

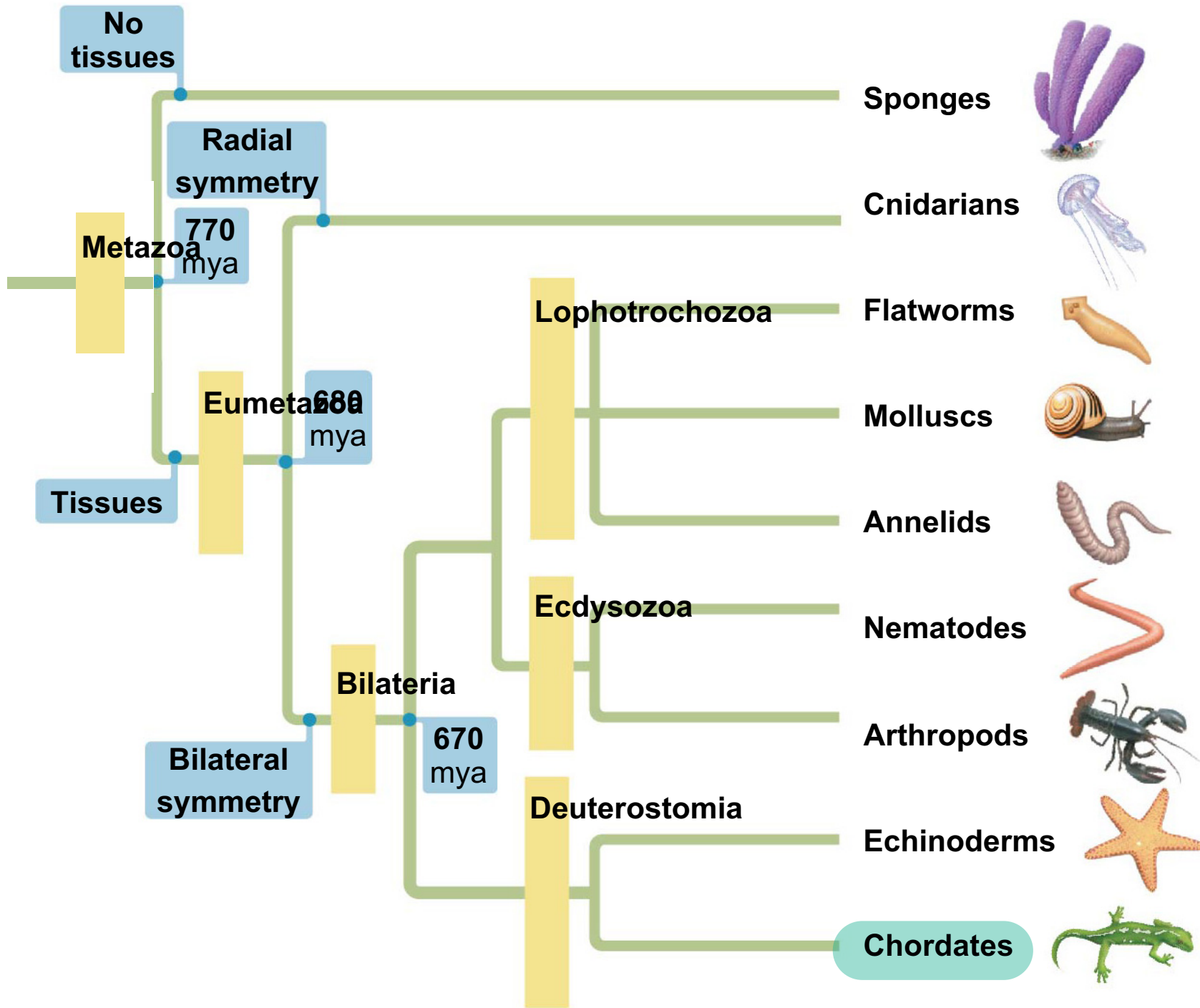
1/26/23

Animals – vertebrates

Chordates – Vertebrates &
Invertebrates



The animal phylogenetic tree



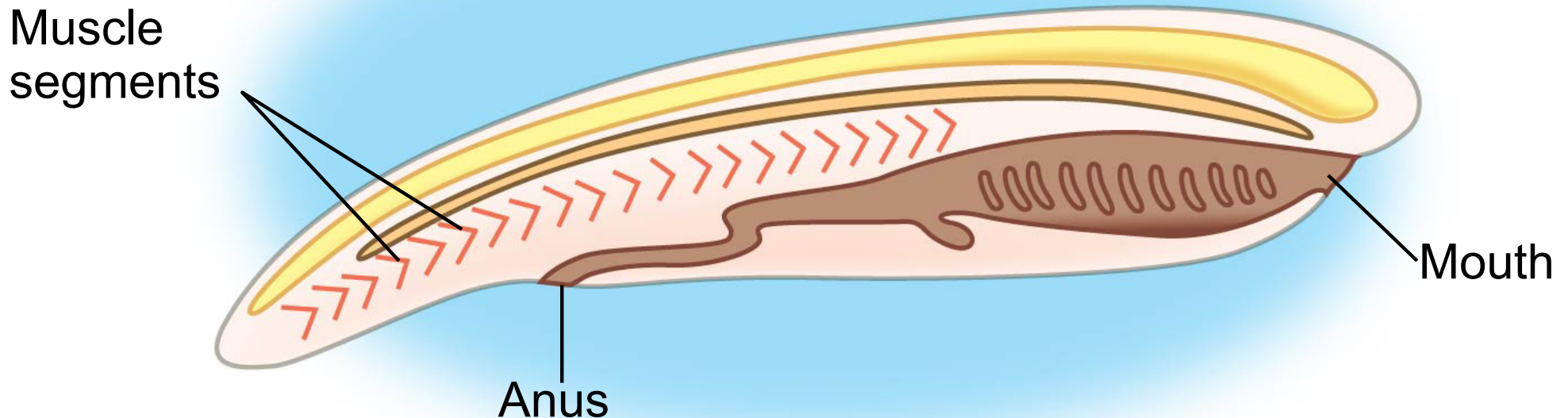
Protostomes:
formation of
mouth, 1st,
anus 2nd

Deuterostomes:
Formation of
mouth, 2nd, anus
1st

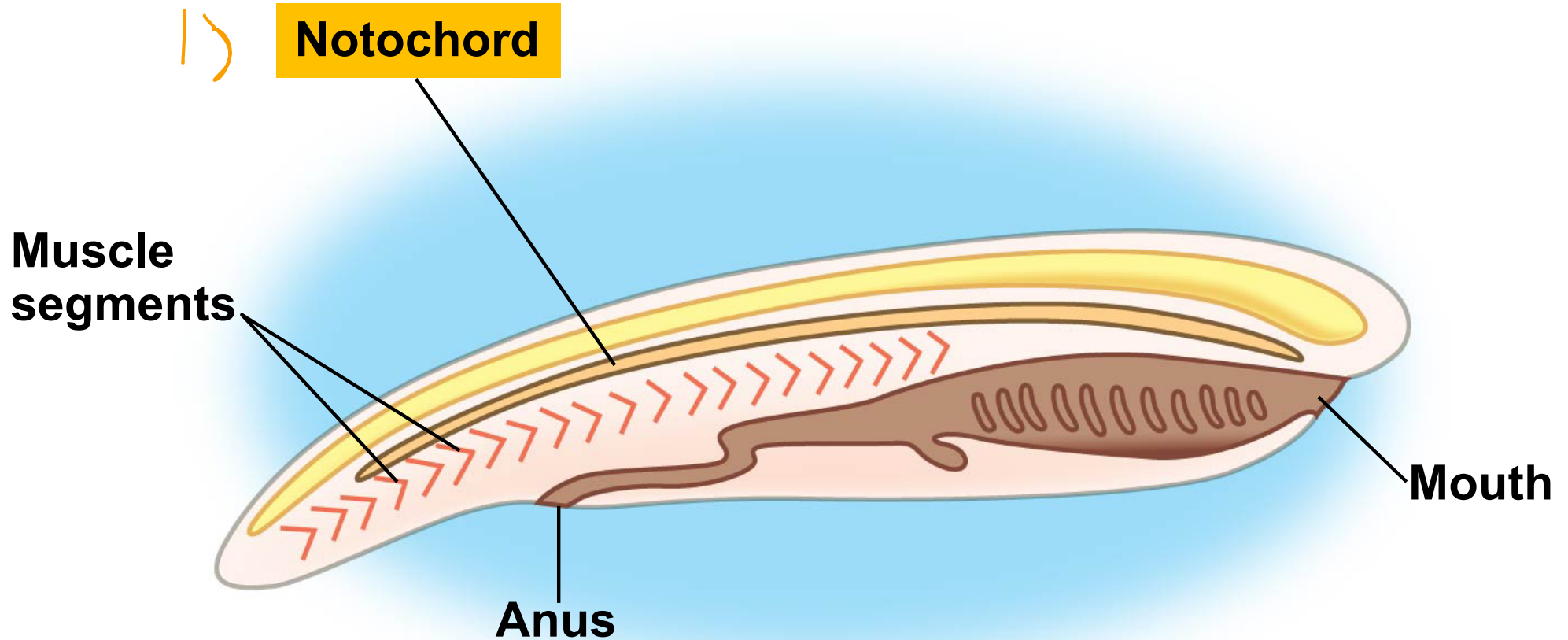
Chordata - our phylum!

