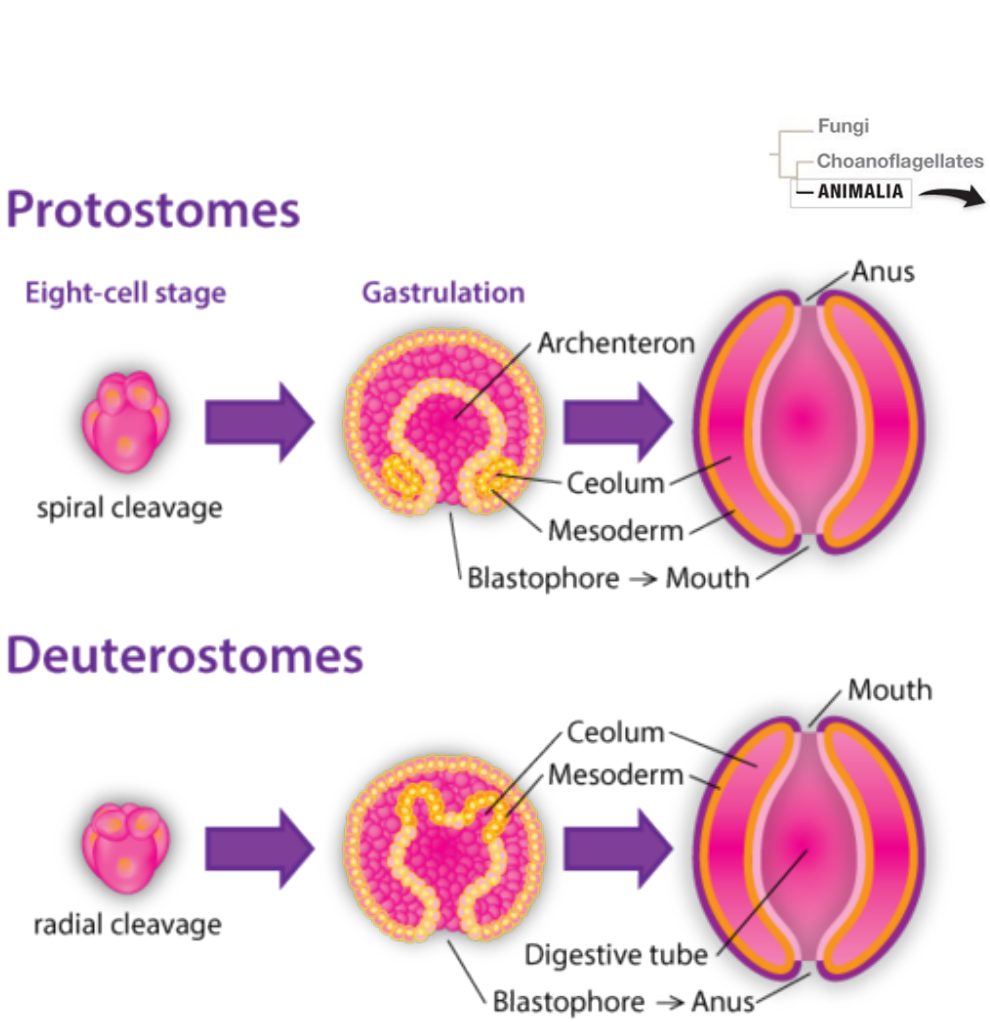
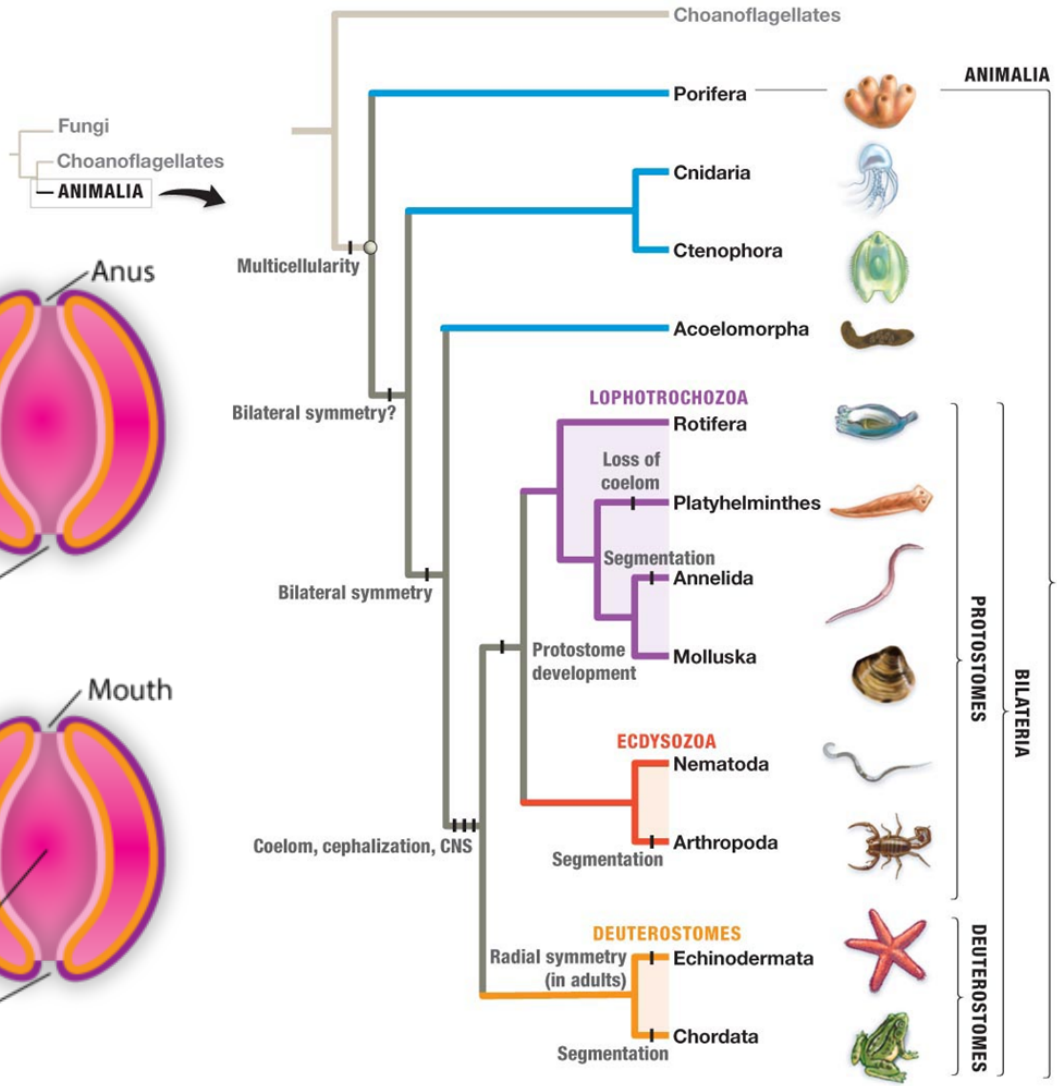
DEUTEROSTOMES

