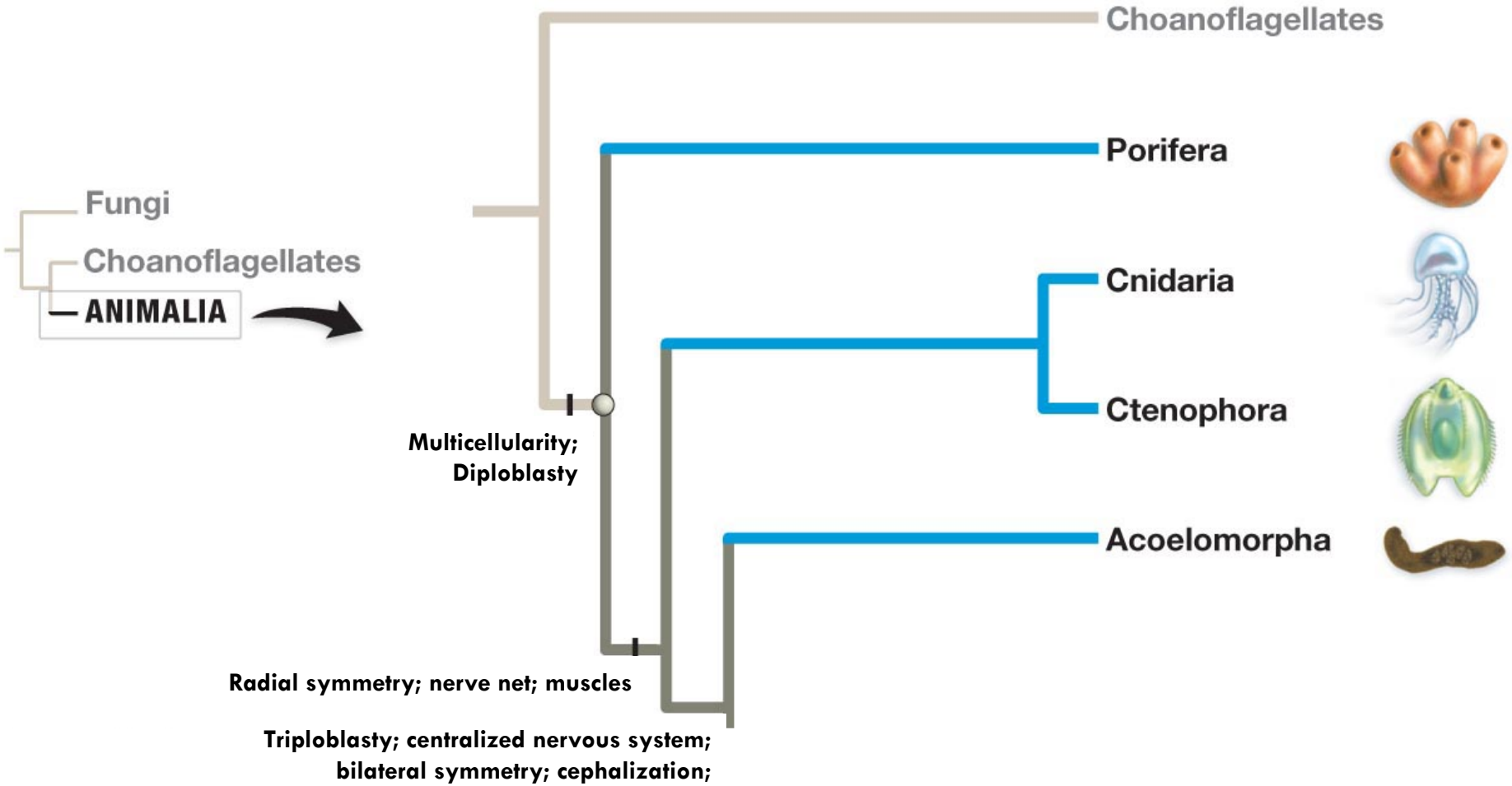
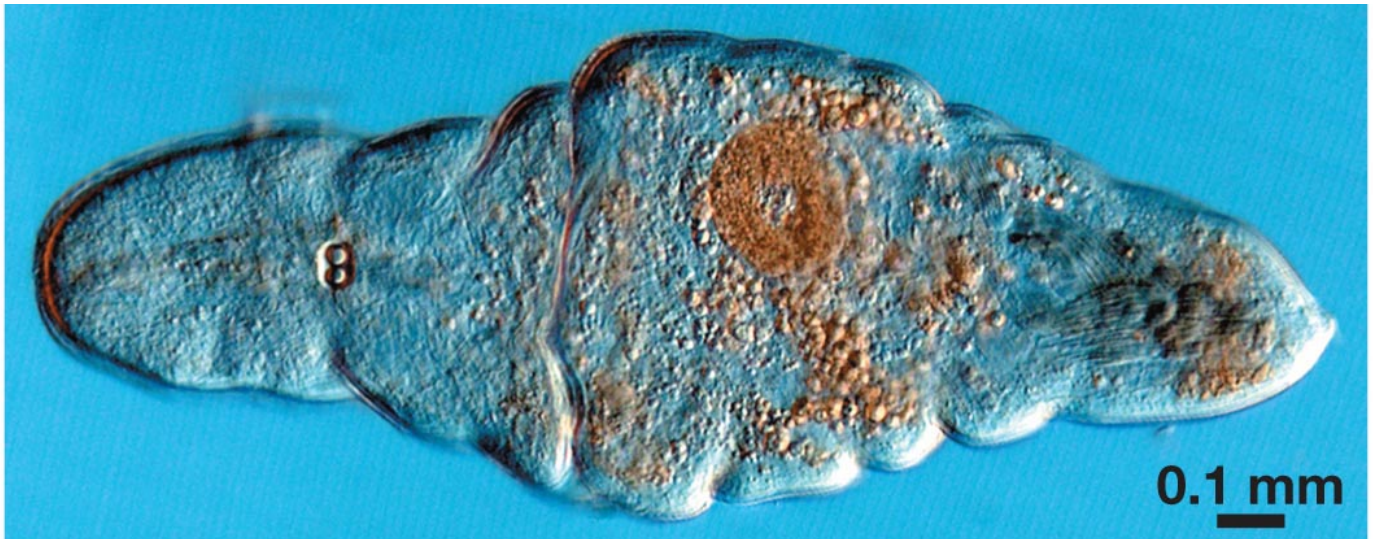
PROTOSTOMES

Animal Phylogenetics



Acoelomorpha

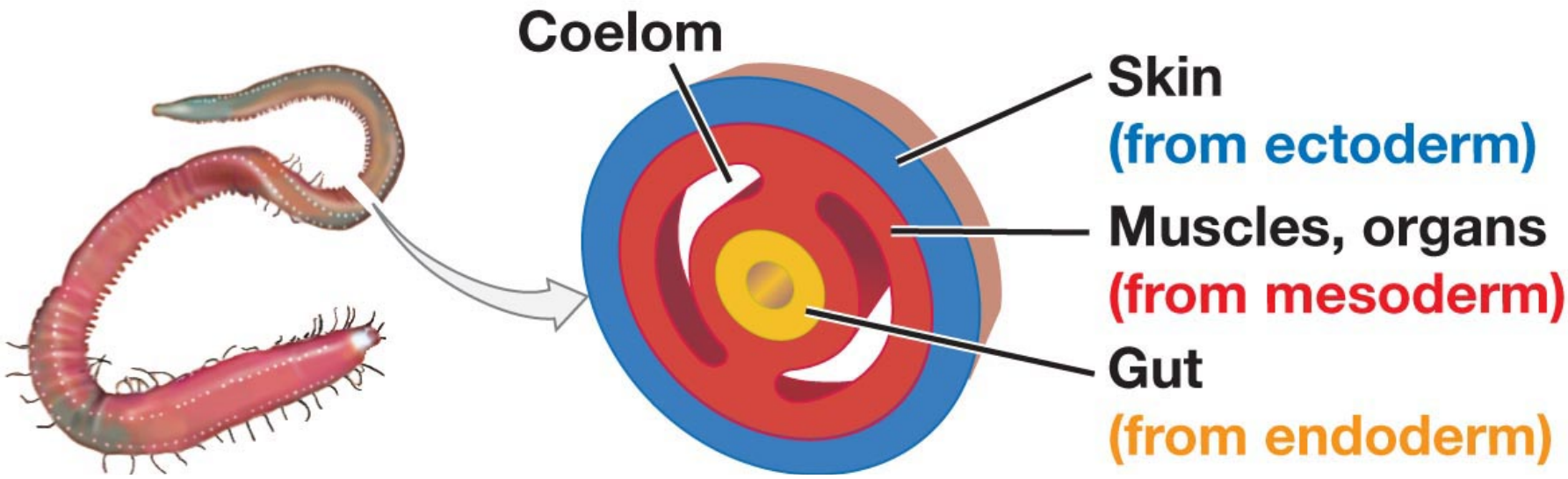
- Bilaterally symmetrical worms
- Triploblastic, but lack coelom
- Live in mud, sand in marine
- Move via cilia



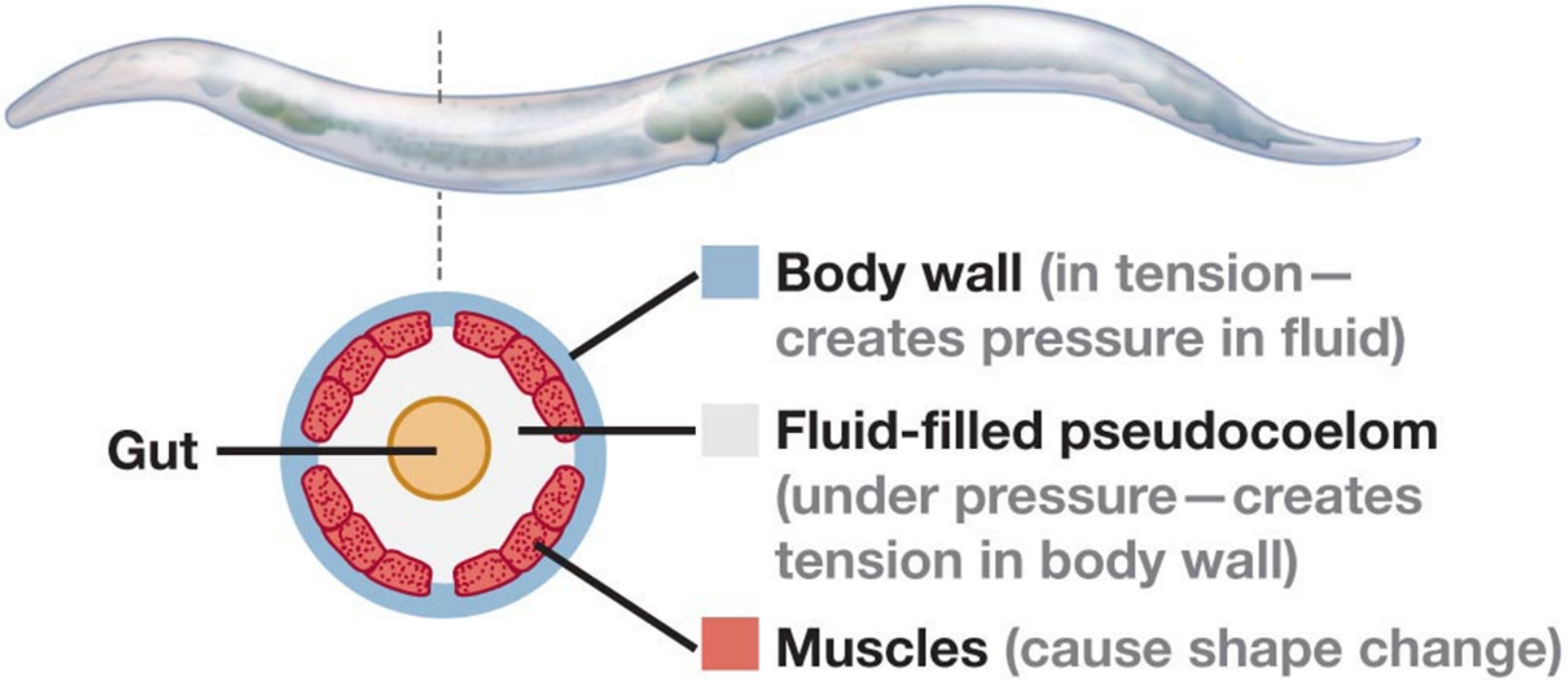
Evolution of body cavity

- Coelomates
  - Enclosed body cavity
    - Completely lined with mesoderm
    - Fluid filled
  - Both sides formed from mesoderm