- All chordates share 4 characteristics
- These are present at some point in development (larva, adult, or both)

Basic chordate body plan



Chordata - our phylum!



- Longitudinal rod of fluid-filled cells and fibrous tissue
- Provides skeletal support through the organism's length for muscles to pull against for swimming
- In vertebrates a hard skeleton forms around it and the notochord is reduced

Chordata - our phylum!

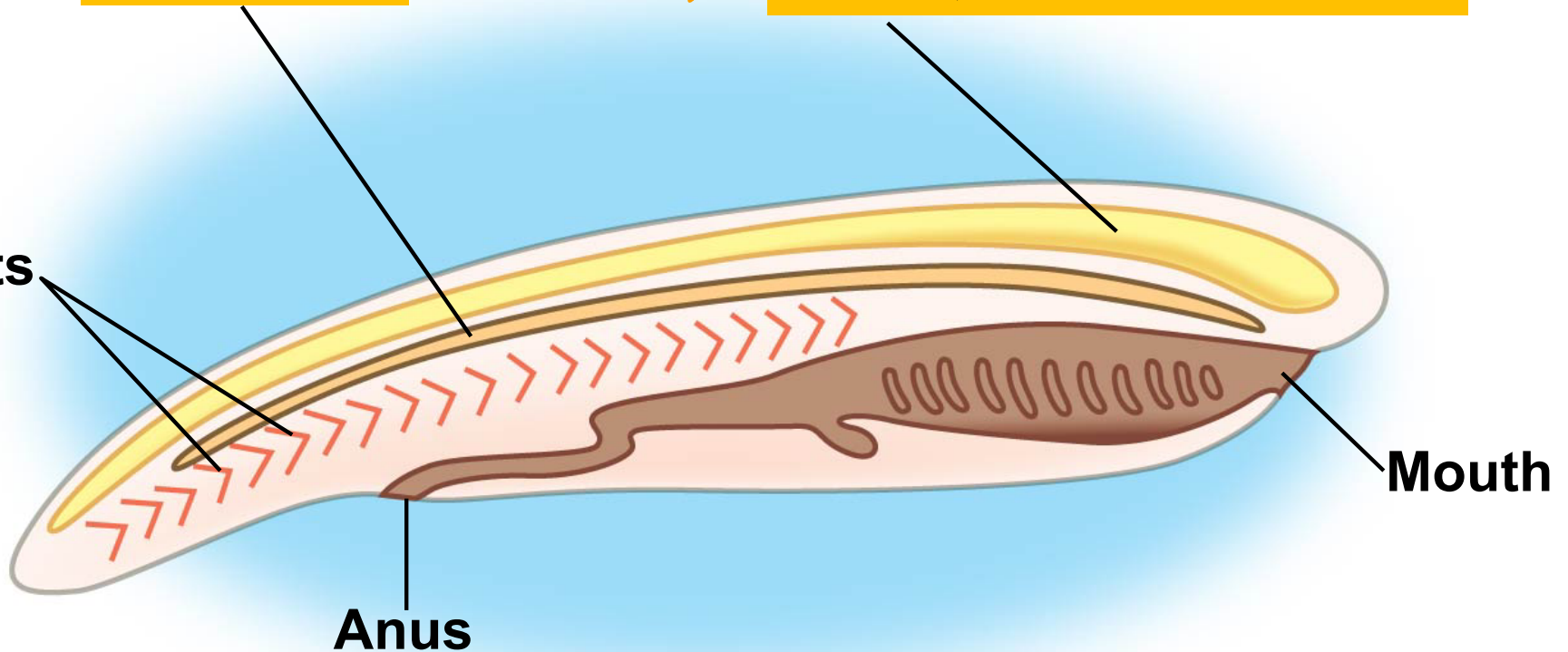
1)

Notochord

2)

Dorsal, hollow nerve cord

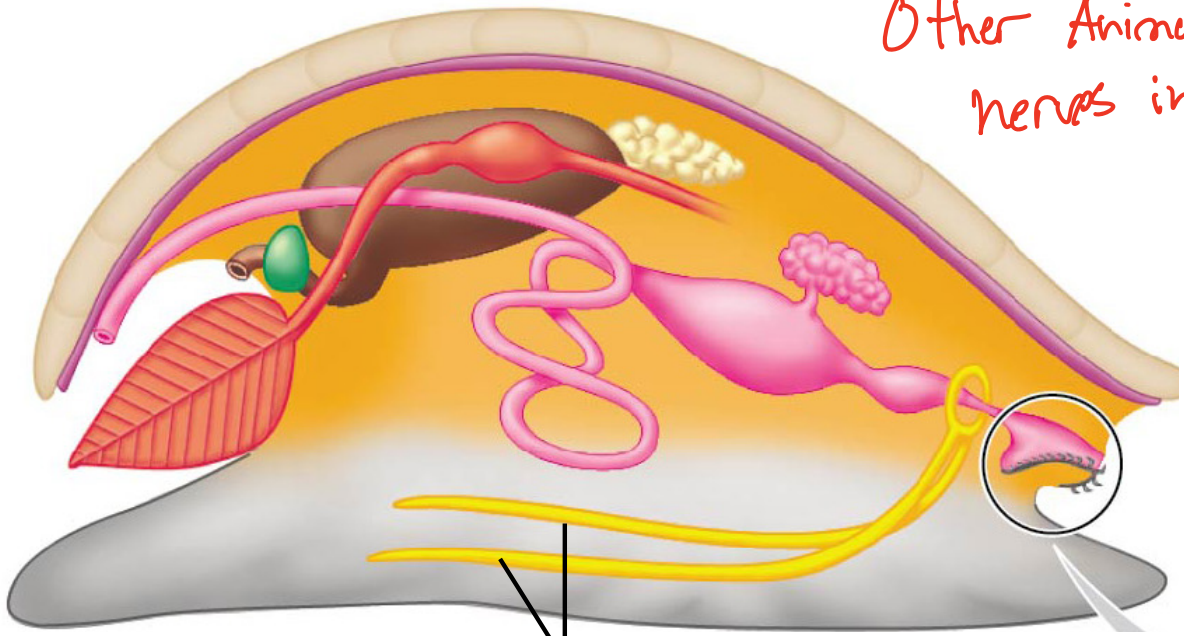
Muscle segments



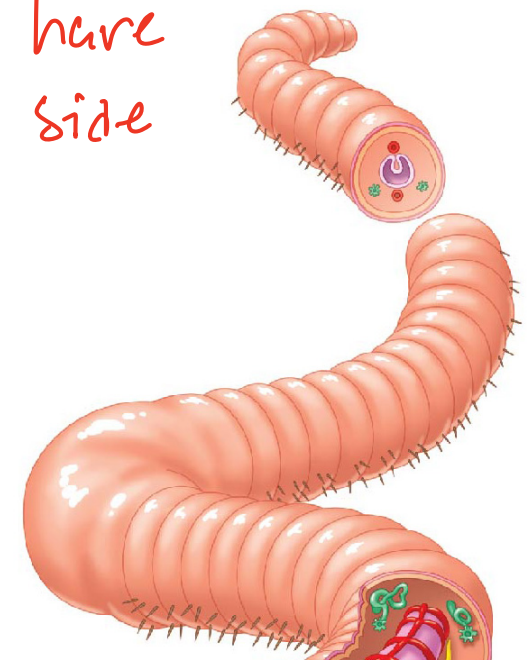
- Unique feature in chordates
- Develops into the central nervous system (aka brain and spinal cord)