Deuterostome

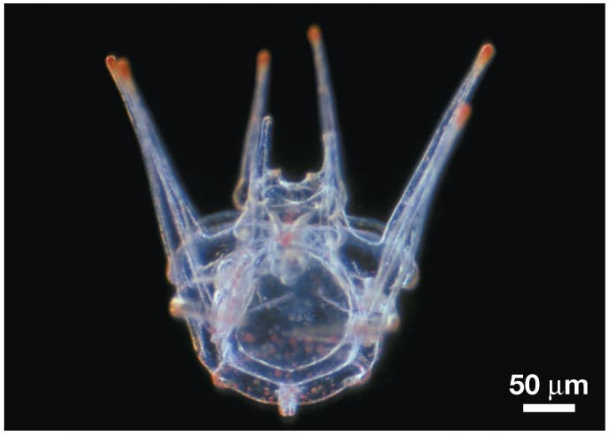




Echinodermata body plan

- Body plan
  - Larvae are bilateral
  - Adults are radial
  - *Endoskeleton*
    - Supportive structure within

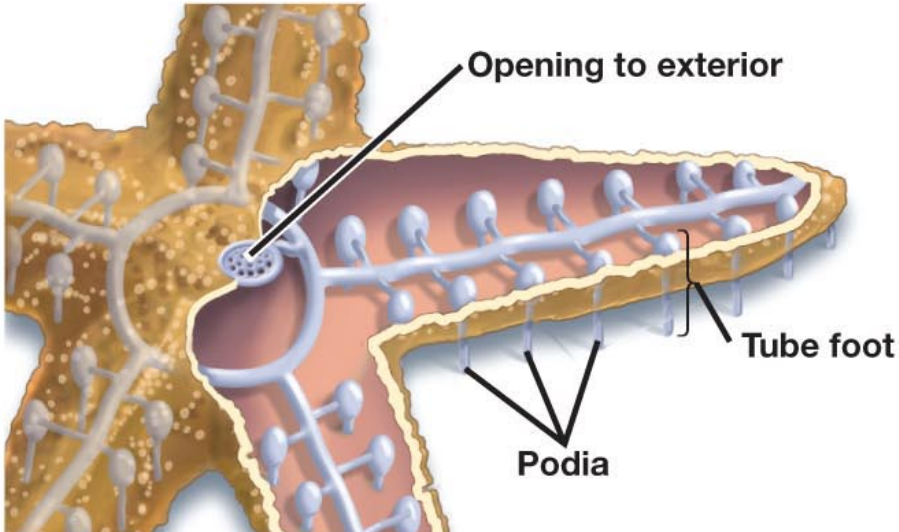
Echinoderm larvae are bilaterally symmetric.



Adult echinoderms are radially symmetric.

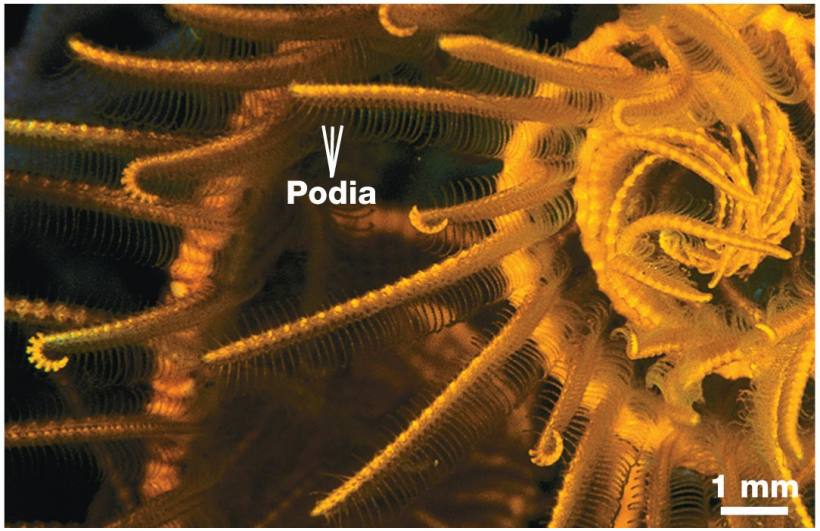
Echinodermata body plan

- Body plan
  - *Water vascular system*
    - Fluid-filled chambers creating hydrostatic skeleton
- Supported by *tube feet*
  - Elongated, fluid filled structures
- *Podia*
  - Sections of tube feet that project outside body
  - Involved in motion

