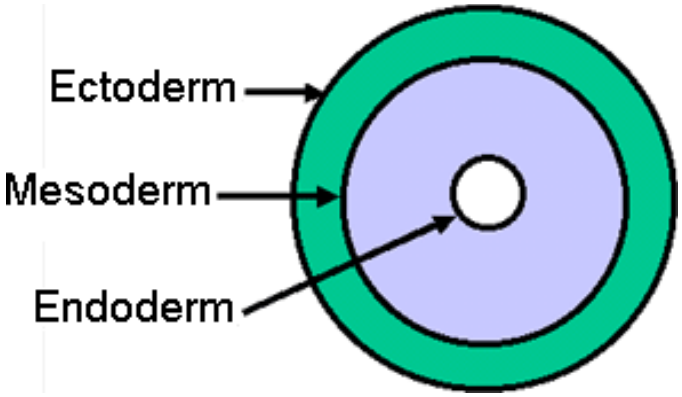


Animal Phylogenetics



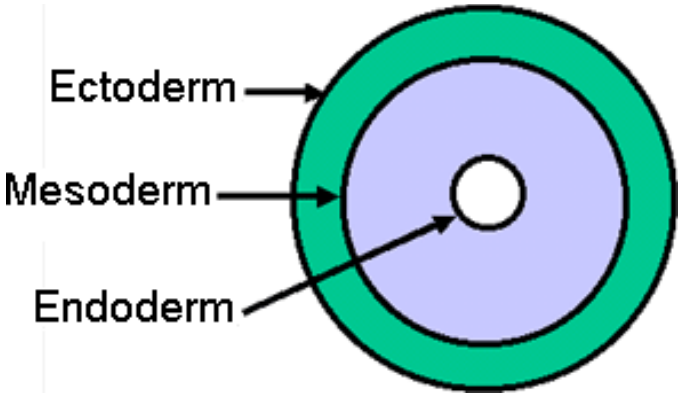
Diversification of tissues

- Triploblast
  - Three germ layers
    - Ectoderm
    - Endoderm
    - Mesoderm
      - "middle skin"



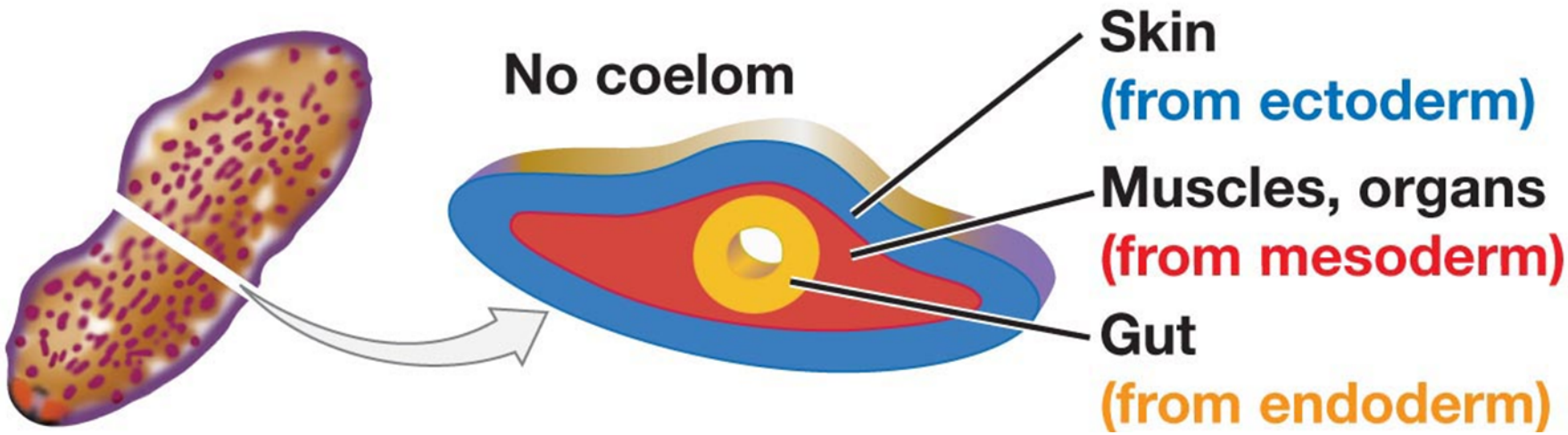
Diversification of tissues

- Ectoderm develops into skin
- Endoderm develops into digestive tract
- Mesoderm develops into every thing else
  - Gave rise to:
    - First complex muscle tissue
    - Organ diversification