• Dorsal side

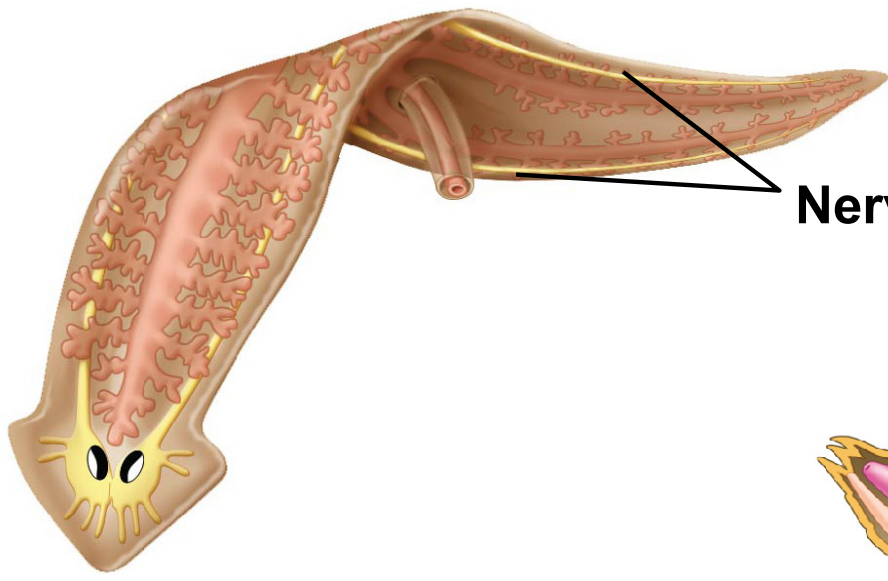
Other Animal groups have
nerves in ventral side



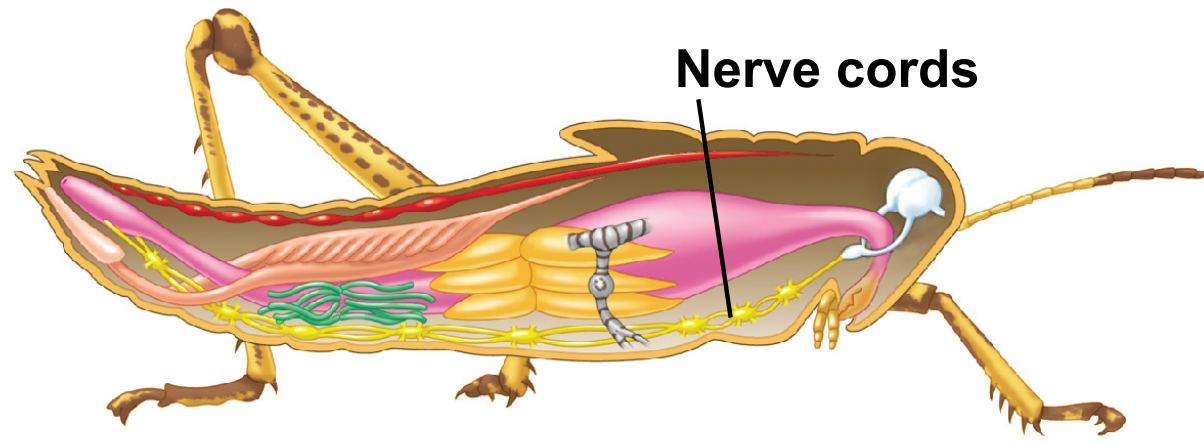
Nerve cords



**Nerve
cord**

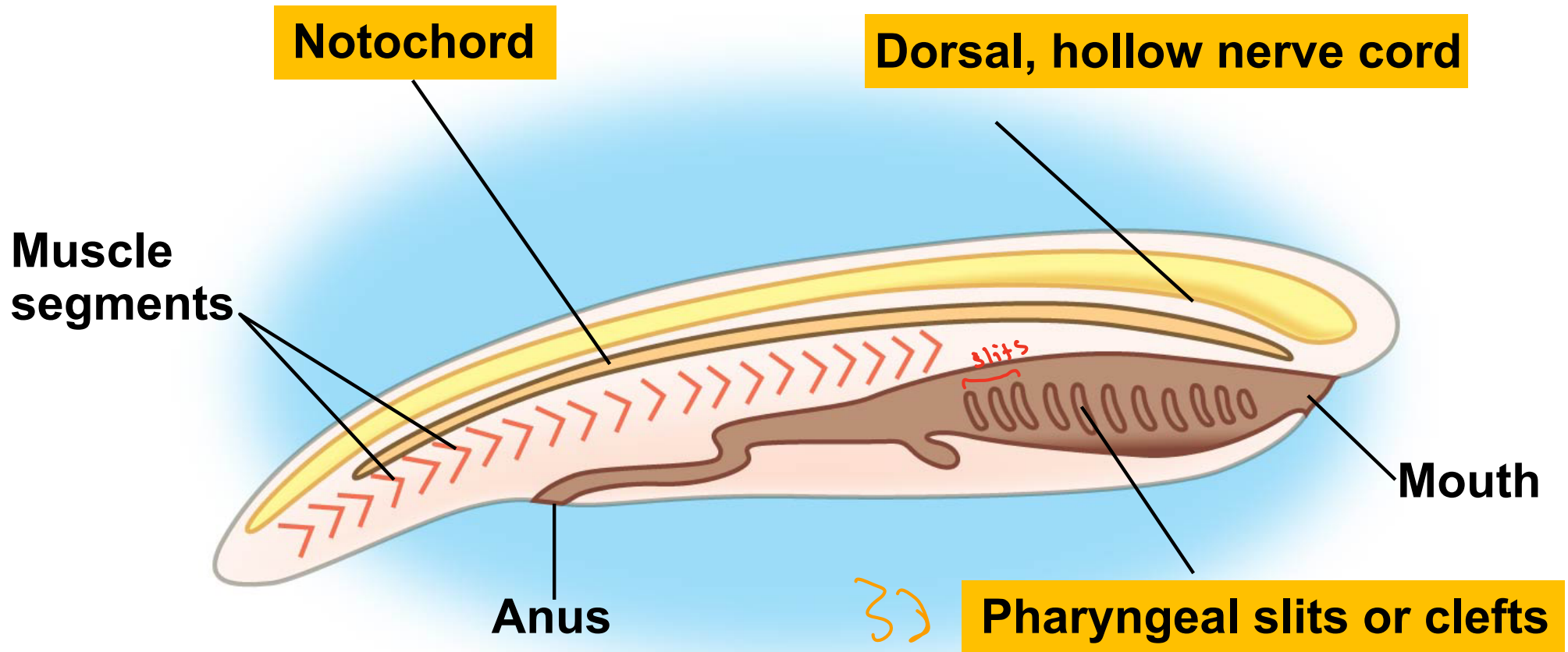


Nerve cords



Nerve cords

Chordata - our phylum!



- Series of arches separated by grooves along the outer surface of pharynx
- Water can come in mouth and exit at the pharynx *through slits*
- Develop into gills in some chordates
- Part of our ear!