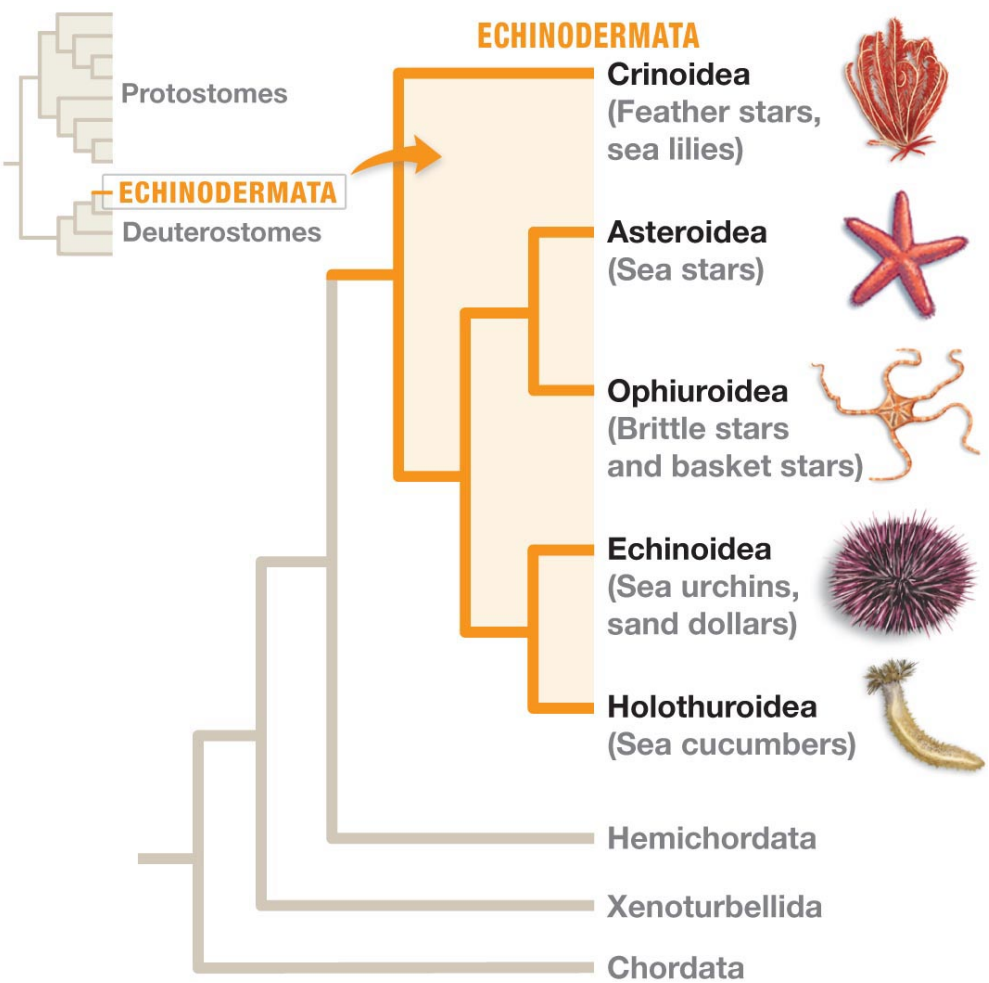


Echinodermata feeding

- Role of podia:
  - Predatory spp.
    - Use podia to pry bivalves
    - Extrude their stomach through opening
  - Suspension feeders
    - Use podia to flick food to cilia
    - Cilia sweep food into mouth