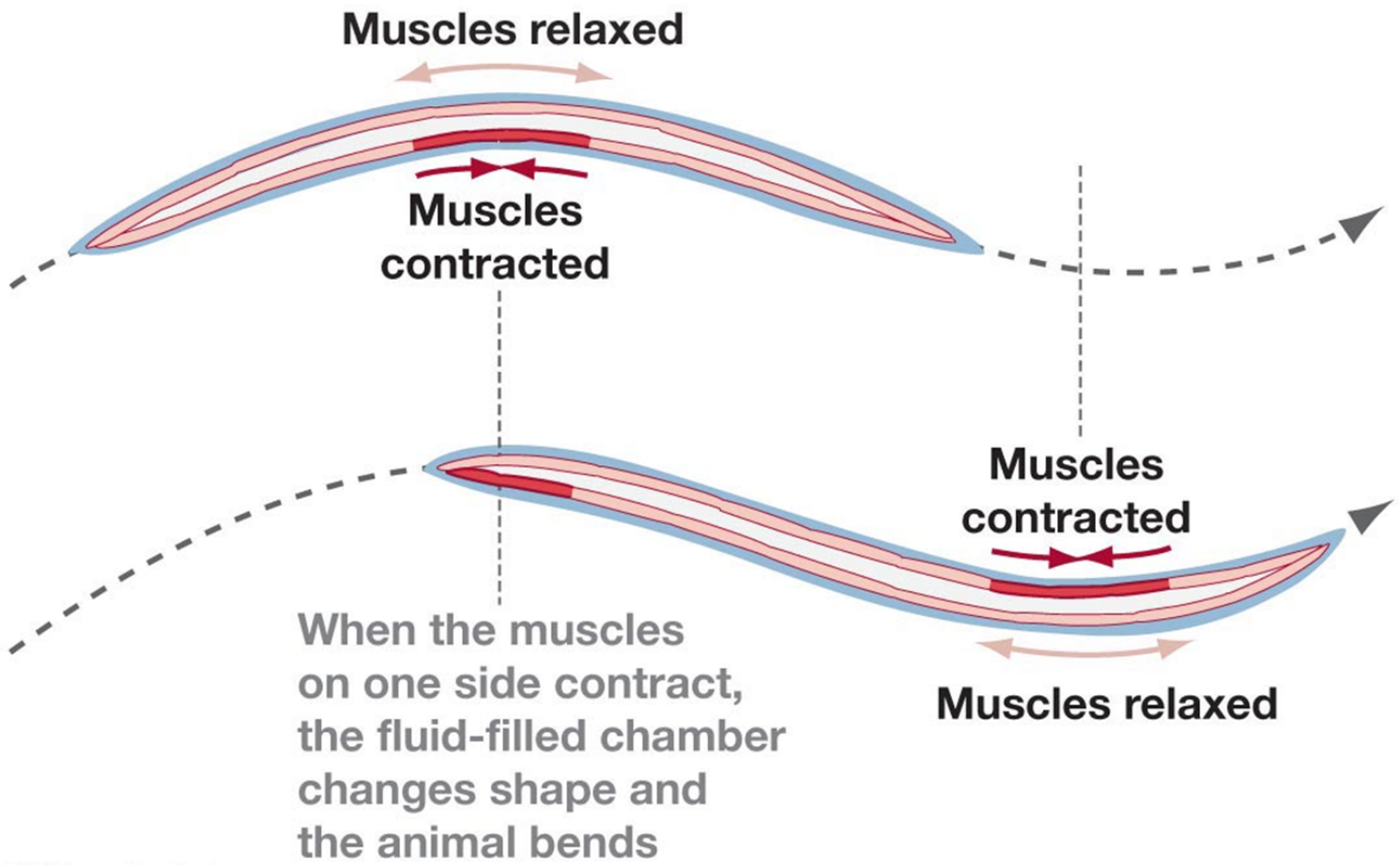
- Coelom
  - Container for oxygen and nutrients
  - Hydrostatic movement
    - Move without limbs/fins



Hydrostatic movement

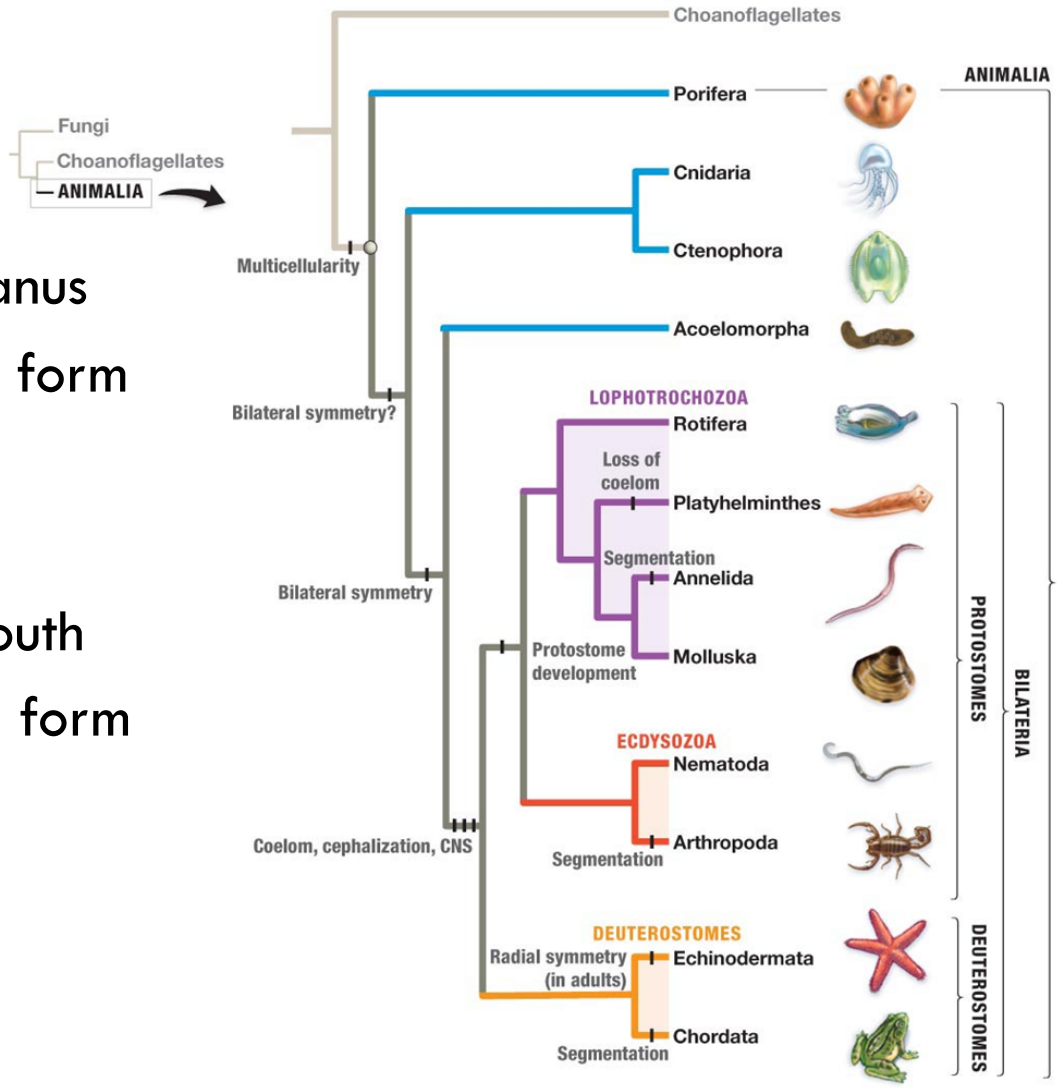


Hydrostatic motion



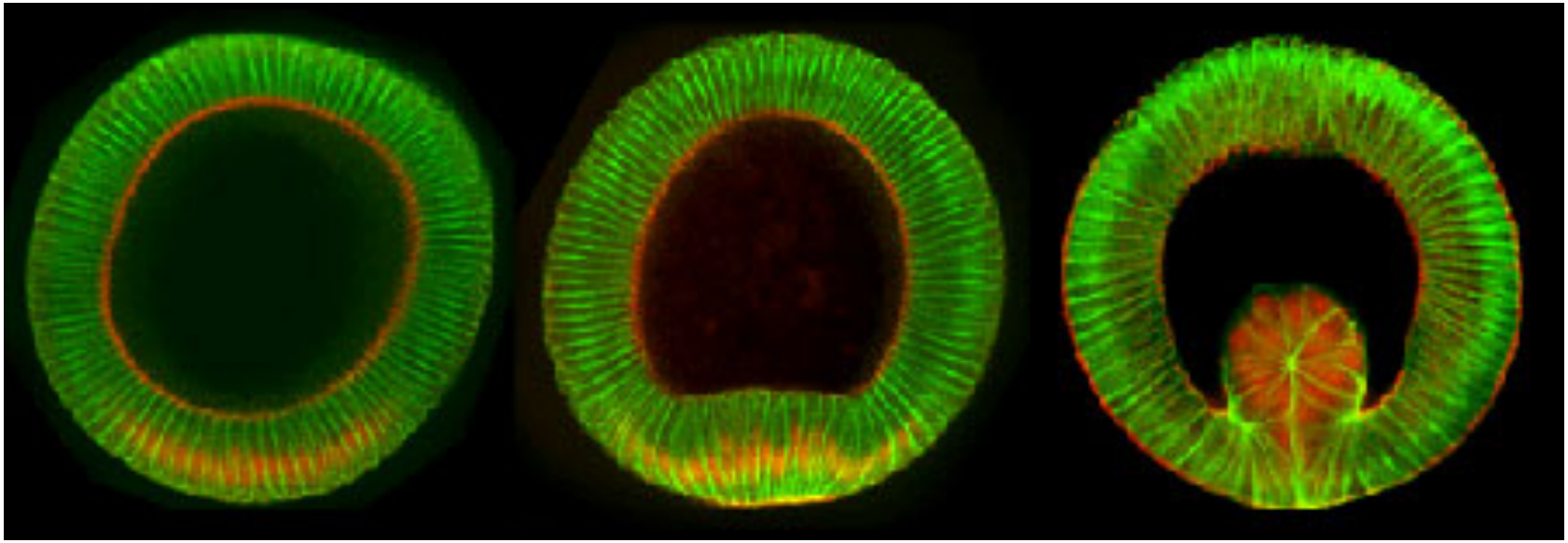
Coelomates

- Coelmates divided into:
  - Protostomes
    - Mouth develops before anus
    - Mesoderm hollows out to form coelom
  - Deuterostomes
    - Anus develops before mouth
    - Mesoderm pinches off to form coelom