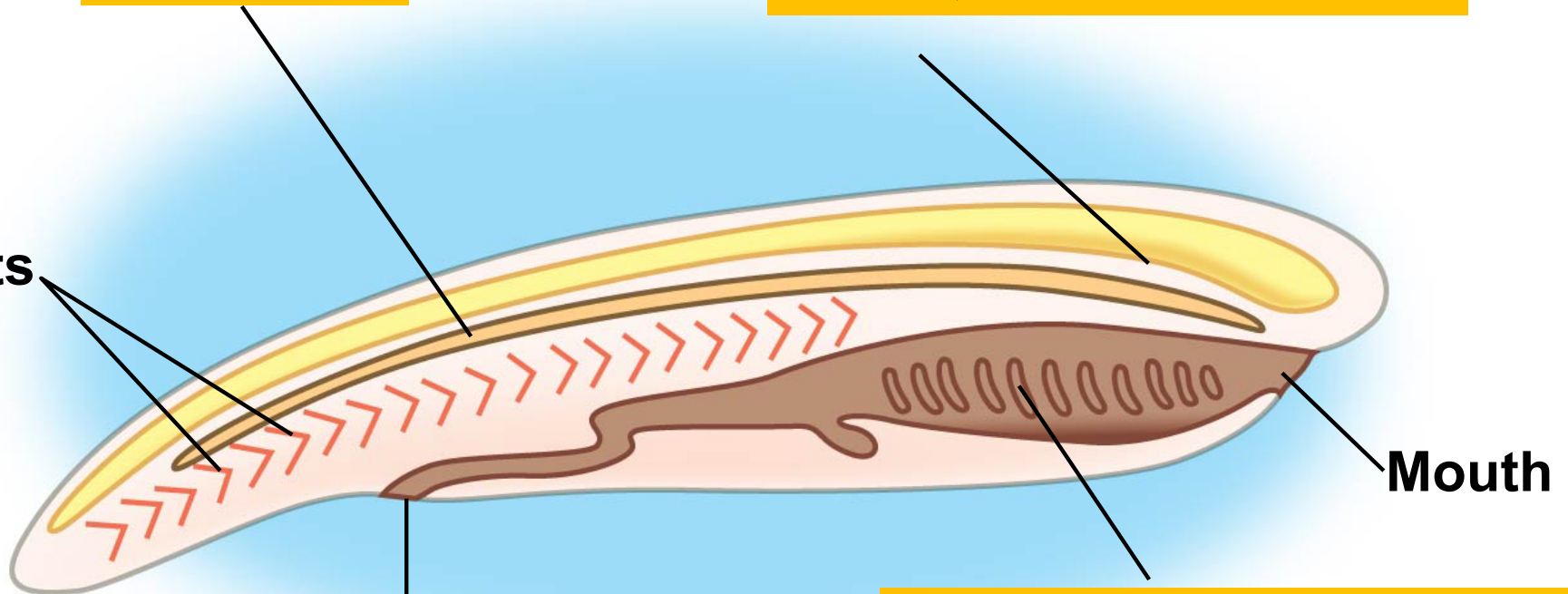
Chordata - our phylum!

location is unique to chordates

Notochord

Dorsal, hollow nerve cord

Muscle segments



Mouth

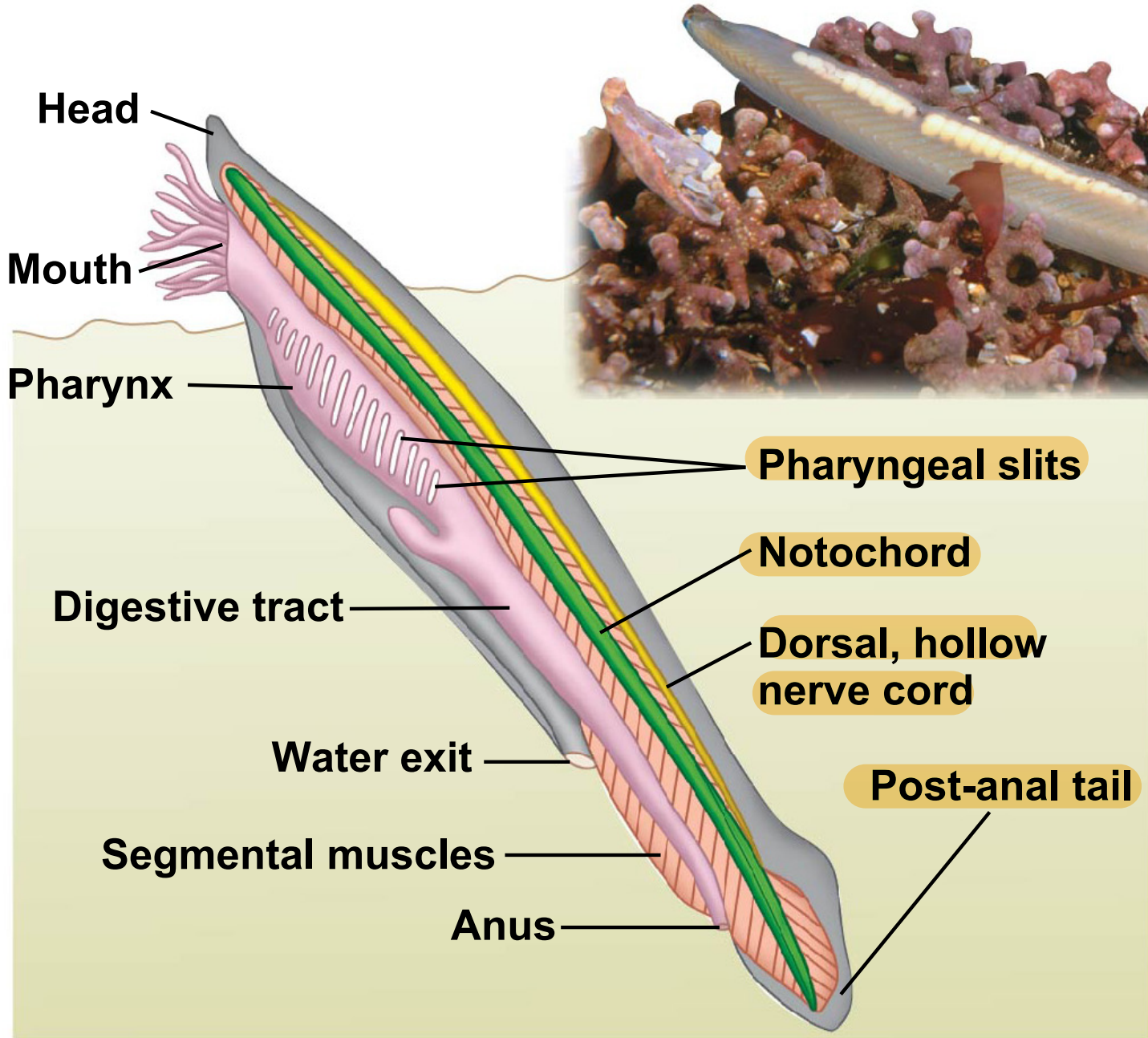
Post-anal tail

Anus

Pharyngeal slits or clefts

- Digestive tract does not go to the end of the body
- Made of muscle and skeletal segments
- Great for swimming
- Muscle segments = segmentation