Echinodermata: lineages



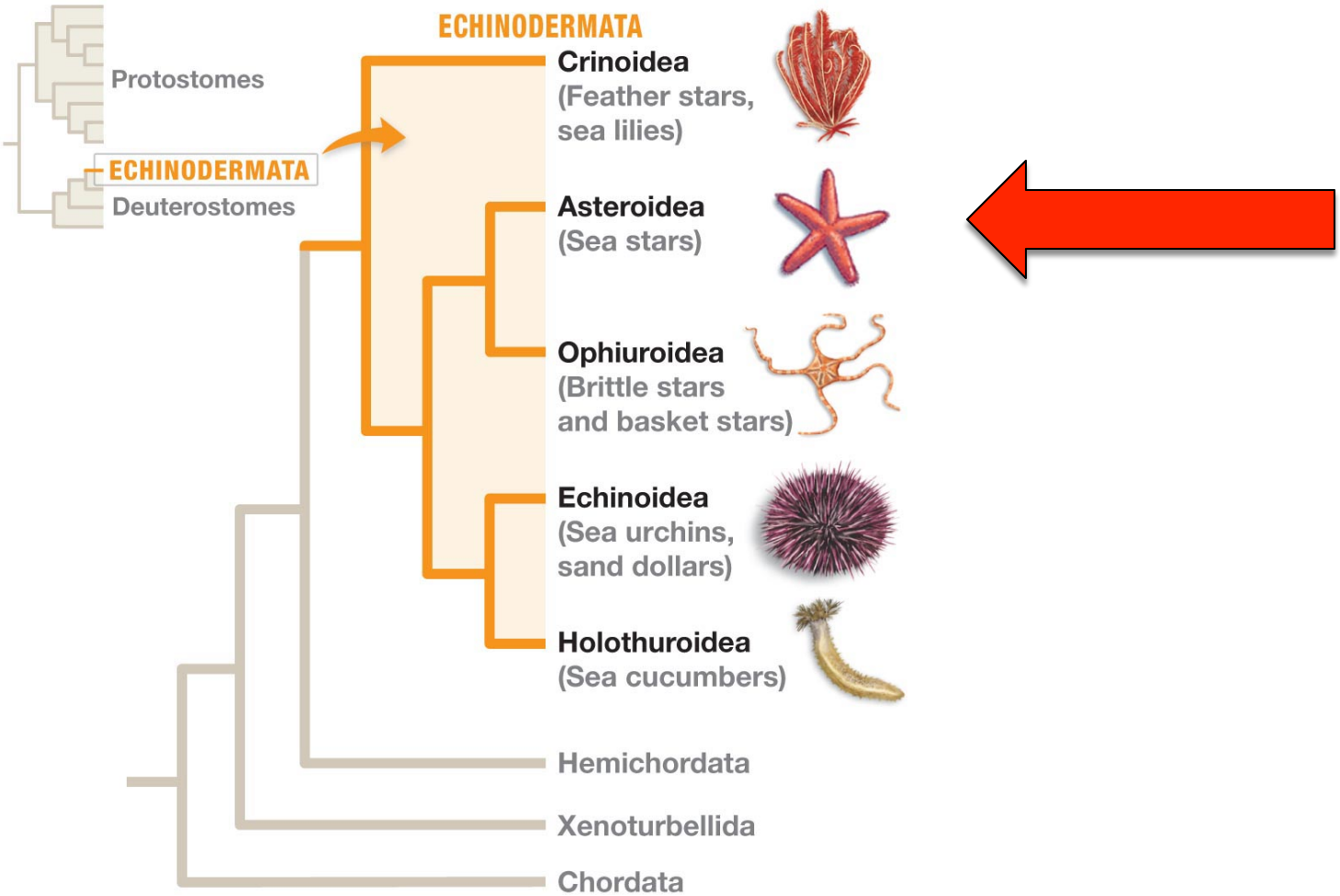
Echinodermata: Crinoidea

- Feather stars & sea lilies
  - Sessile suspension feeders

Feather star

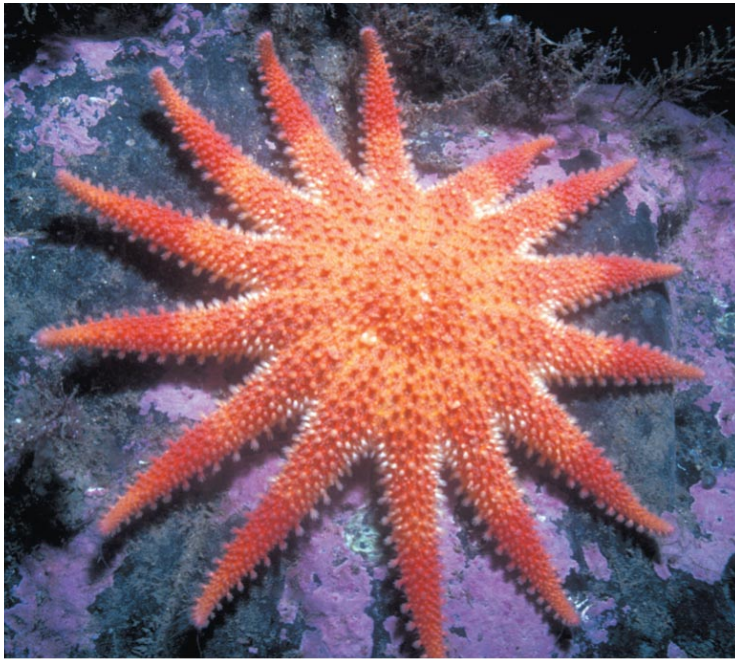
Sea lilly

Echinodermata: lineages

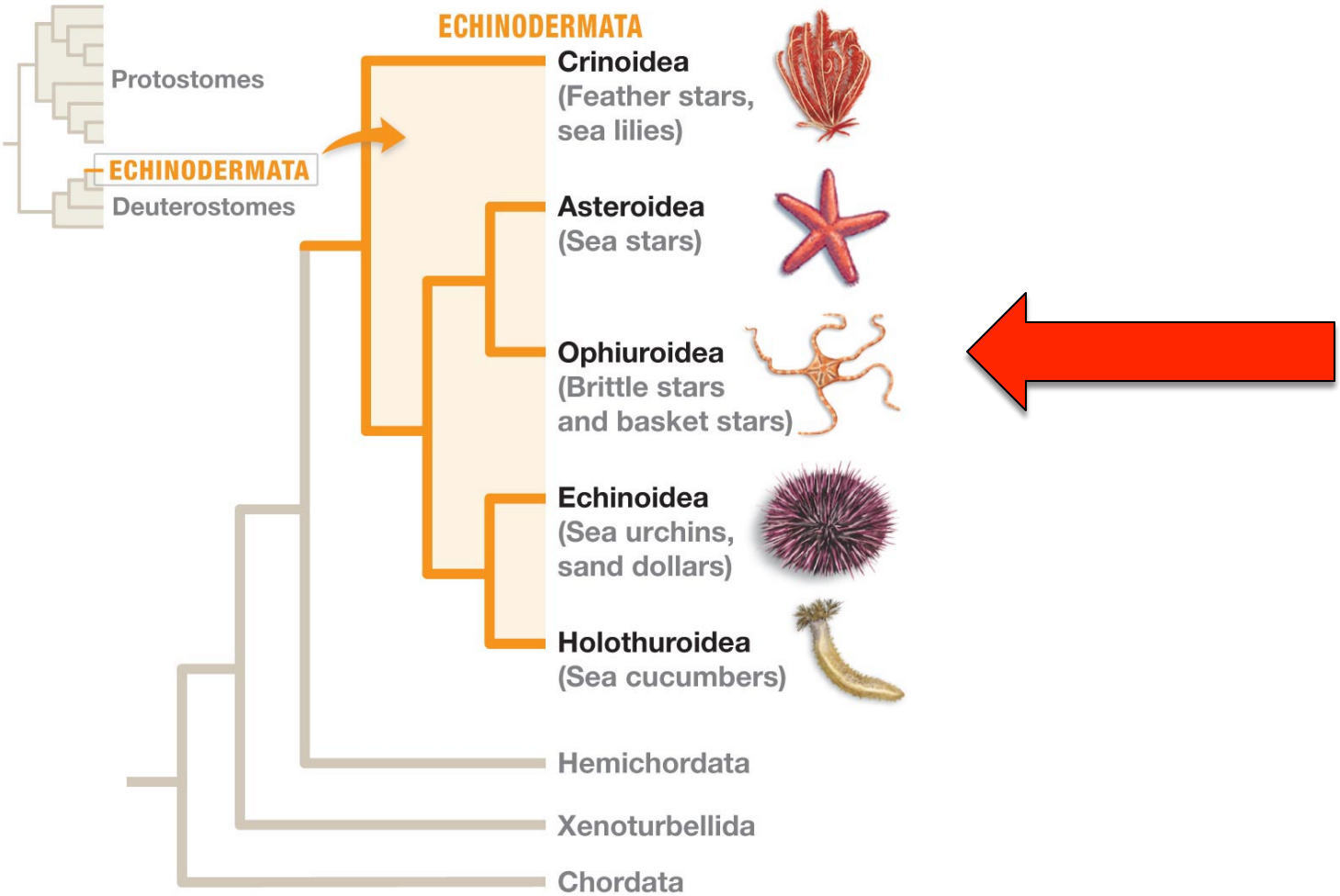


Echinodermata: Asteroidea

- Sea stars
- 5 (or more) long arms
  - Radiating from central region
- Predators
- Crawl using tube feed
- Reproductive organs in arms