Bilateria: gastulation

- Formation of the gut and embryonic layers



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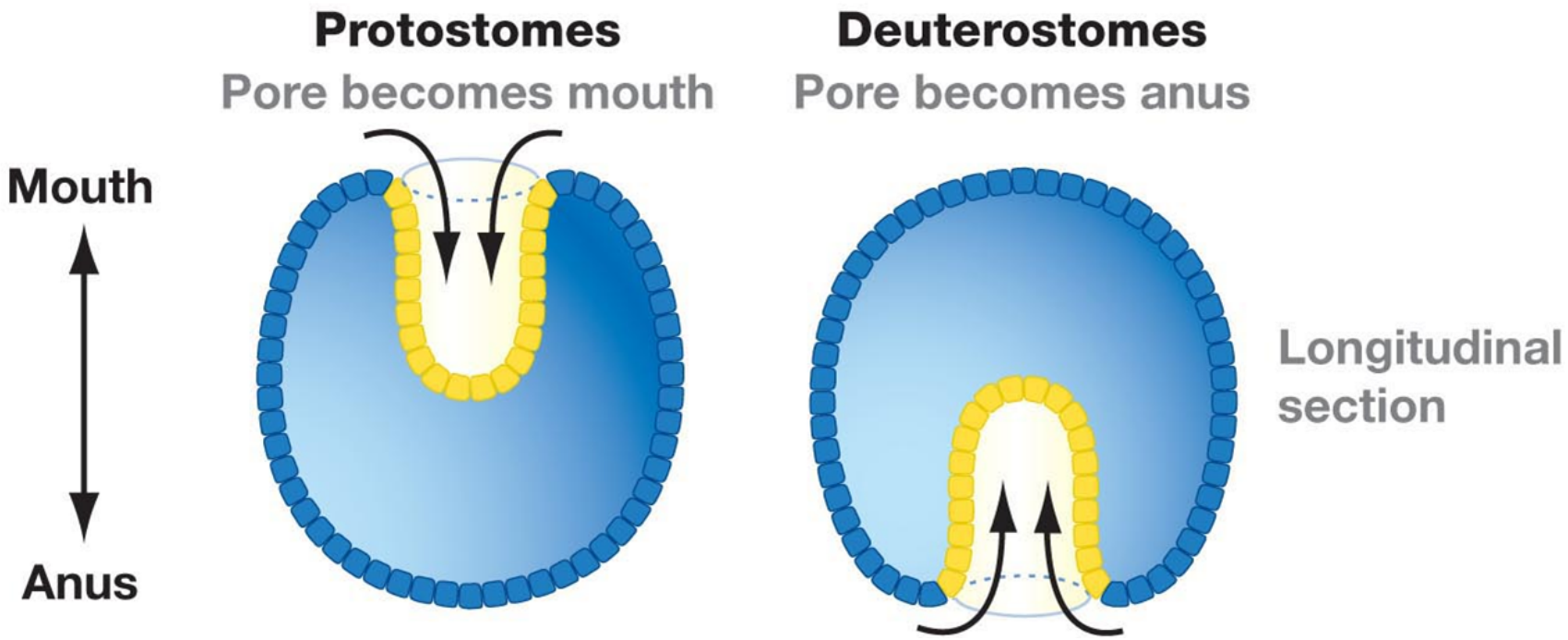
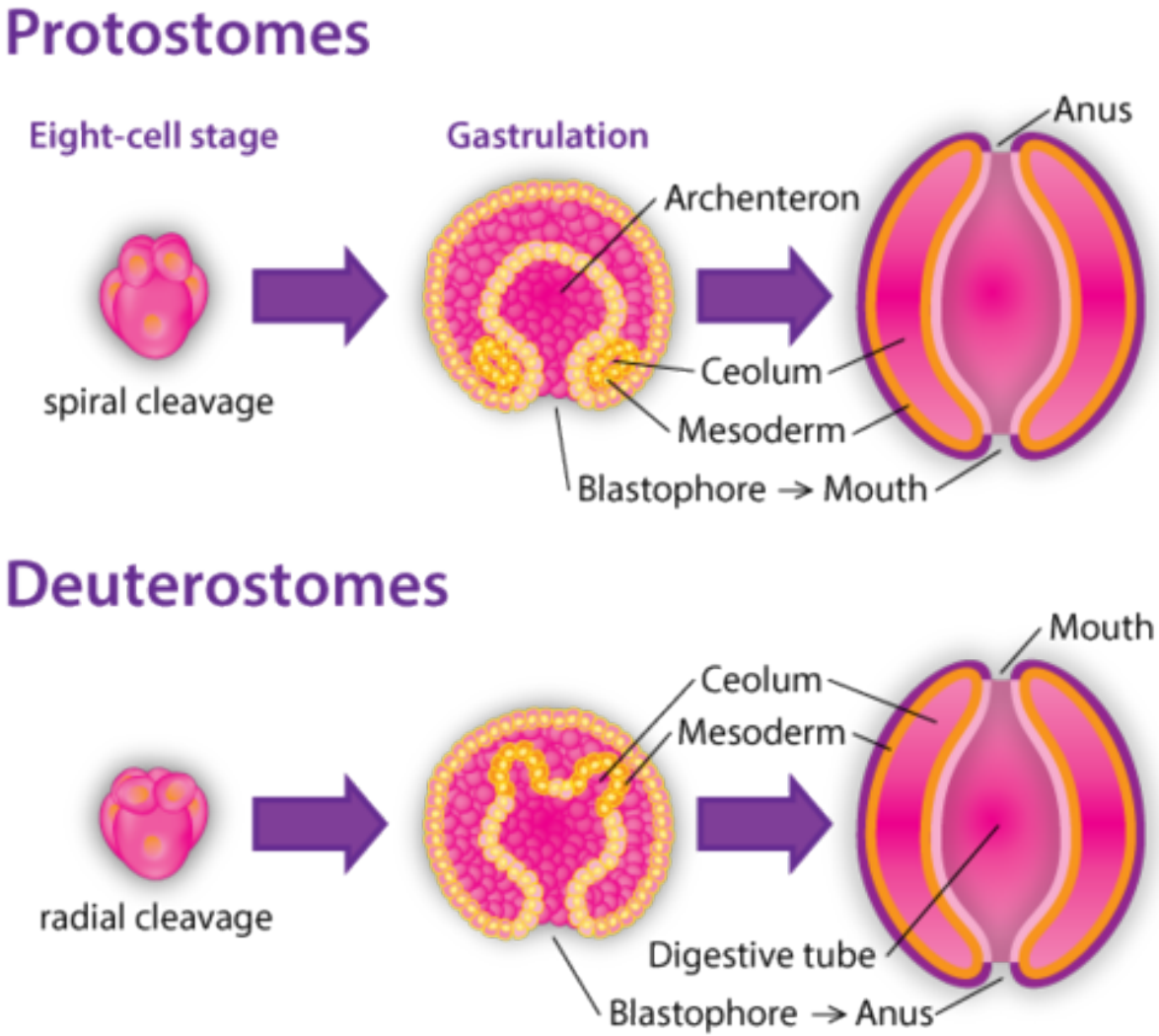
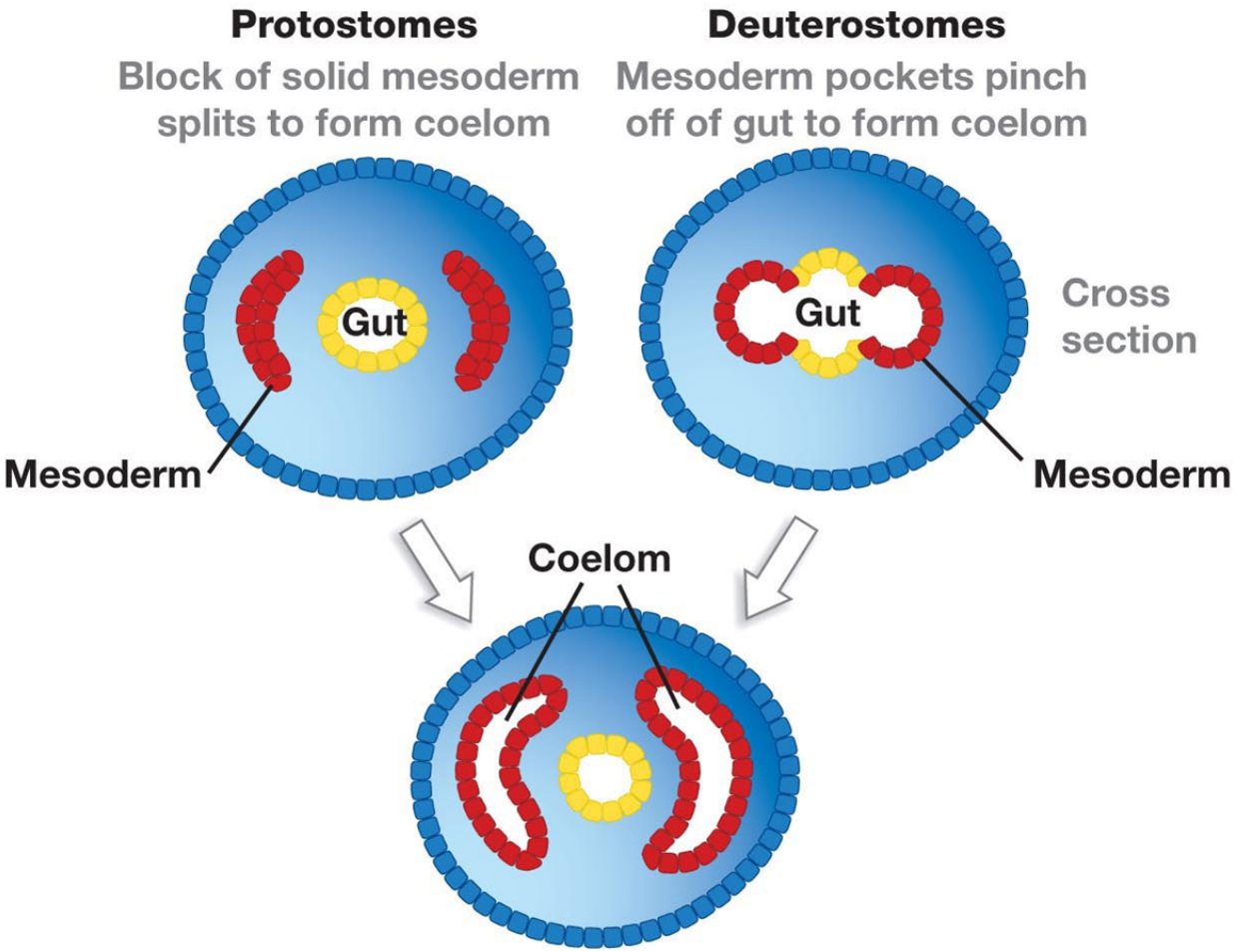