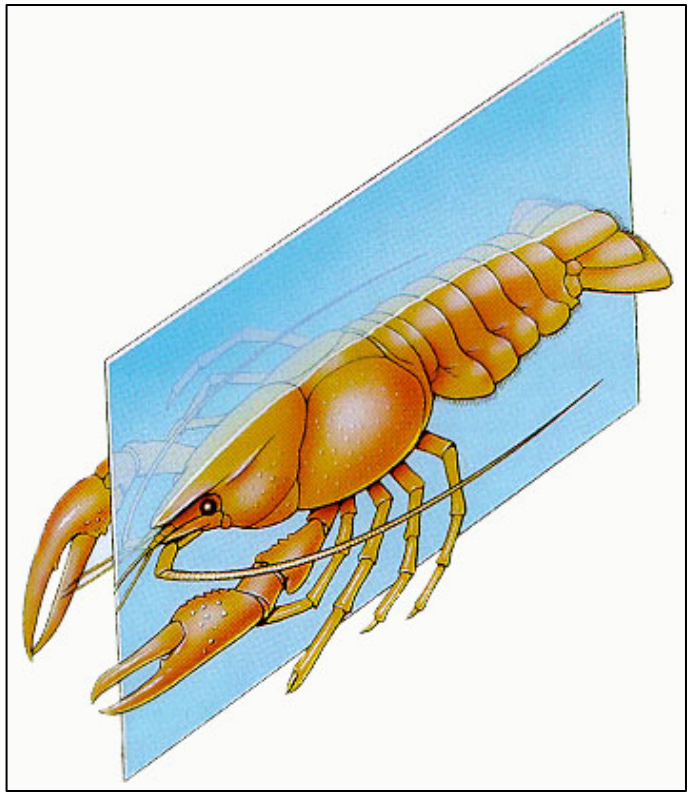


Evolution of body cavity

- Acoelomates
  - No enclosed body cavity
    - No *coelom*
  - Flatworms

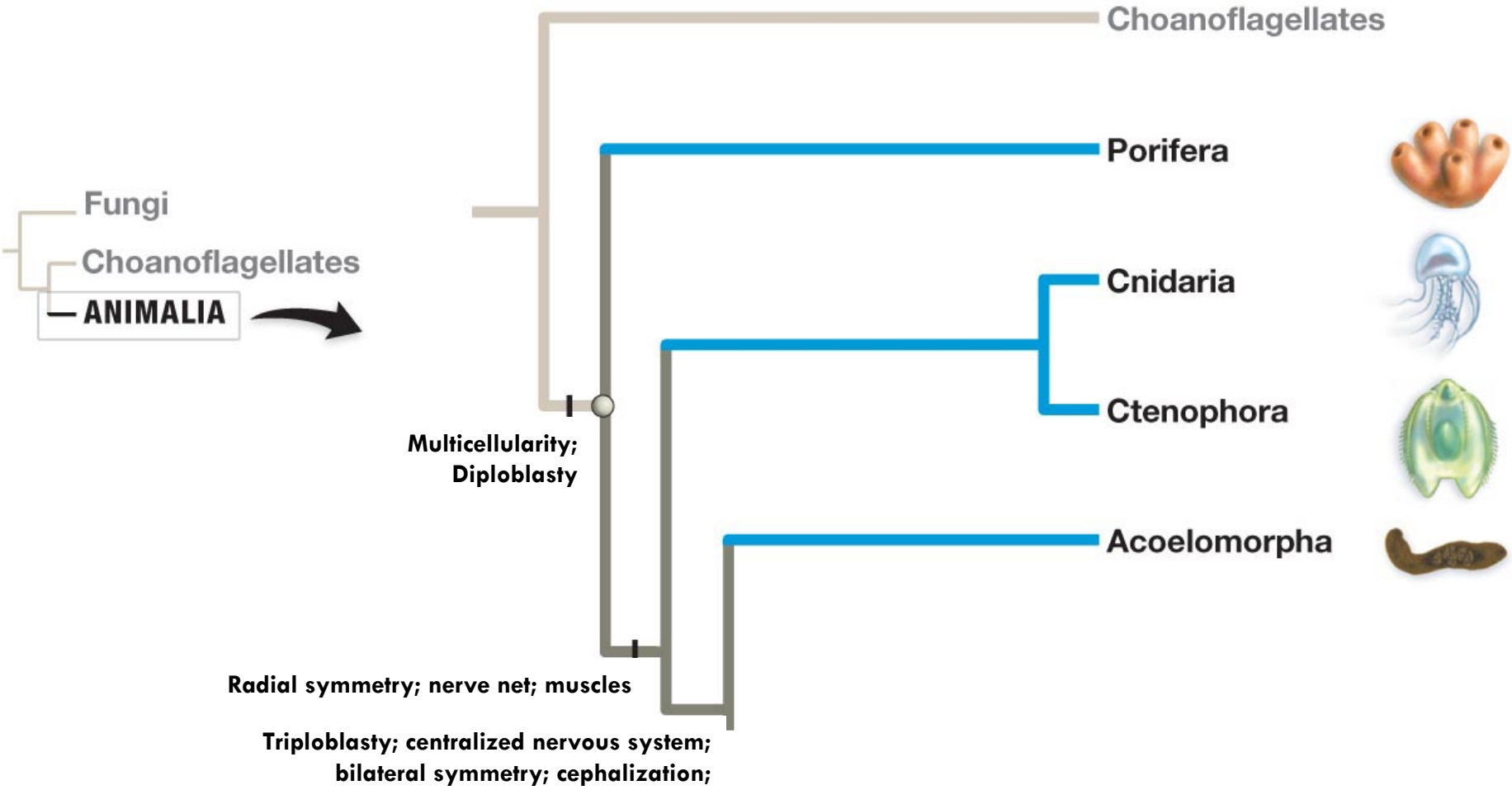


Body symmetry



- *Bilateral symmetry*
  - Single plane of symmetry
  - Long, narrow bodies
- Tend to encounter environment at one end
- Allowed *cephalization*
  - Development of head region
  - Concentration of feeding and sensing structures

Animal Phylogenetics



Acoelomorpha

- Bilaterally symmetrical worms
- Triploblastic, but lack coelom
- Live in mud, sand in marine
- Move via cilia