Echinodermata: lineages



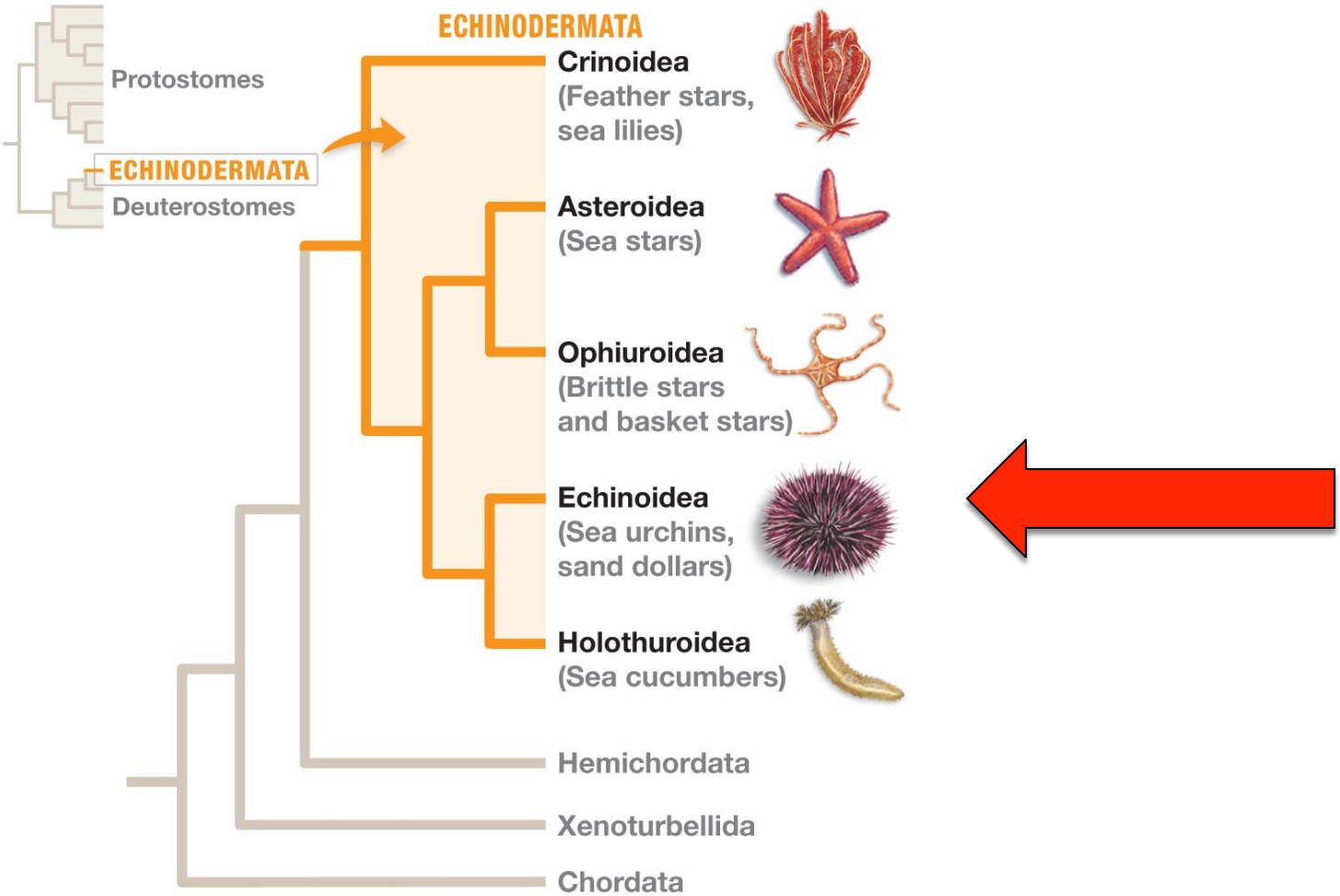
Echinodermata: Ophiuroidea

- Brittle stars & basket stars
  - Five (or more) long arms
    - Used in suspension feeding

Brittle star

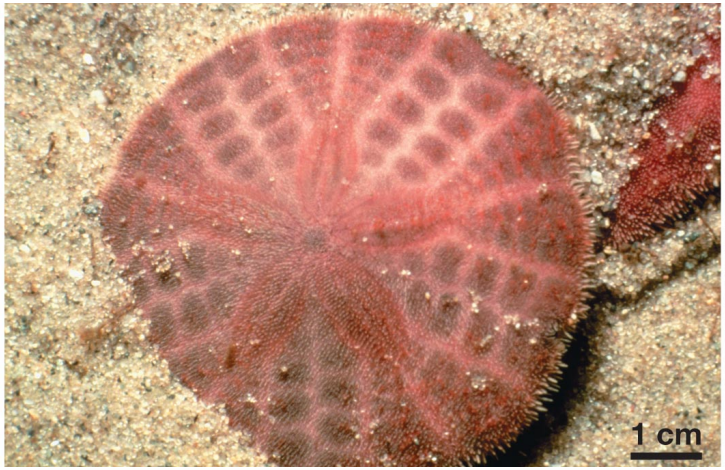
Basket star

Echinodermata: lineages

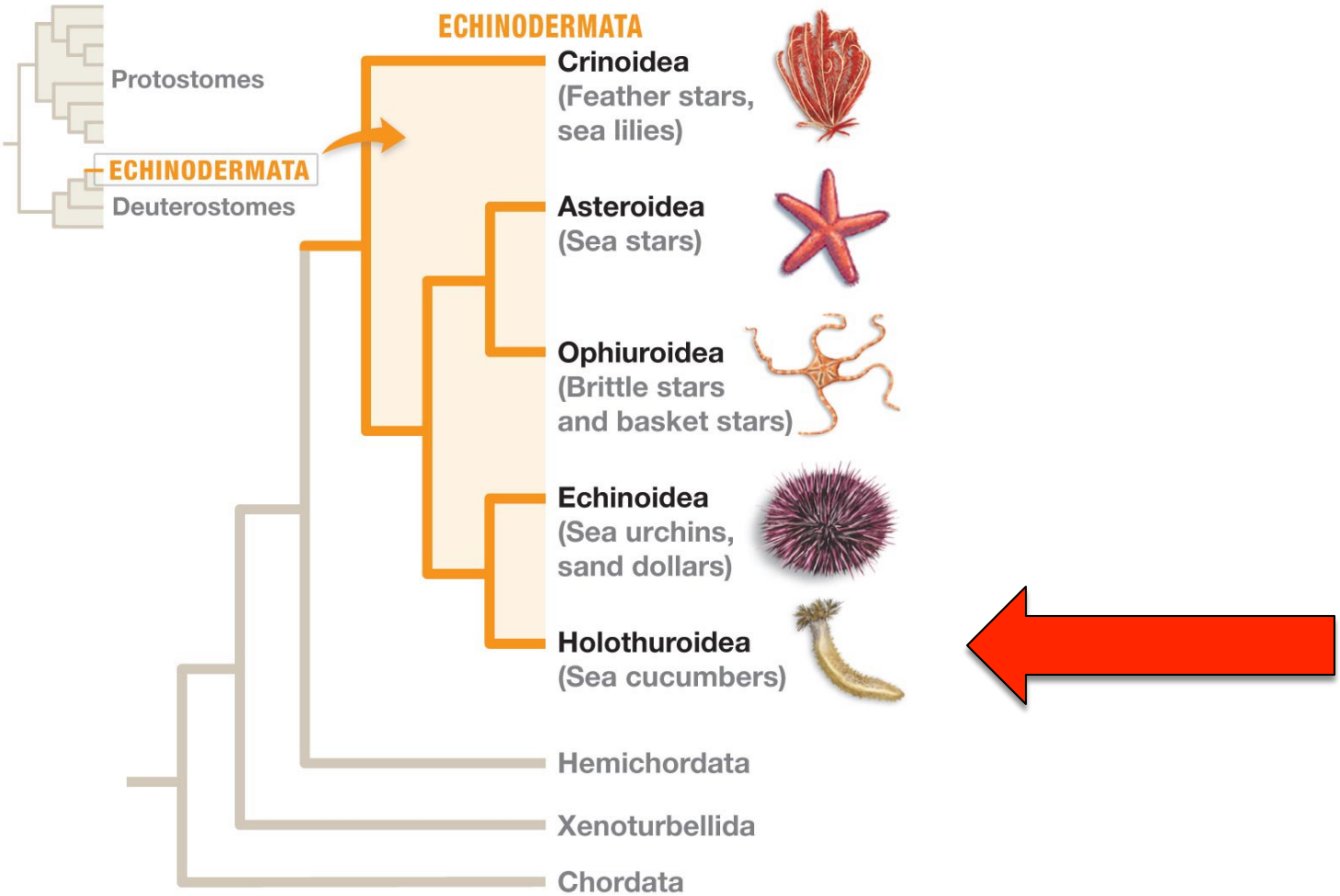


Echinodermata: Echinoidea

- Sea urchins
  - Spherical bodies
  - Herbivores
  - Crawl using spines
- Sand dollars
  - Disk-shaped bodies
  - Suspension feeders