Bilateria: gastulation



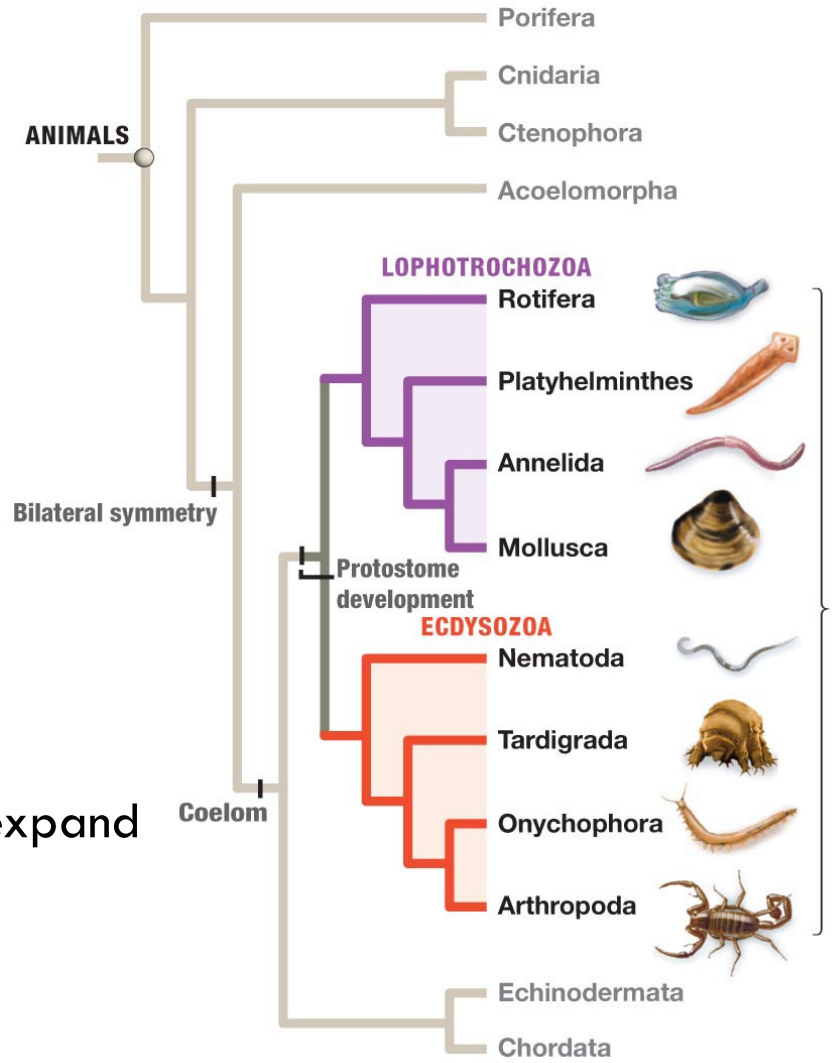
Bilateria: formation of coelom



Protostome phylogenetics

- Lophotrochozoa
  - Grow incrementally
    - by extending size of skeletons

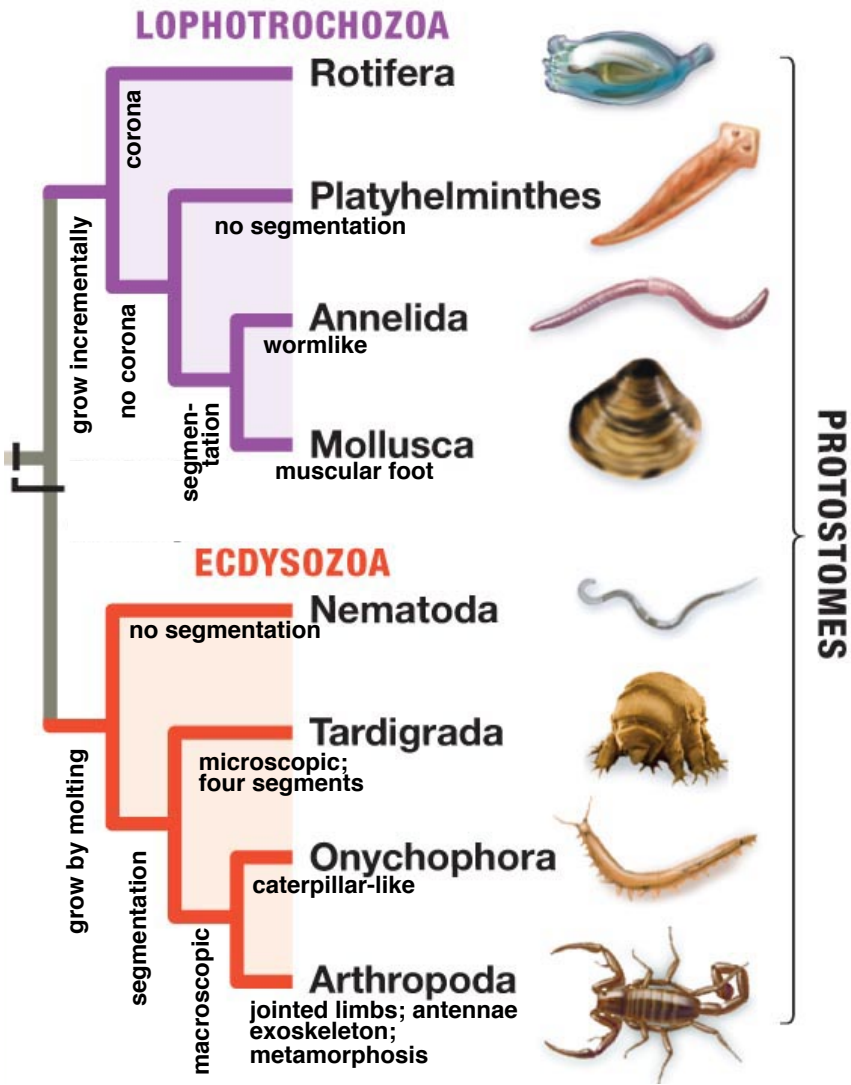
- Ecdysozoa
  - Grow by molting
    - Shed exoskeleton to expand bodies



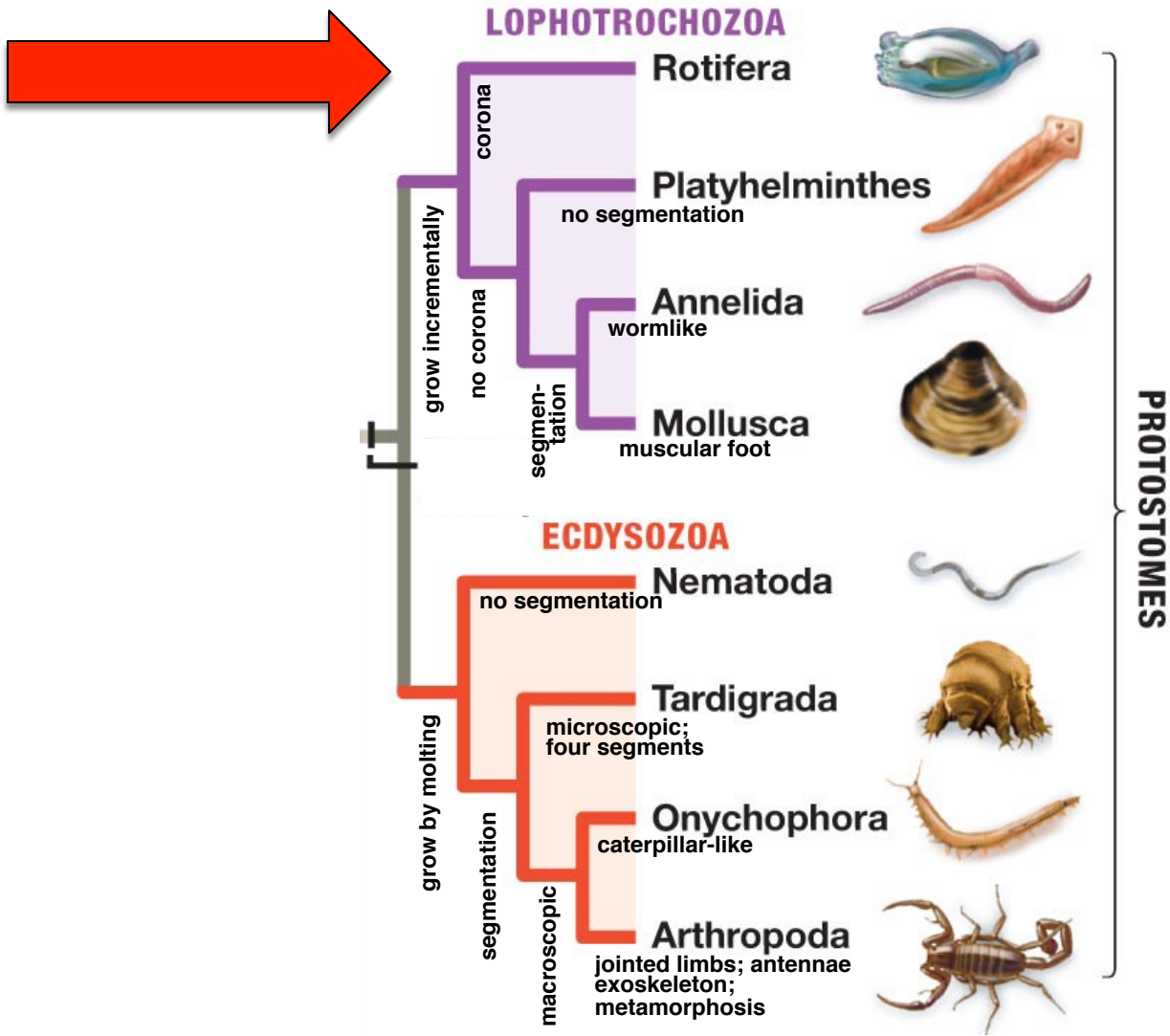
Growth patterns

- Biggest difference is method of growing
  - Lophotrochozoans grow incrementally
  - Ecdysozoans grow by *molting*
    - Shedding of outer coating
      - Cuticle: soft
      - Exoskelton: hard