Invertebrate chordates - lancelets



4 unique Chordate traits

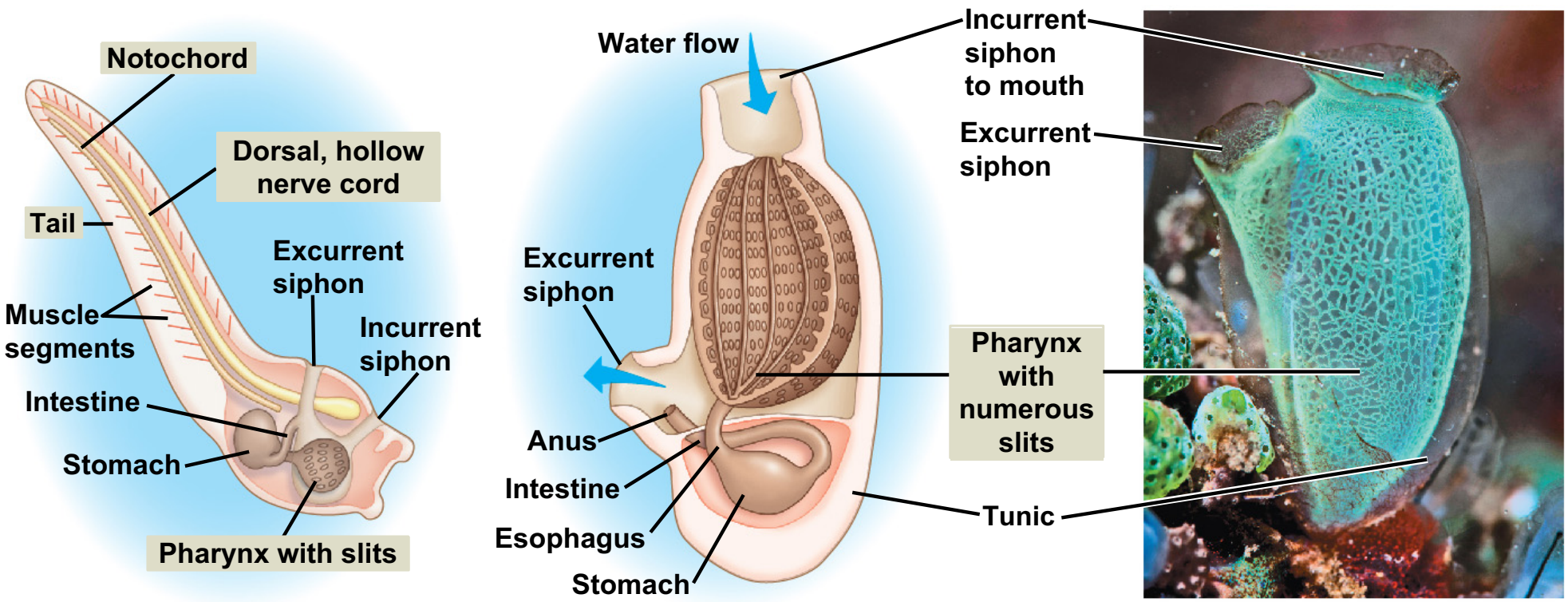
Pharyngeal slits

Notochord

Dorsal, hollow nerve cord

Post-anal tail

Invertebrate chordates - tunicates

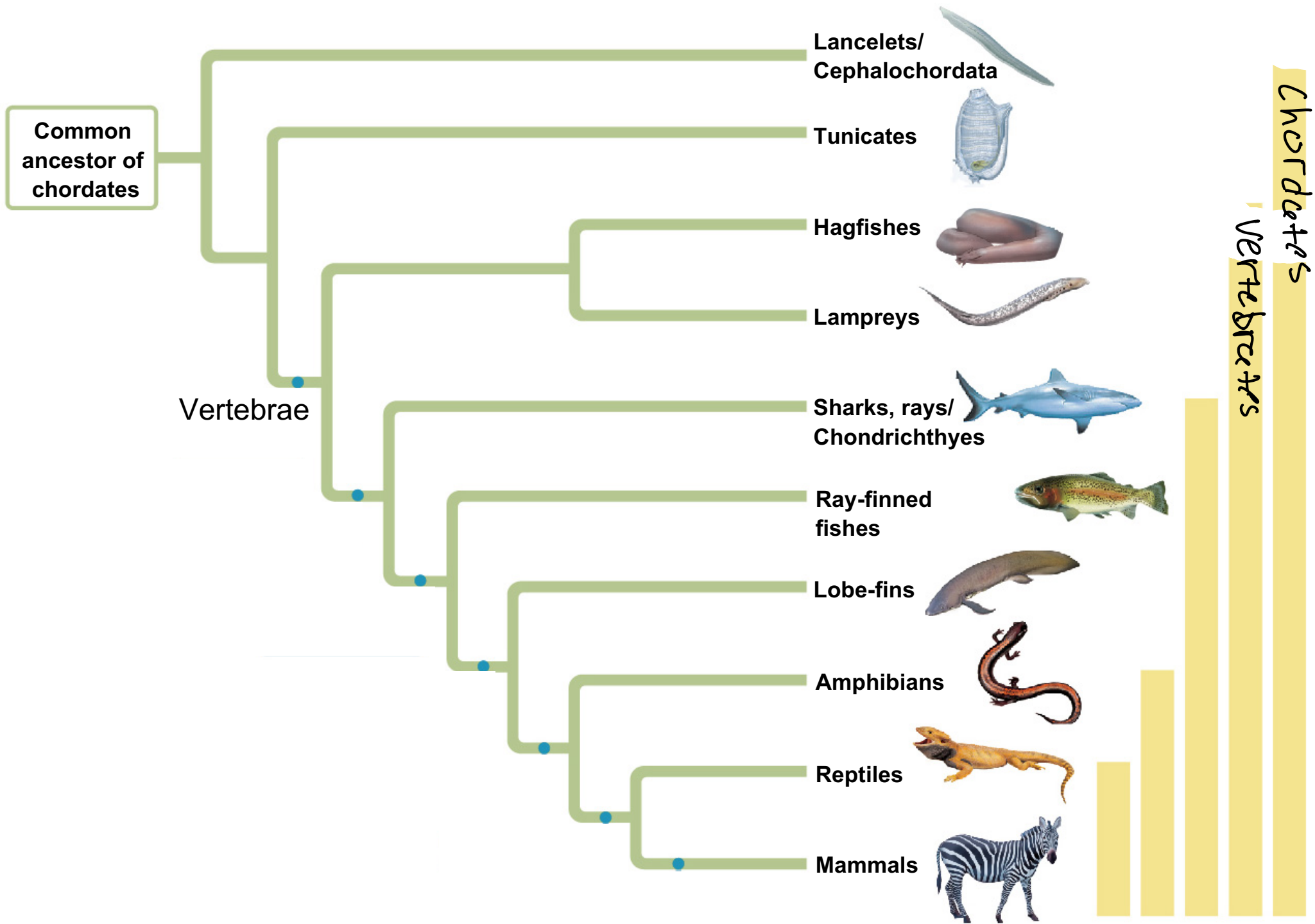


(a) A tunicate larva

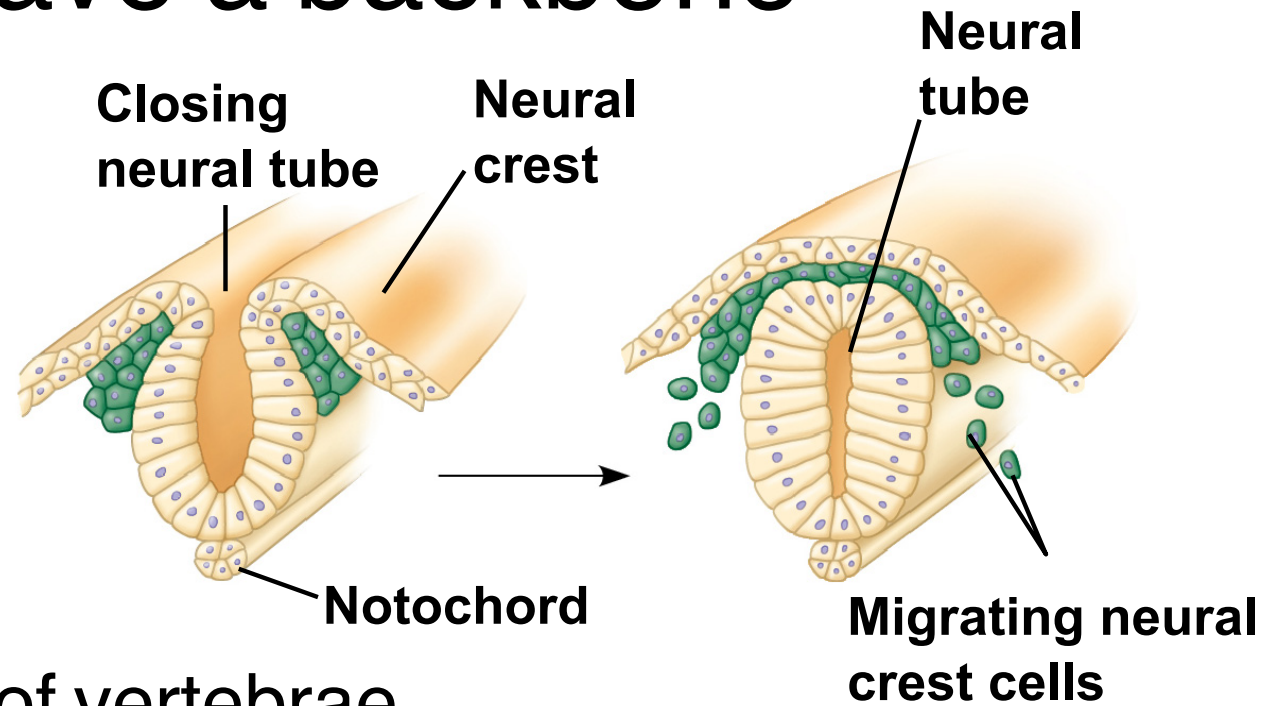
(b) An adult tunicate

(c) An adult tunicate

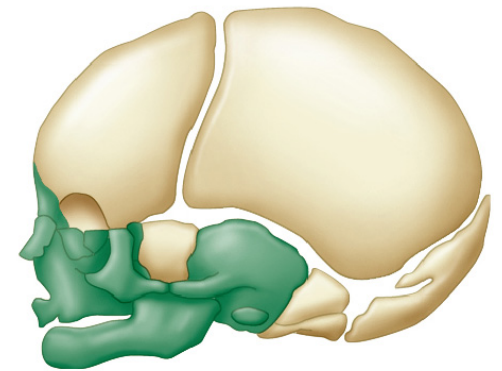
- Loss of many features from larva to adult