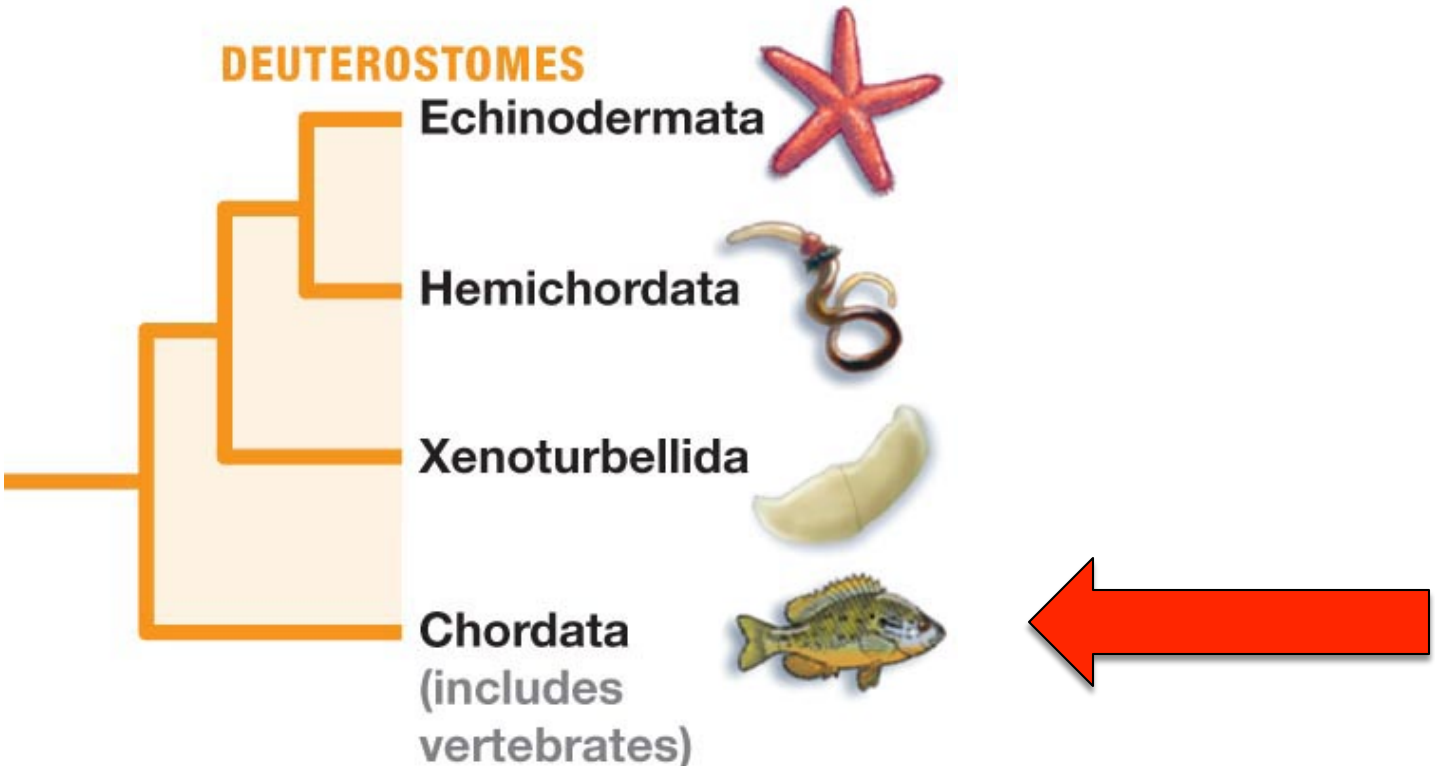
Echinodermata: lineages



Echinodermata: Holothuroidea

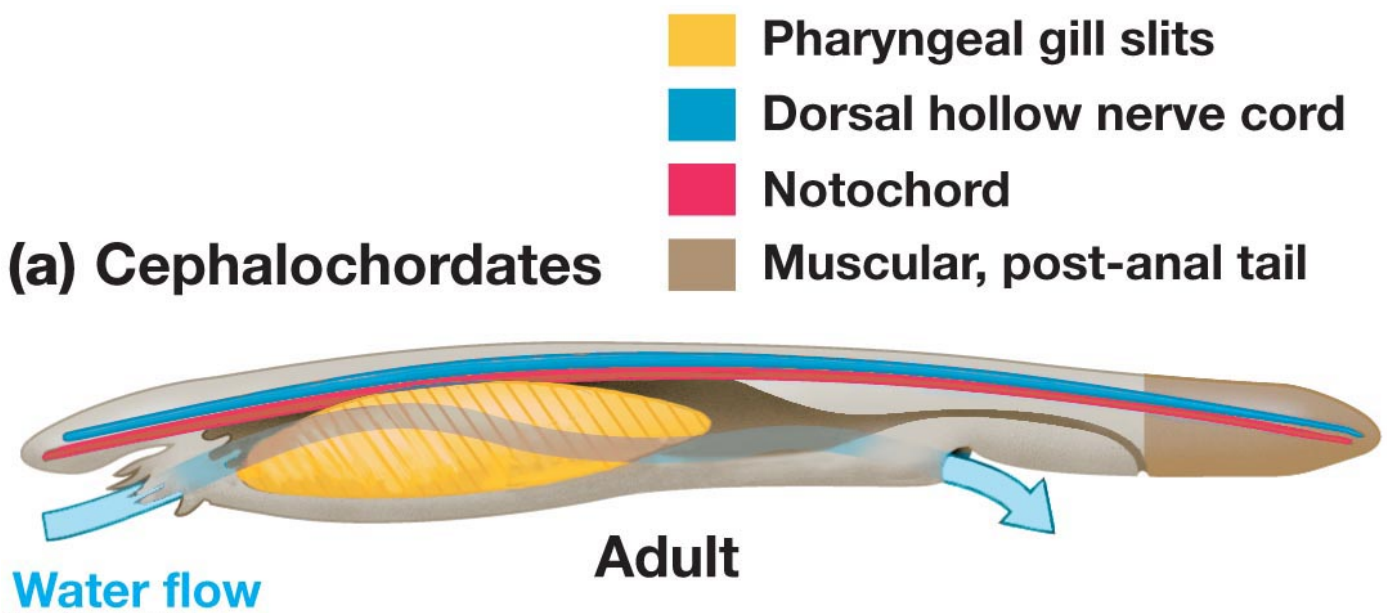
- Sea cucumbers
  - Sausages of the sea
  - Suspension feed (or deposit feed)
    - Using modified tube feet (*tentacles*) in a whorl around their mouth