Protostome phylogenetics

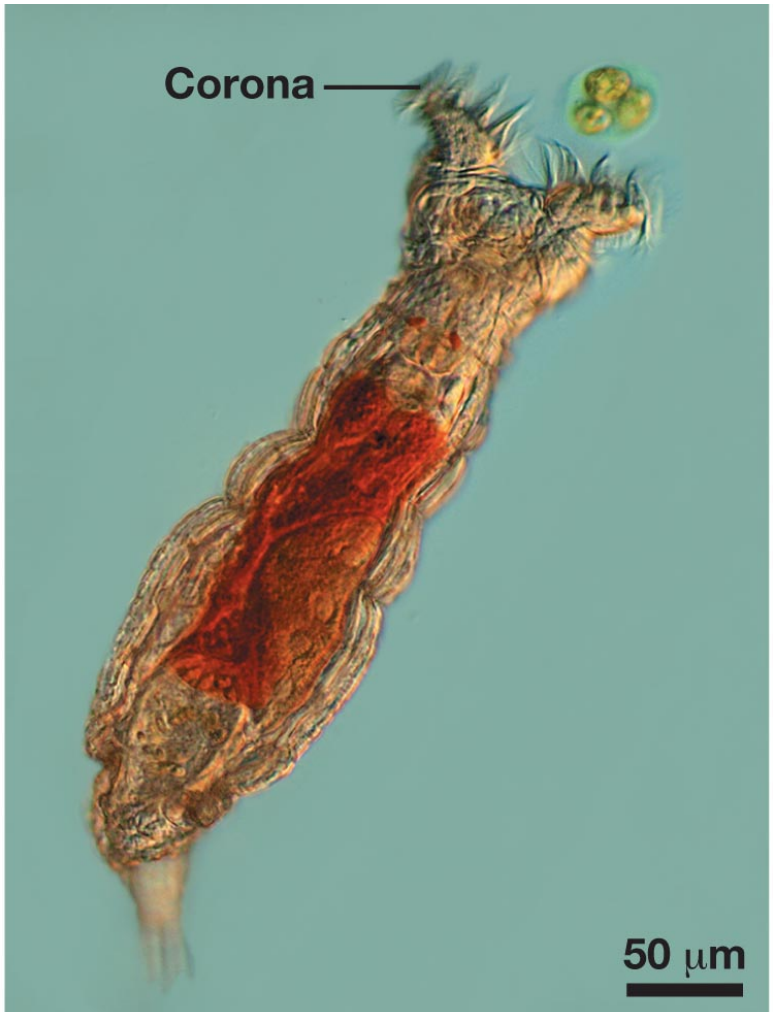


Protostome phylogenetics

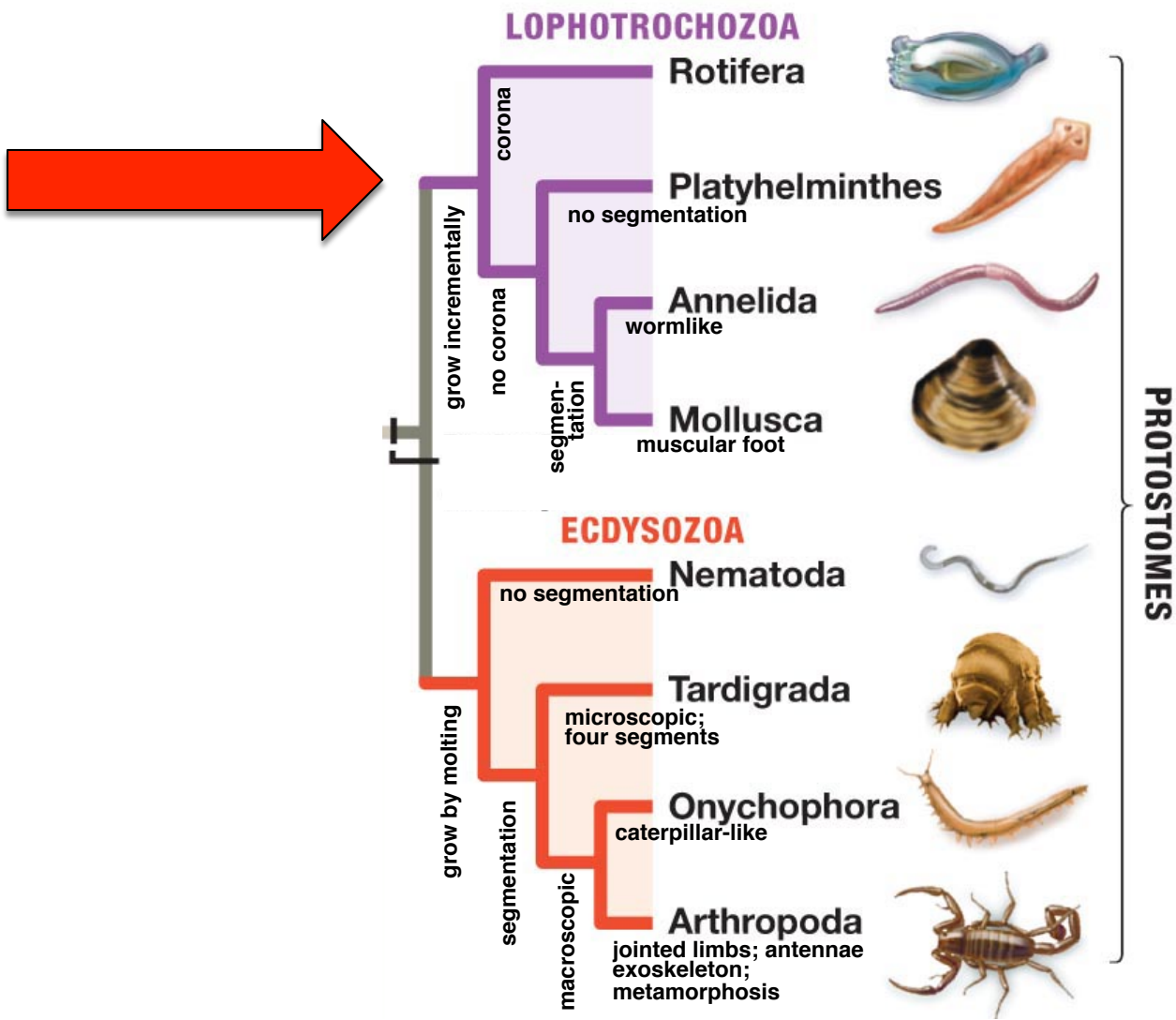


Lophotrochozoa: Rotifera

- Rotifers
- Damp soil or in water
- *Corona*
  - 'crown'
  - Cluster of cilia
  - Used for swimming and suspension feeding



Protostome phylogenetics



Lophotrochozoa: Platyhelminthes

- Flatworms
- Broad, flattened body shape
- Digestive system
  - One opening
  - Ingestion and elimination

Lophotrochozoa: Platyhelminthes

- Turbellarians
  - Free living flatworms
  - Hunters/scavengers
- Cestodes
  - Endoparasitic tapeworms
  - Nutrients via diffusion across body
  - Lack mouth and digestive system
- Trematodes
  - Parasitic flukes
  - Gulp host tissues
  - Have digestive tract

Turbellarian

Lophotrochozoa: Platyhelminthes

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  - Free living flatworms
  - Hunters/scavengers
- Cestodes
  - Endoparasitic tapeworms
  - Nutrients via diffusion across body
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- Trematodes
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  - Have digestive tract

Cestode

Lophotrochozoa: Platyhelminthes

- Turbellarians
  - Free living flatworms
  - Hunters/scavengers
- Cestodes
  - Endoparasitic tapeworms
  - Nutrients via diffusion across body
  - Lack mouth and digestive system
- Trematodes
  - Parasitic flukes
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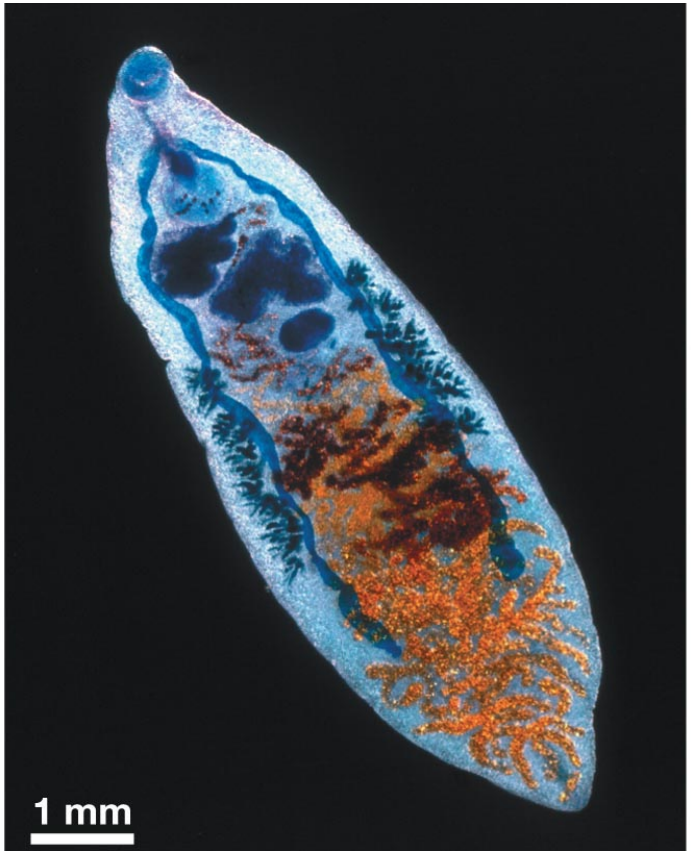
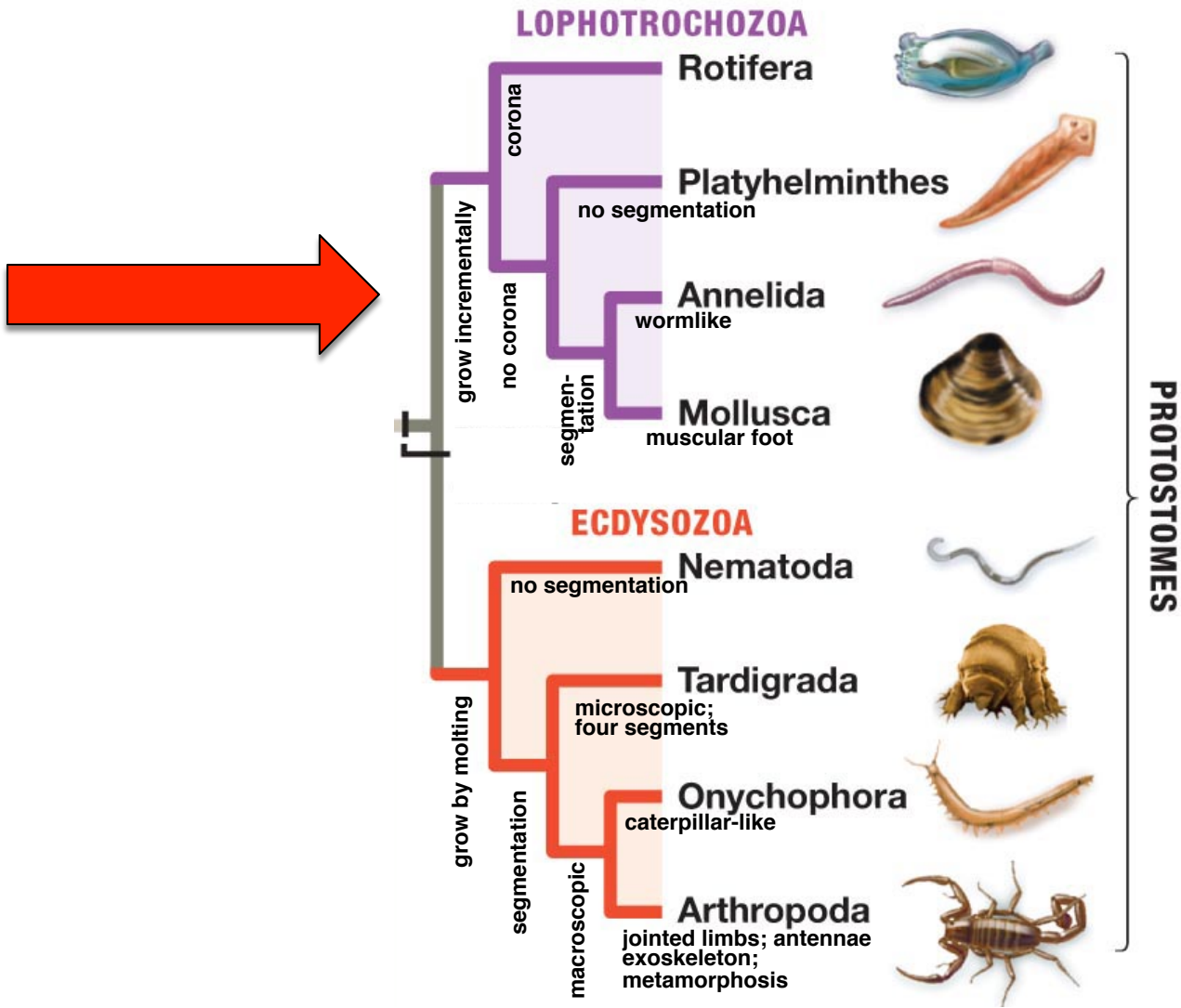
  - Have digestive tract



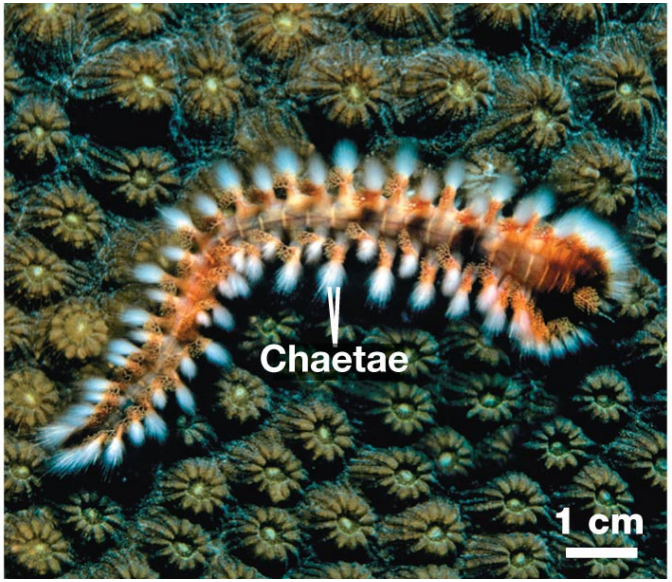
Turbellarian

Protostome phylogenetics



Lophotrochozoa: Annelida

- Segmented worms
- Polychaeta
  - Have *parapodia*
    - Appendages with *chaetae*
      - Bristlelike extensions from parapodia
- Oligochaeta
  - Lost parapodia
  - Reduced chaetae
  - Earthworms
- Hirundinea
  - Lost parapodia & chaetae
  - Leeches



Polychaeta

Lophotrochozoa: Annelida

- Segmented worms
- Polychaeta
  - Have *parapodia*
    - Appendages with *chaetae*
      - Bristlelike extensions from parapodia
- Oligochaeta
  - Lost parapodia
  - Reduced chaetae
  - Earthworms
- Hirundinea
  - Lost parapodia & chaetae
  - Leeches