 - ↳ It's still a Chordate if the 4 characteristics are present during some stage (larval form)
- Adult form lacks many of the 4 features

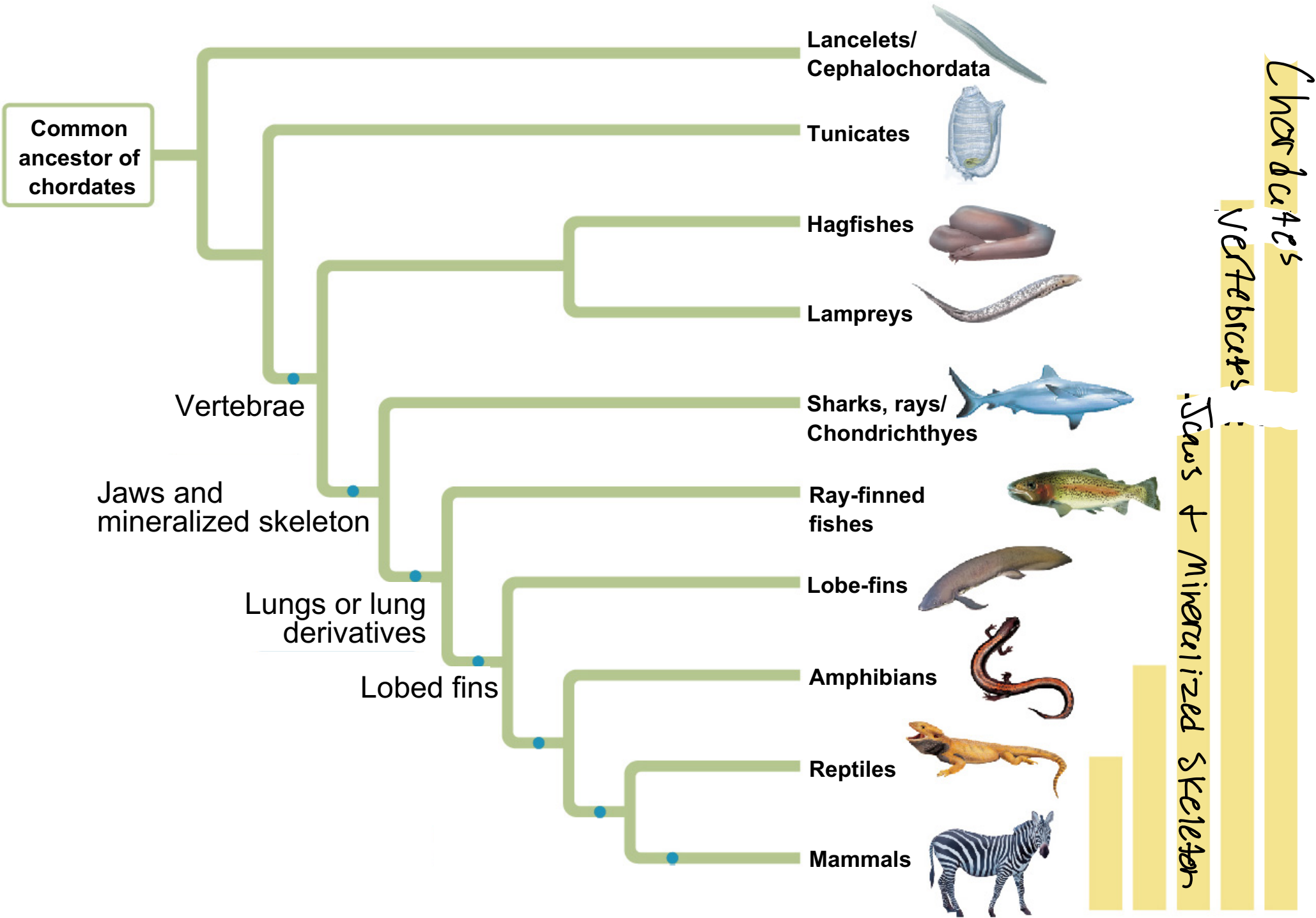


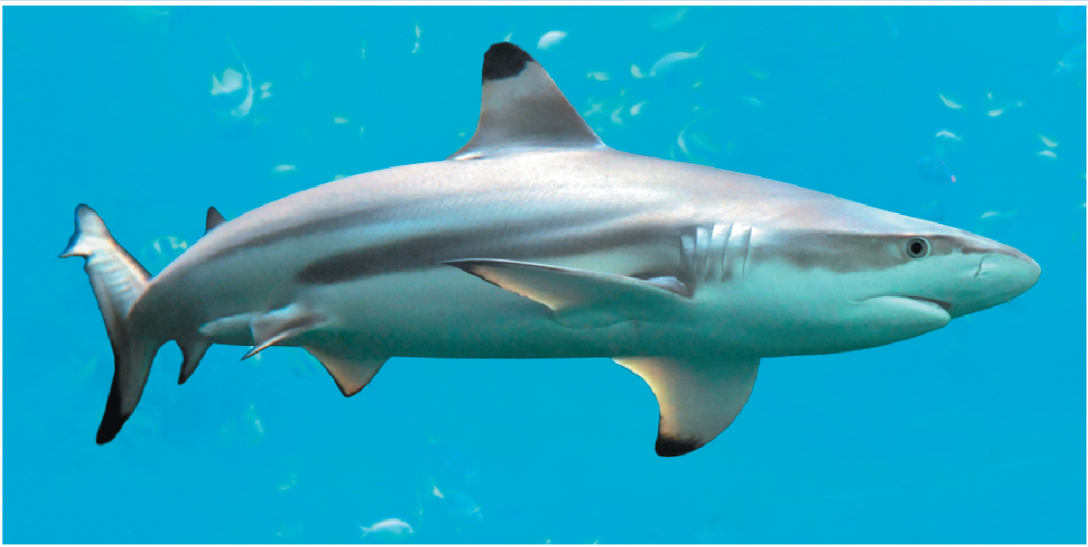
Vertebrates have a backbone



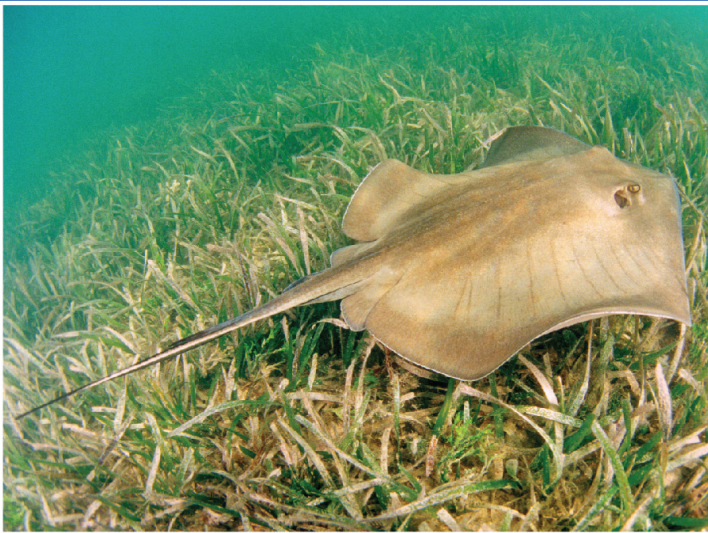
- Vertebral column of vertebrae
- Takes over most of the role of notochord
- Neural crest cells = teeth, bones, cartilage of the skull, neurons, and sensory capsules