Deuterostome phylogenetics

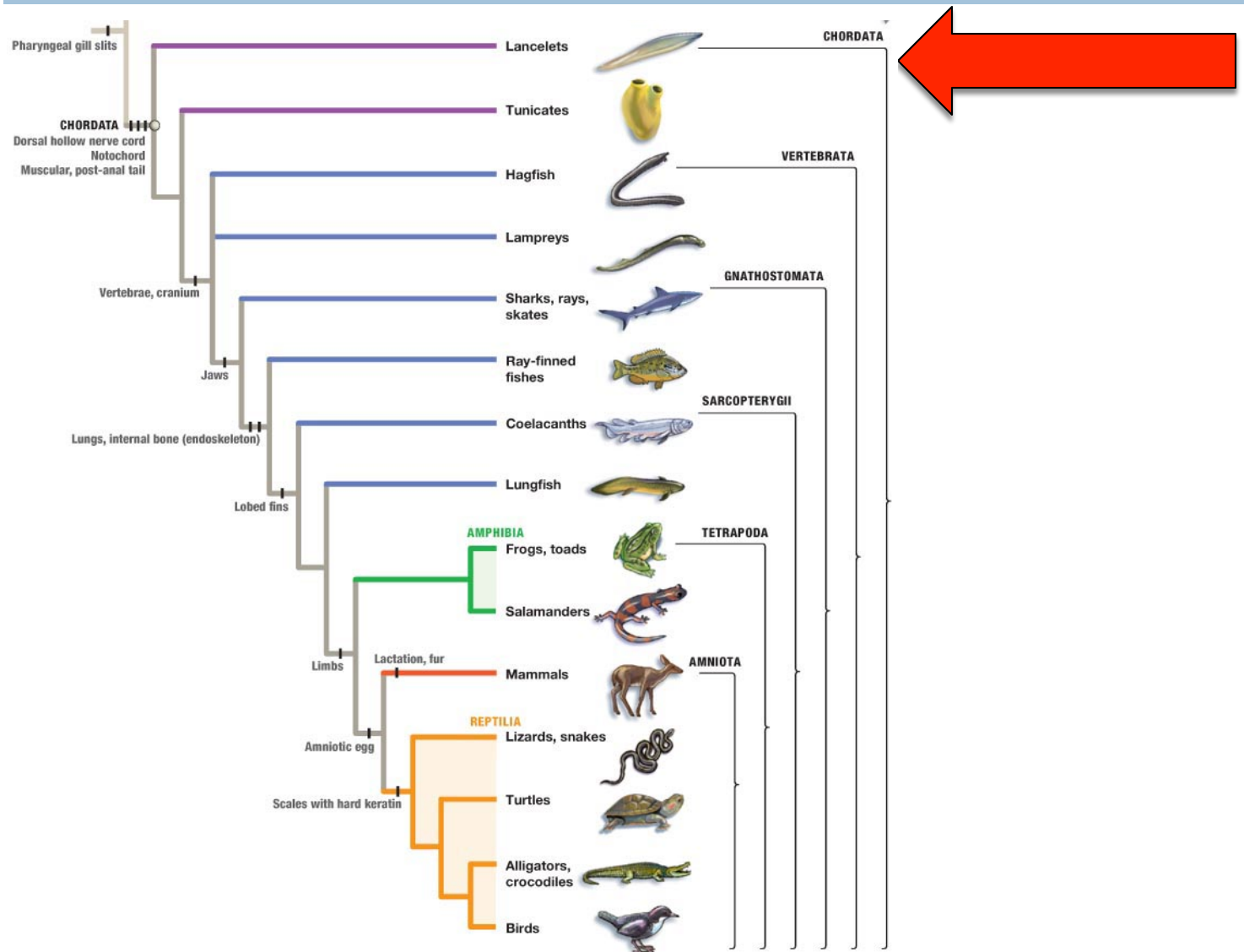


Chordata's morphological features

1. Hollow nerve cord (running length of body)
2. N*otochord* (a supportive, yet flexible rod)
3. Tail
4. *Pharyngeal gill slits* (openings in throat)