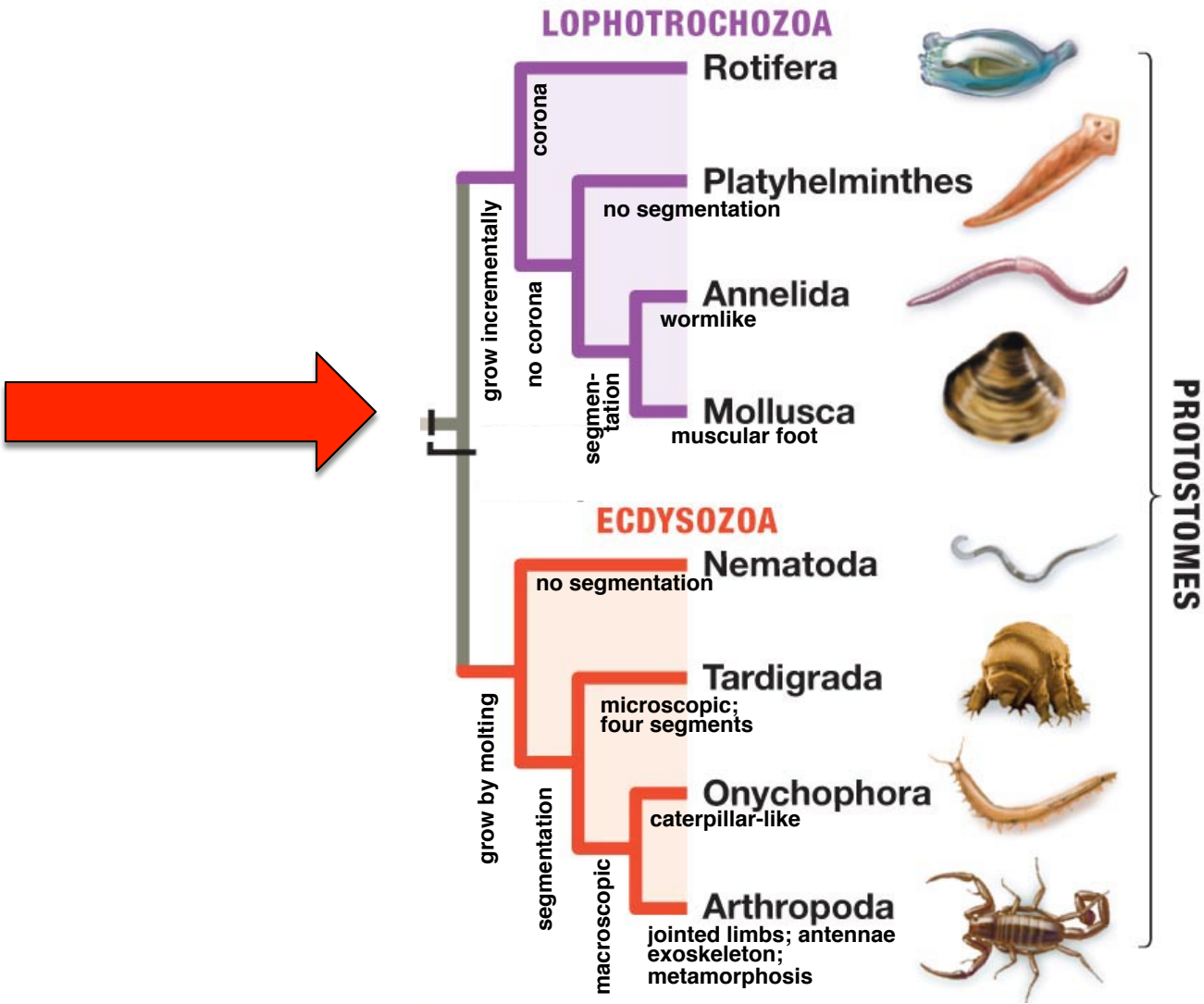
Oligochaeta

Lophotrochozoa: Annelida

- Segmented worms
- Polychaeta
  - Have *parapodia*
    - Appendages with *chaetae*
      - Bristlelike extensions from parapodia
- Oligochaeta
  - Lost parapodia
  - Reduced chaetae
  - Earthworms
- Hirundinea
  - Lost parapodia & chaetae
  - Leeches

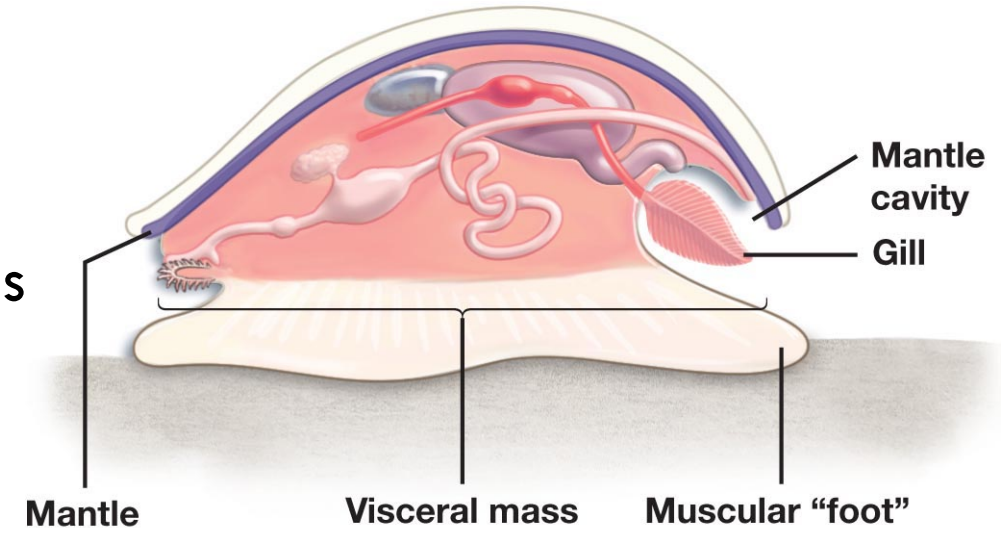
Hirundinea

Protostome phylogenetics



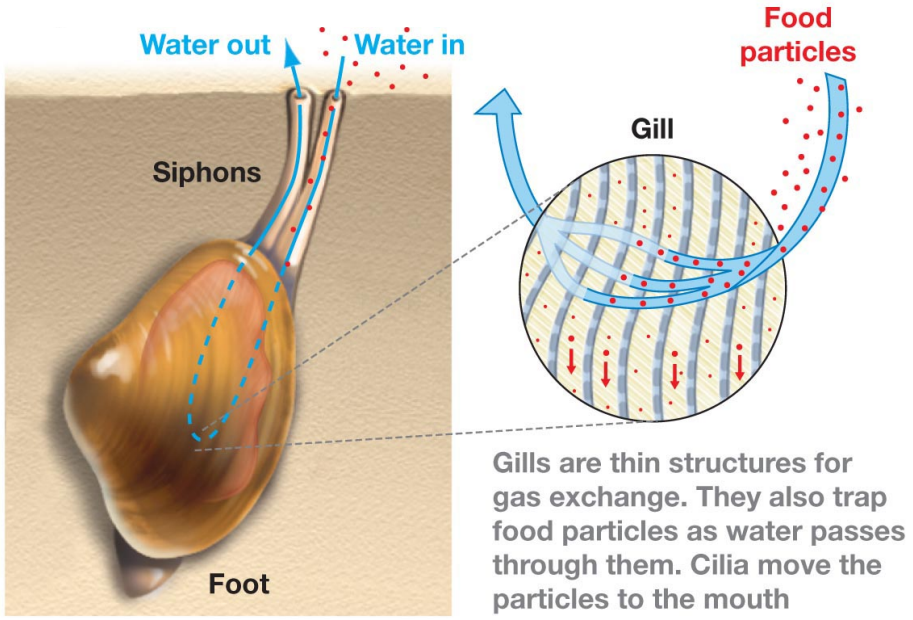
Mollusc body plans

- *Foot*
  - Large muscle at base
  - Movement
- *Visceral mass*
  - Contains internal organs
- *Mantle*
  - Covers visceral mass
  - Secretes calcium carbonate shells



Lophotrochozoa: Mollusca

- Bivalves
  - Suspension feeders
  - 2 hinged shells
  - Clams burrow
  - Oysters & mussels attached
  - Scallops are mobile

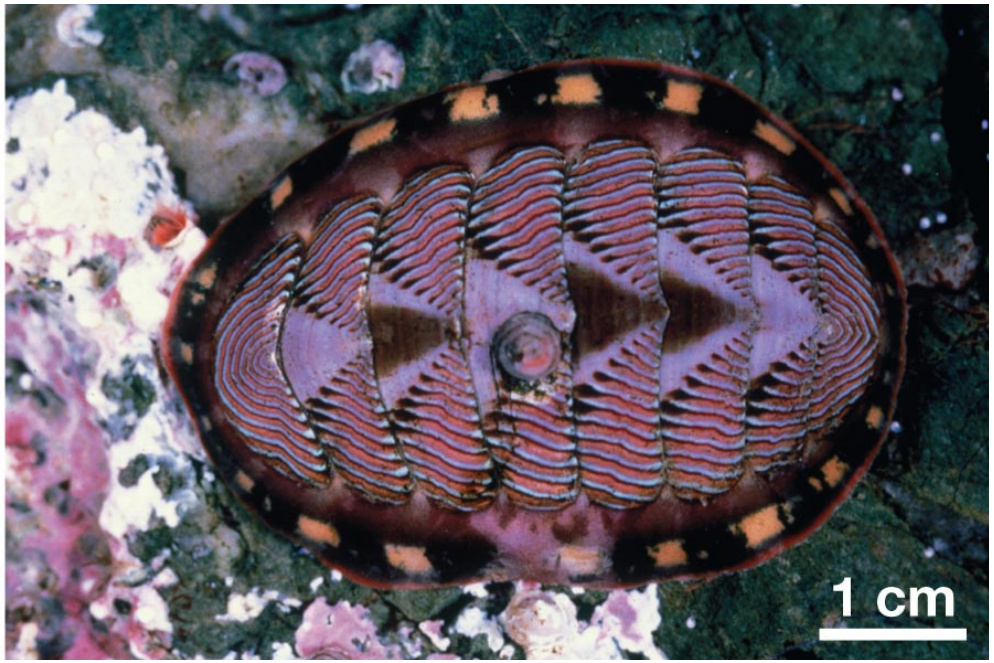


Lophotrochozoa: Mollusca

- Gastropods
  - Marine snails & slugs
  - Large, muscular foot
    - Gliding movement
  - *Radula*
    - Mouth on foot

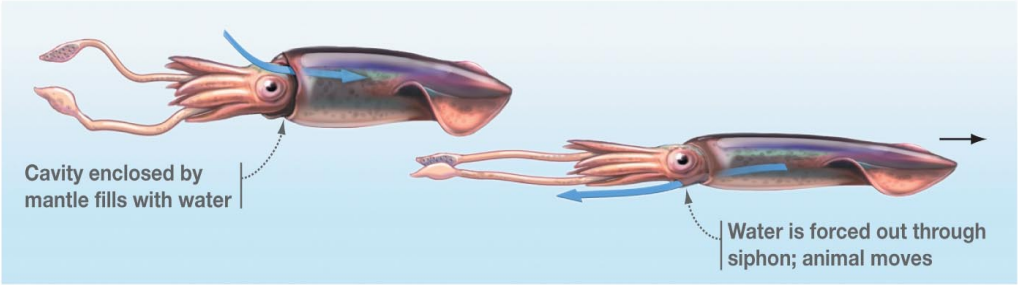
Lophotrochozoa: Mollusca

- Chitons
  - 8 shell plates for protection
  - Have radula to scrape algae
  - Muscular foot