Bones made from cartilage



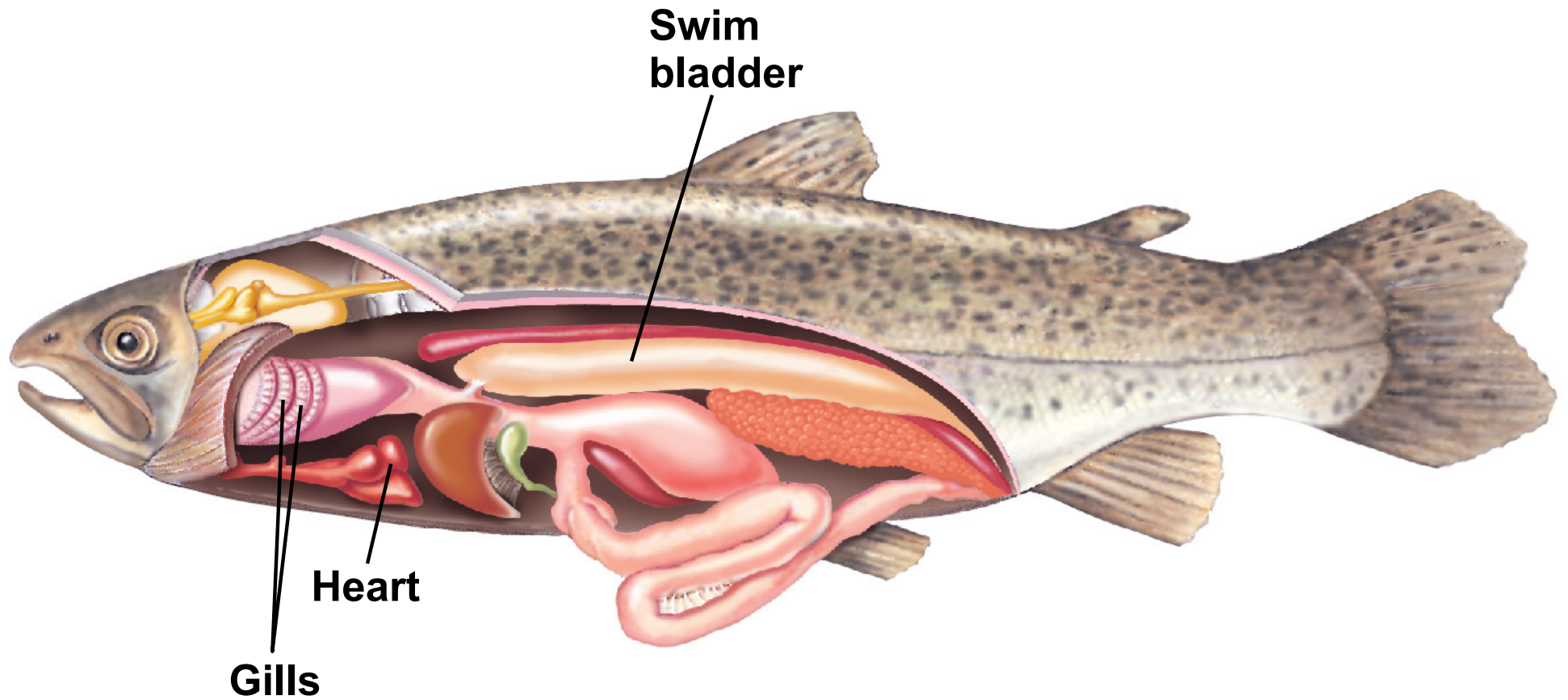
ray
finned
have swim bladder

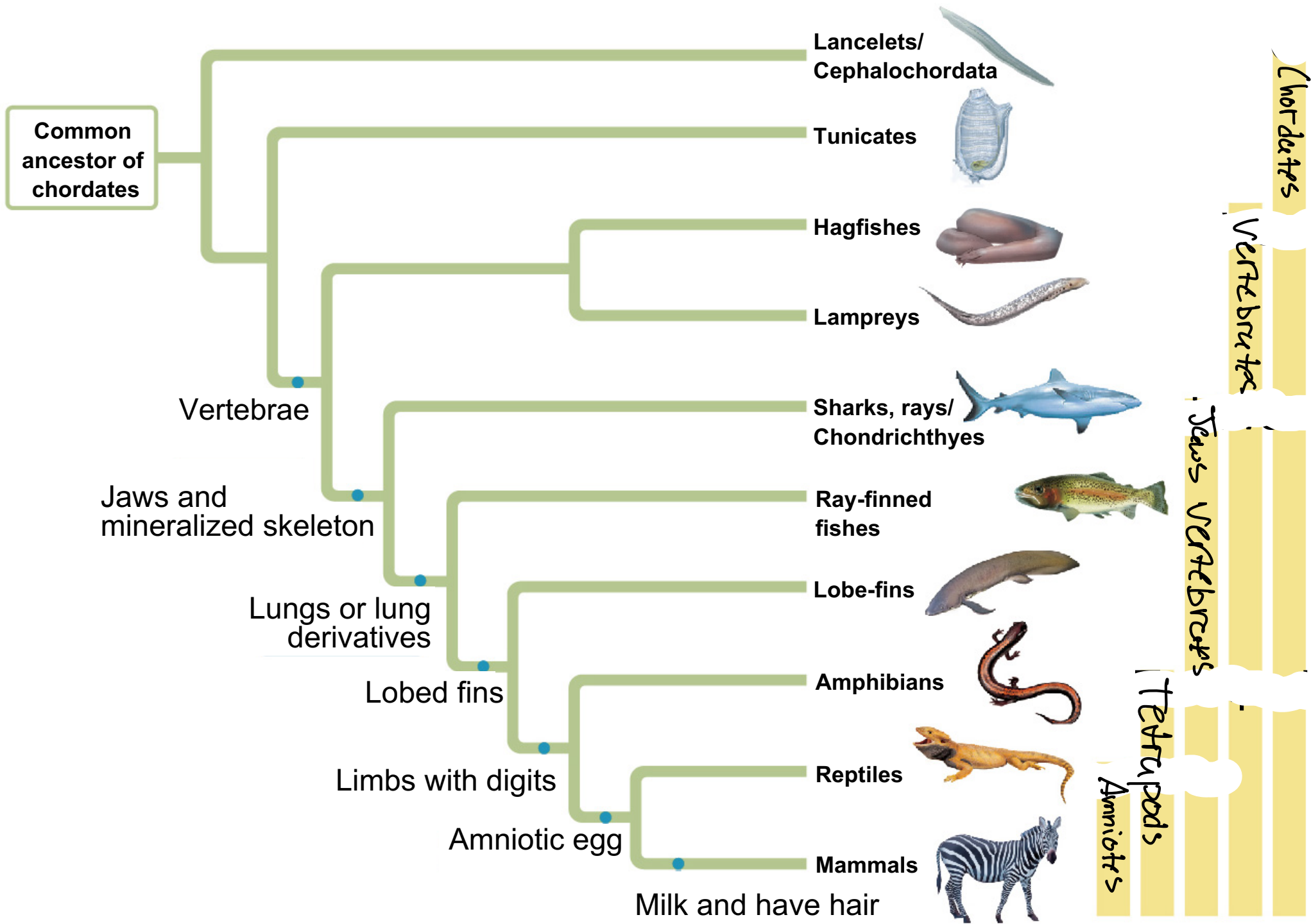
Chondrichthyes vs Osteichthyes

Bones mineralized to make actual hard bones



Lungs or lung derivatives???





Amphibians



(a) The tadpole



(b) During metamorphosis

often breathe through skin



(c) The adults return to water to mate

Reptiles (including birds): shelled eggs, amnion, and other extraembryonic membranes



Skin is hydrophobic

- Bring the water with you
- No longer need a body of water to complete life cycle!

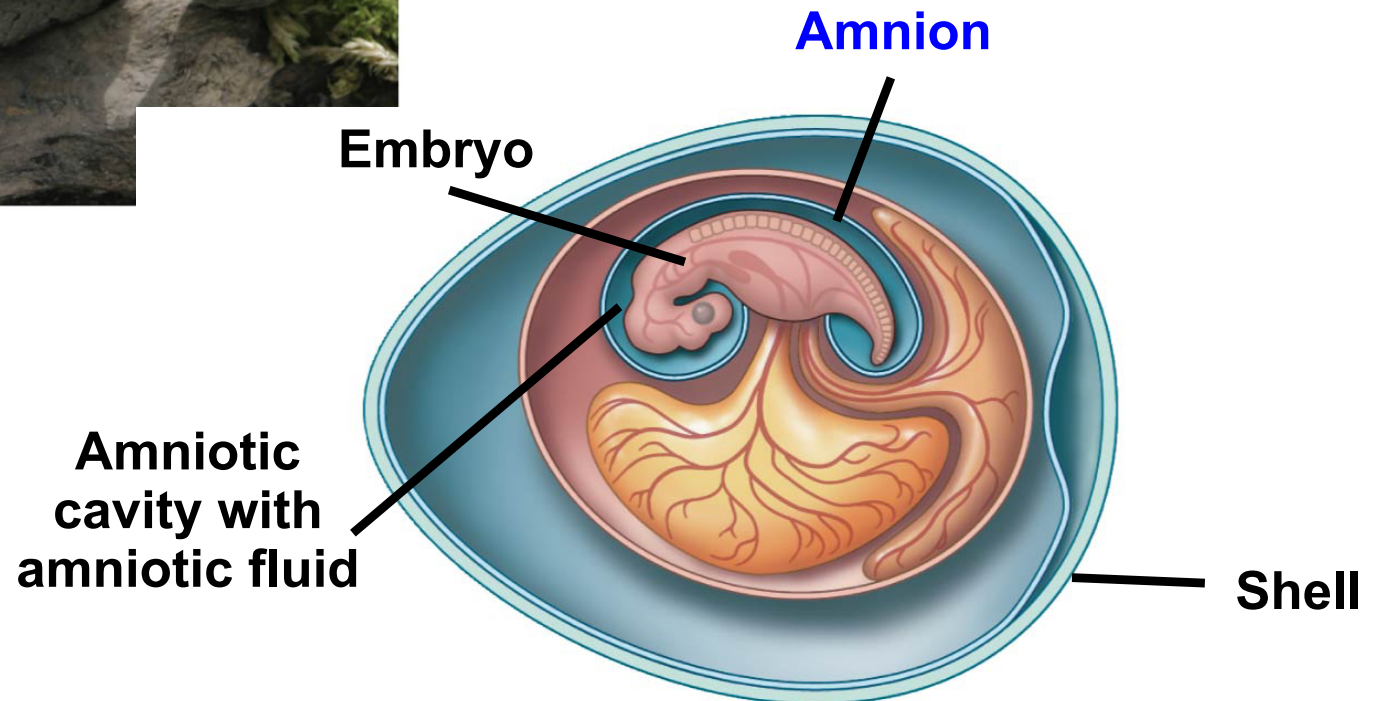
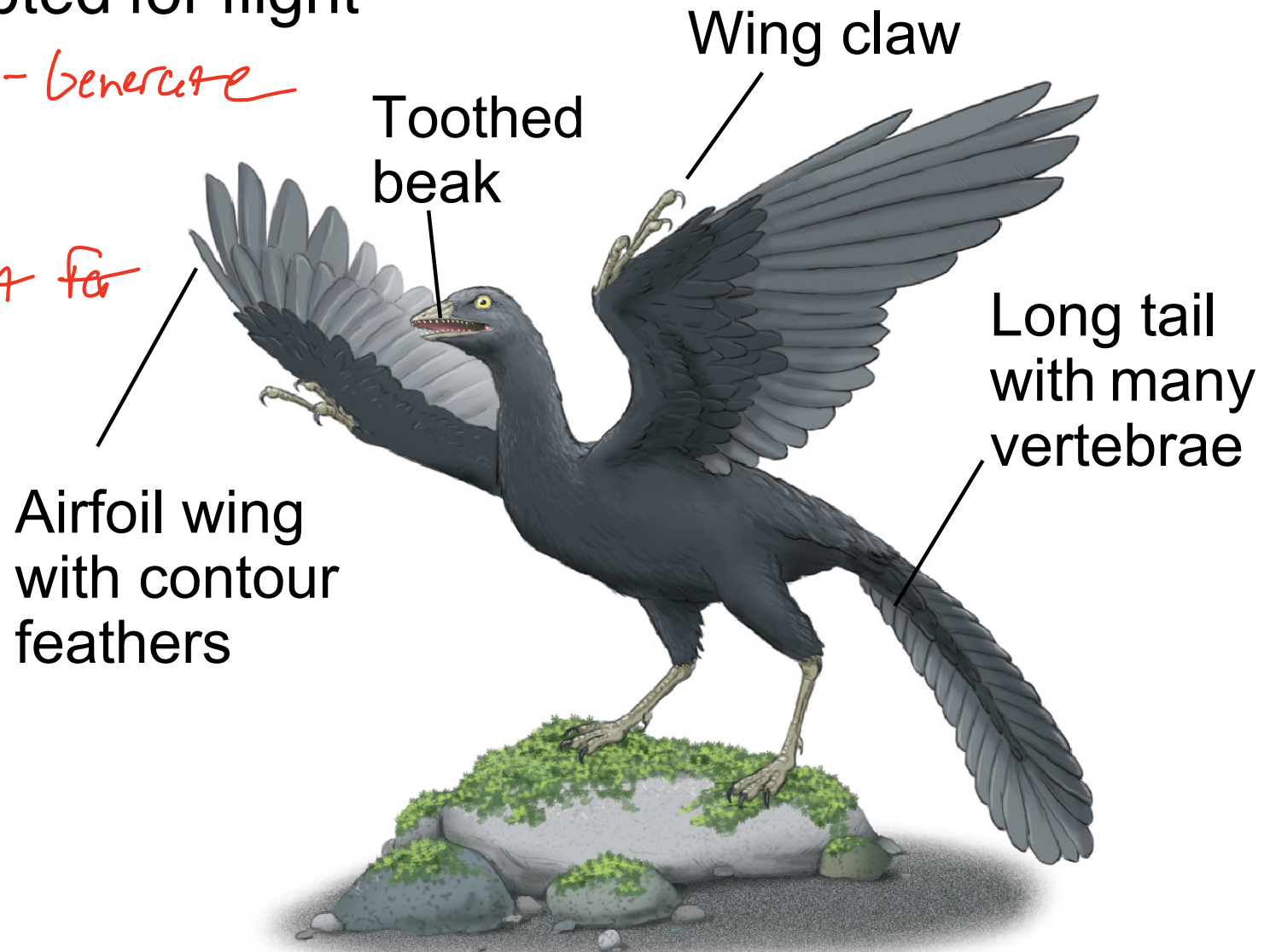


Figure 19.6a

Birds – living dinosaurs

- feathers coopted for flight
- endothermic - generate
Body heat

• ↑ specialized just for
Flight



Mammals - Monotremes

- egg-laying mammals
- oldest group



Mammals - Marsupials

- nurtured by a **placenta**
- **short gestation**

*Fetus makes most
development outside
of Mom's uterus*



Mammals - Eutherian mammals

- nurtured by a **placenta**
- long gestation

Fetus does more developing while in uterus