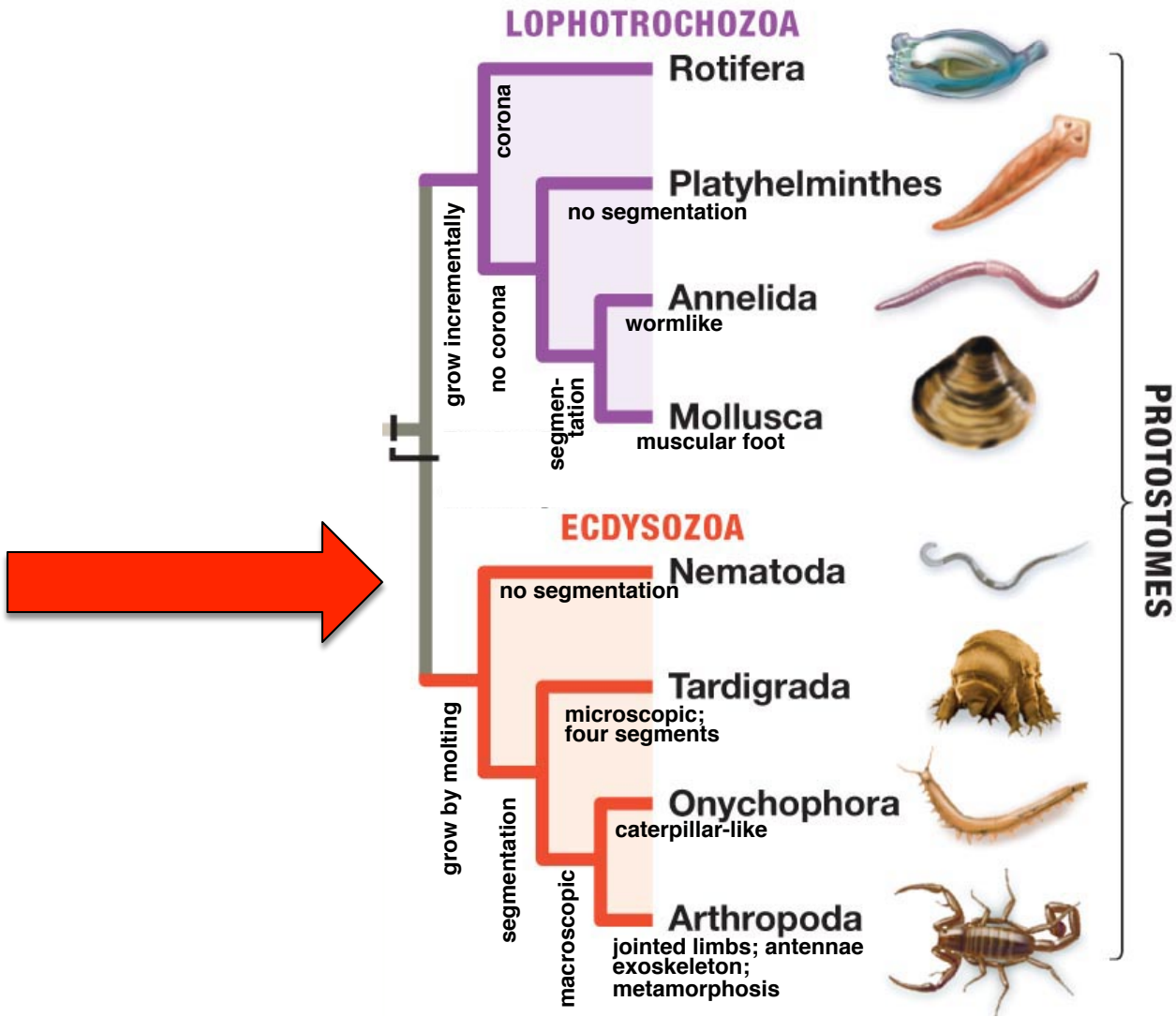


Lophotrochozoa: Mollusca

- Cephalopods
  - Nautilus, cuttlefish, squid, & octopus
  - Well-developed head
    - Beak
  - Foot modified as tentacles
  - Large brain and eyes

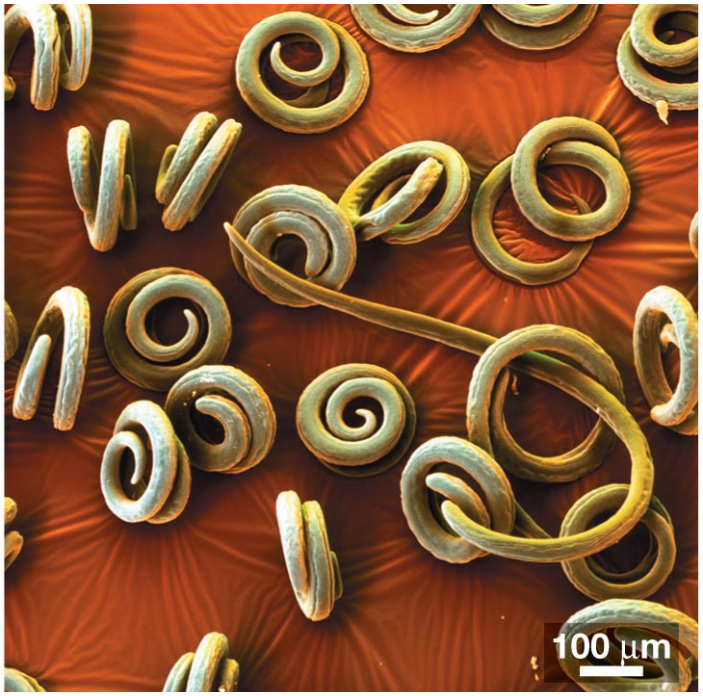


Protostome phylogenetics



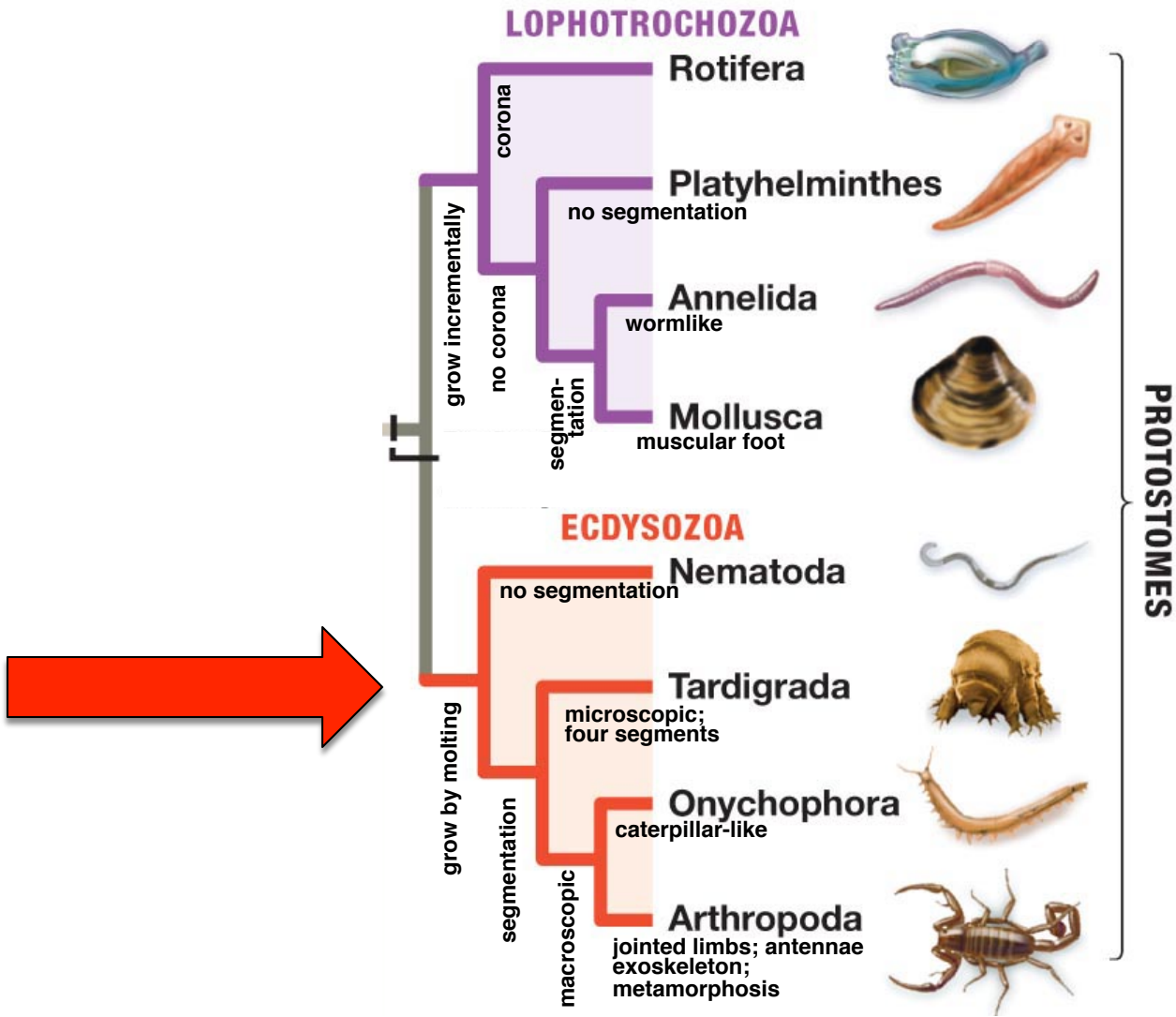
Ecdysozoa: Nematoda

- Nematodes (Roundworms)
- Unsegmented worms
- Virtually every habitat
  - Some human parasites
- Very abundant
  - 80% of individuals of animals



Nematode that causes trichinosis

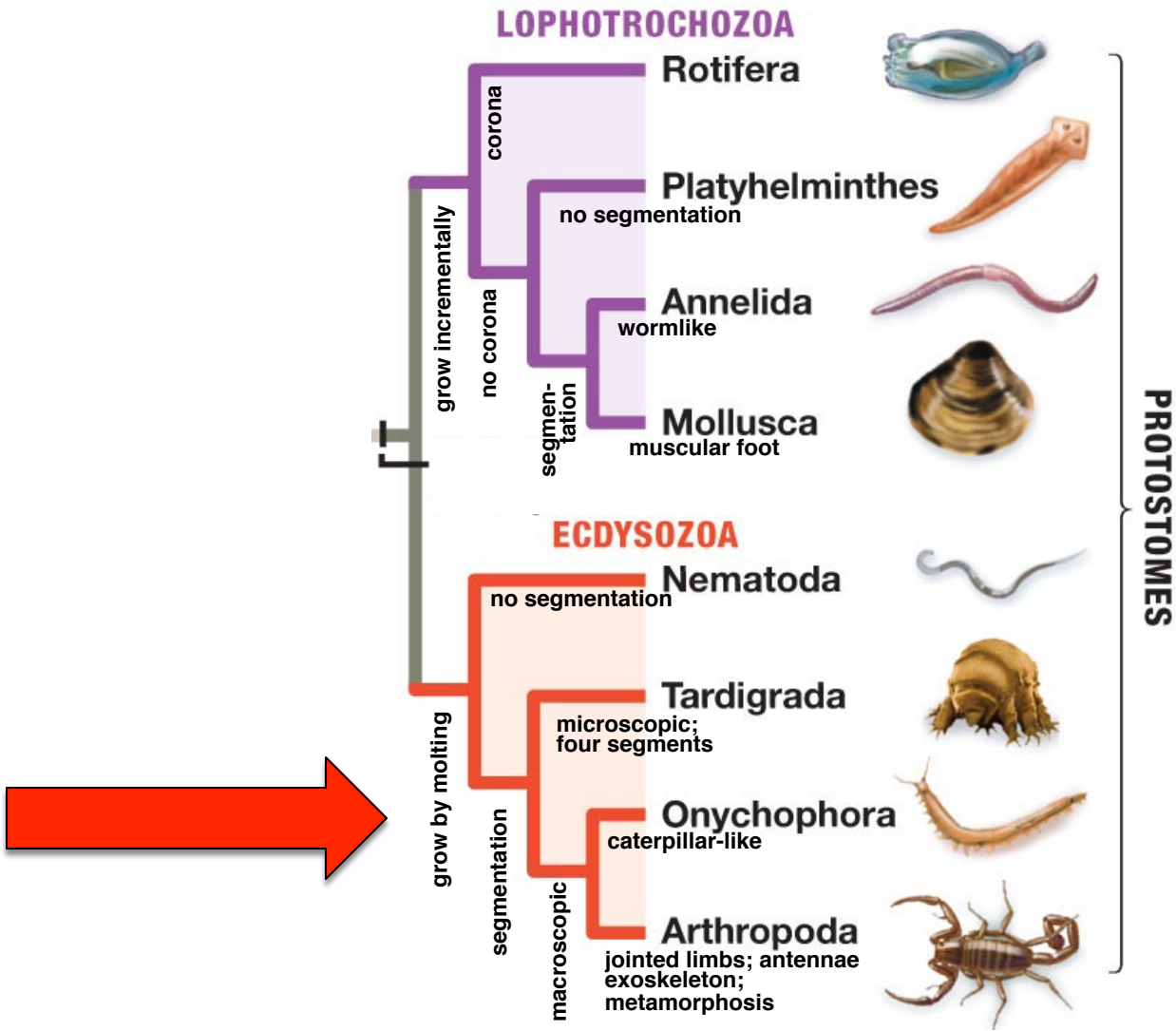
Protostome phylogenetics



Ecdysozoa: Tardigrada

- Segmented body and limbs
- Lacks jointed limbs and exoskeleton
- Water bears
  - Microscopic
  - Floor of aquatic env.
  - Feed by sucking fluids
    - Plants or animals
- Discovery article

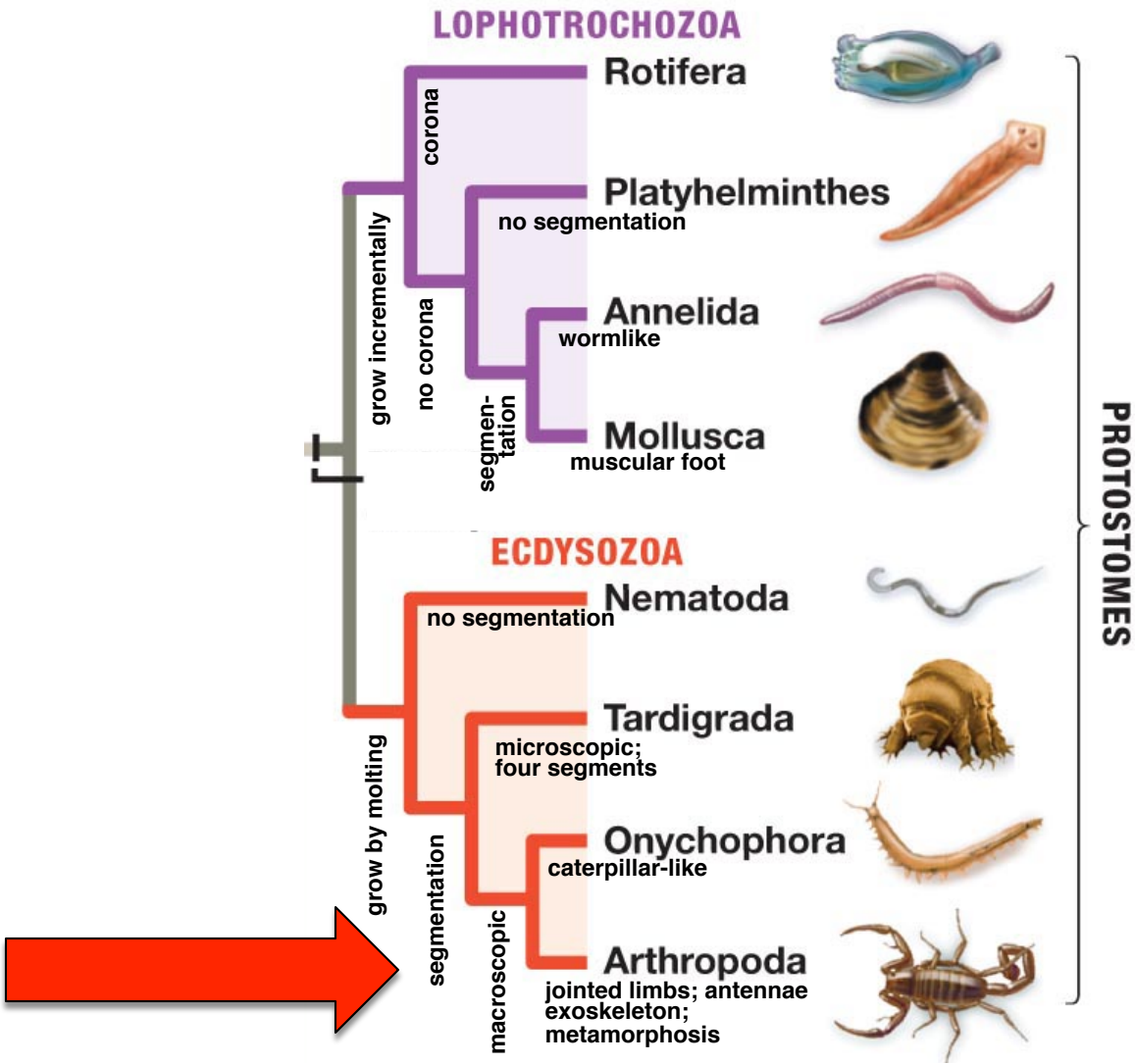
Protostome phylogenetics



Ecdysozoa: Onychophora

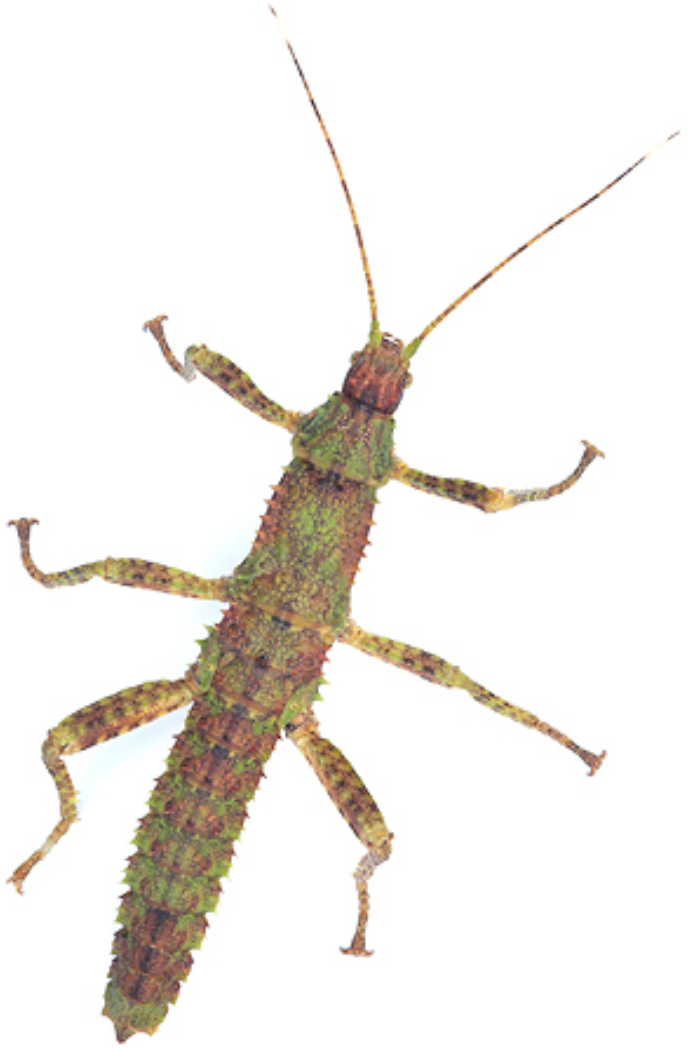
- Segmented body and limbs
- Lacks jointed limbs and exoskeleton
- Velvet worms
  - Small, caterpillar-like
  - Moist leaf litter
  - Prey on small invertebrates

Protostome phylogenetics



Ecdysozoa: Arthropoda

- Segmented bodies
- Jointed exoskeletons
- Distinct head and trunk
  - Trunk usually has
    - Abdomen & thorax
- Metamorphosis
- Compound eyes
- Antennae

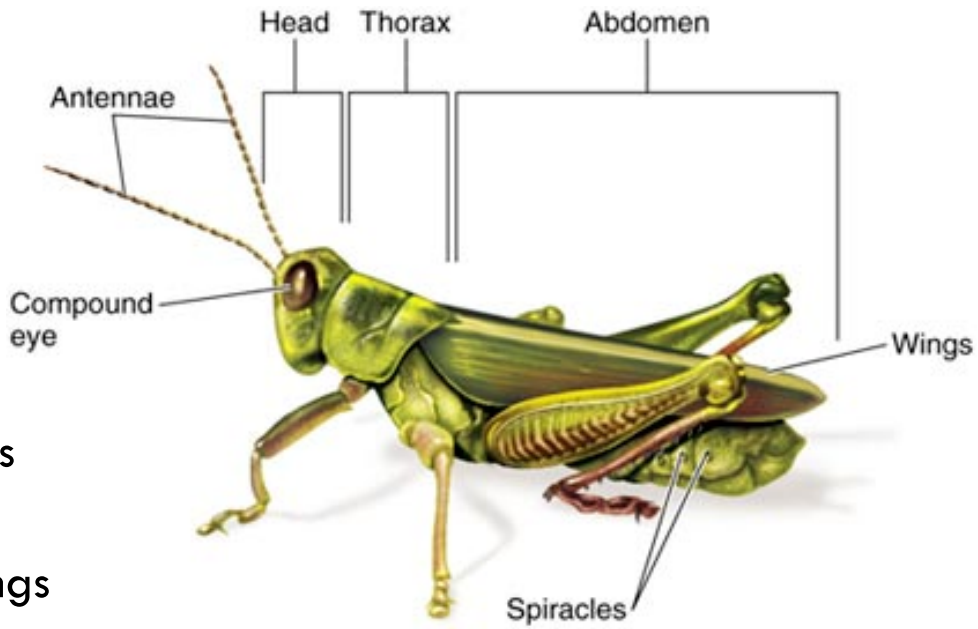


Ecdysozoa: Arthropoda

- Myriapoda
  - Simple body plan
    - Short segments
      - 1 or 2 leg pairs
  - Millipedes
    - Detritivores
  - Centipedes
    - Predators

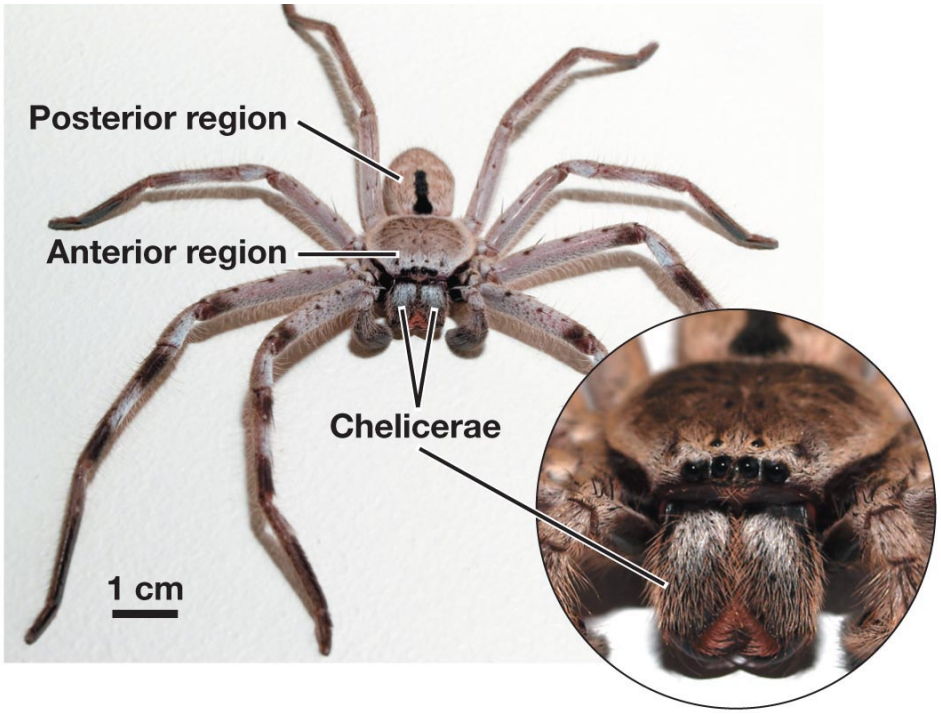
Ecdysozoa: Arthropoda

- Insecta
  - Three tagmata
    - Head
      - Antennae
      - Compound eyes
      - 4 sets of mouthparts
    - Thorax
      - Ventral thorax
        - 3 pair walking legs
      - Dorsal thorax
        - 1 or 2 pairs of wings
    - Abdomen
  - 90% of diversity on Earth



Ecdysozoa: Arthropoda

- Chelicerata
  - Spiders, ticks, mites, horseshoe crabs, scorpions
  - 2 tagamata
    - Cephalothorax
    - Abdomen
  - Lack antenna
  - Have *chelicerae*
    - Near mouth
    - Feeding
    - Defense
    - copulation
  - No metamorphosis



Ecdysozoa: Arthropoda

- Crustacea
  - Lobsters, shrimp, crab
  - 2 Tagamata
    - Cephalothorax
    - Abdomen
  - Have antennae
  - *Carapace*
    - Platelike exoskeleton
    - Protects cephalothorax