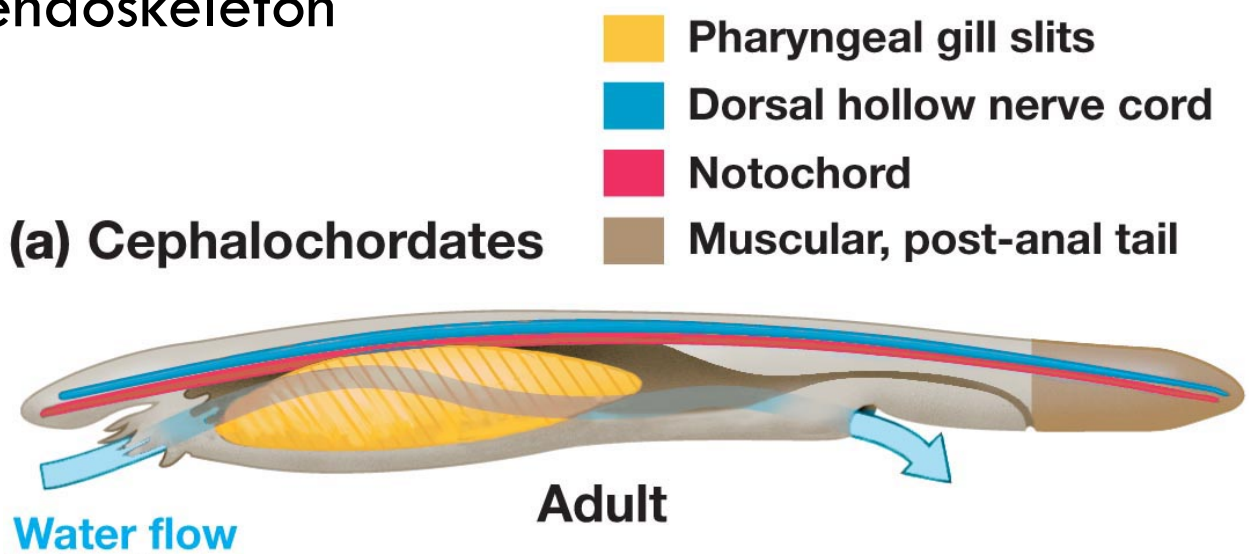


Deuterostome phylogenetics

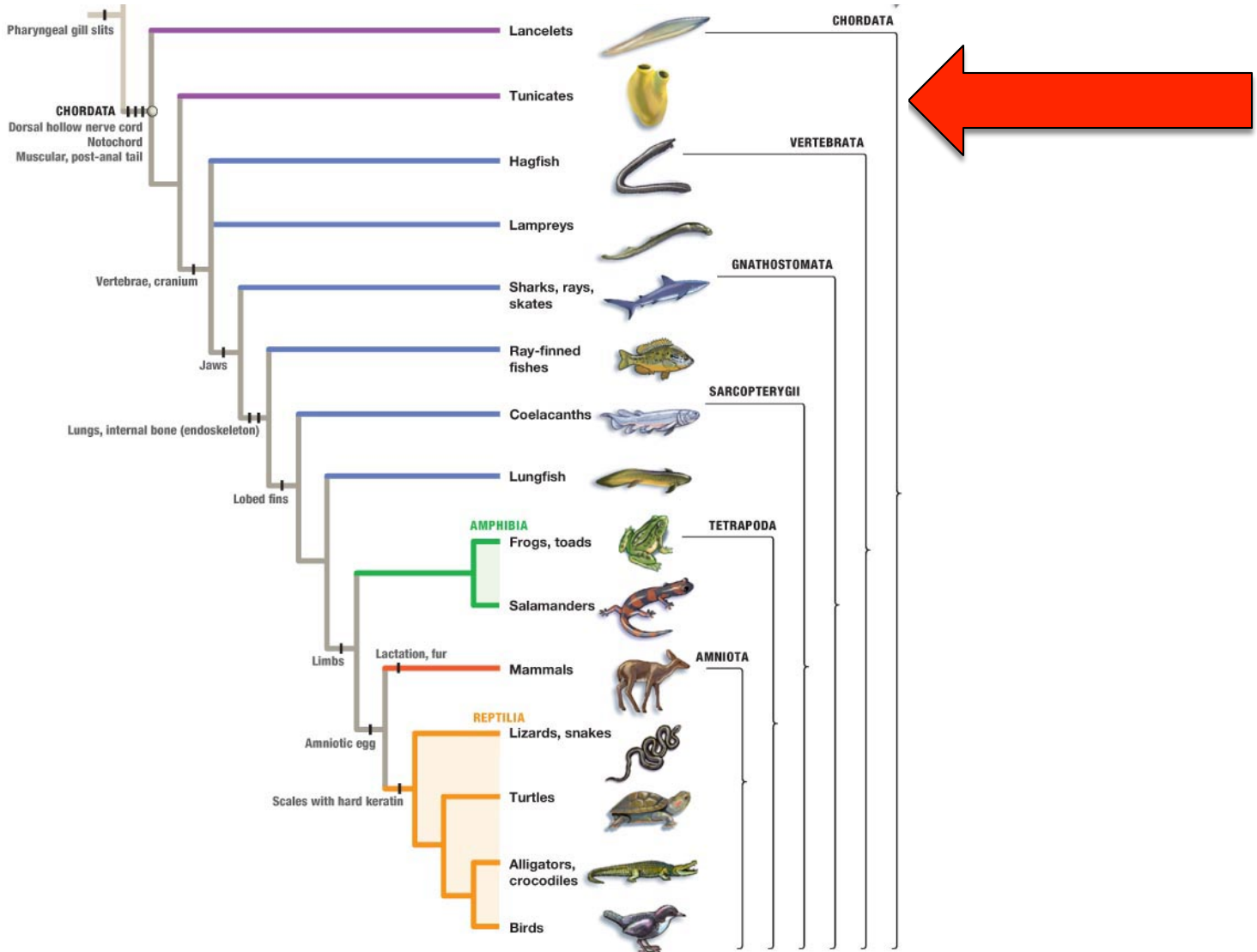


Chordata: Cephalochordata

- Lancets
  - Small, mobile
  - Suspension feeders
  - Resemble fish
  - Intermediary b/n invertebrates and vertebrates
  - Notochord is endoskeleton

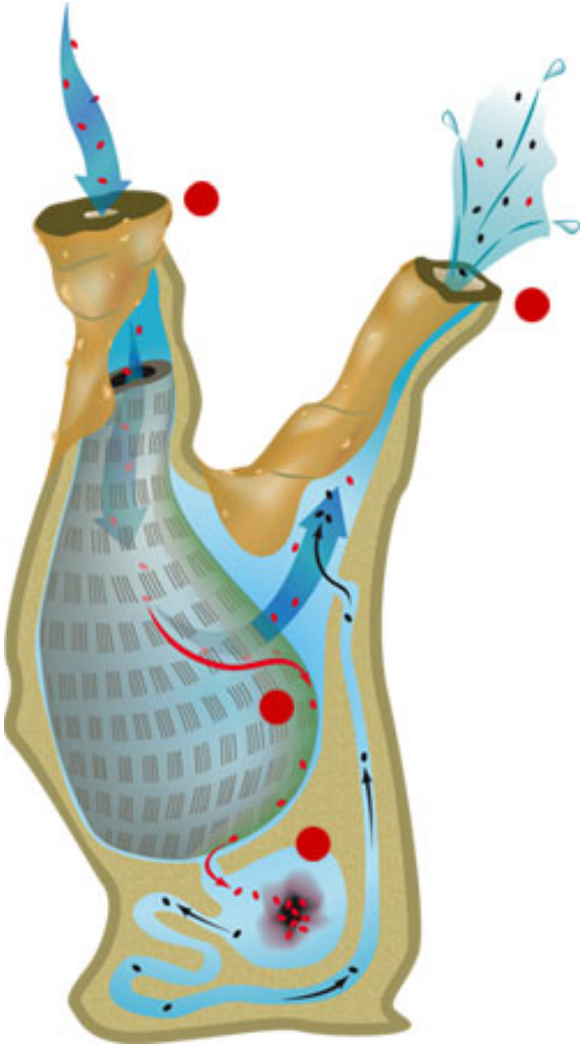


Deuterostome phylogenetics

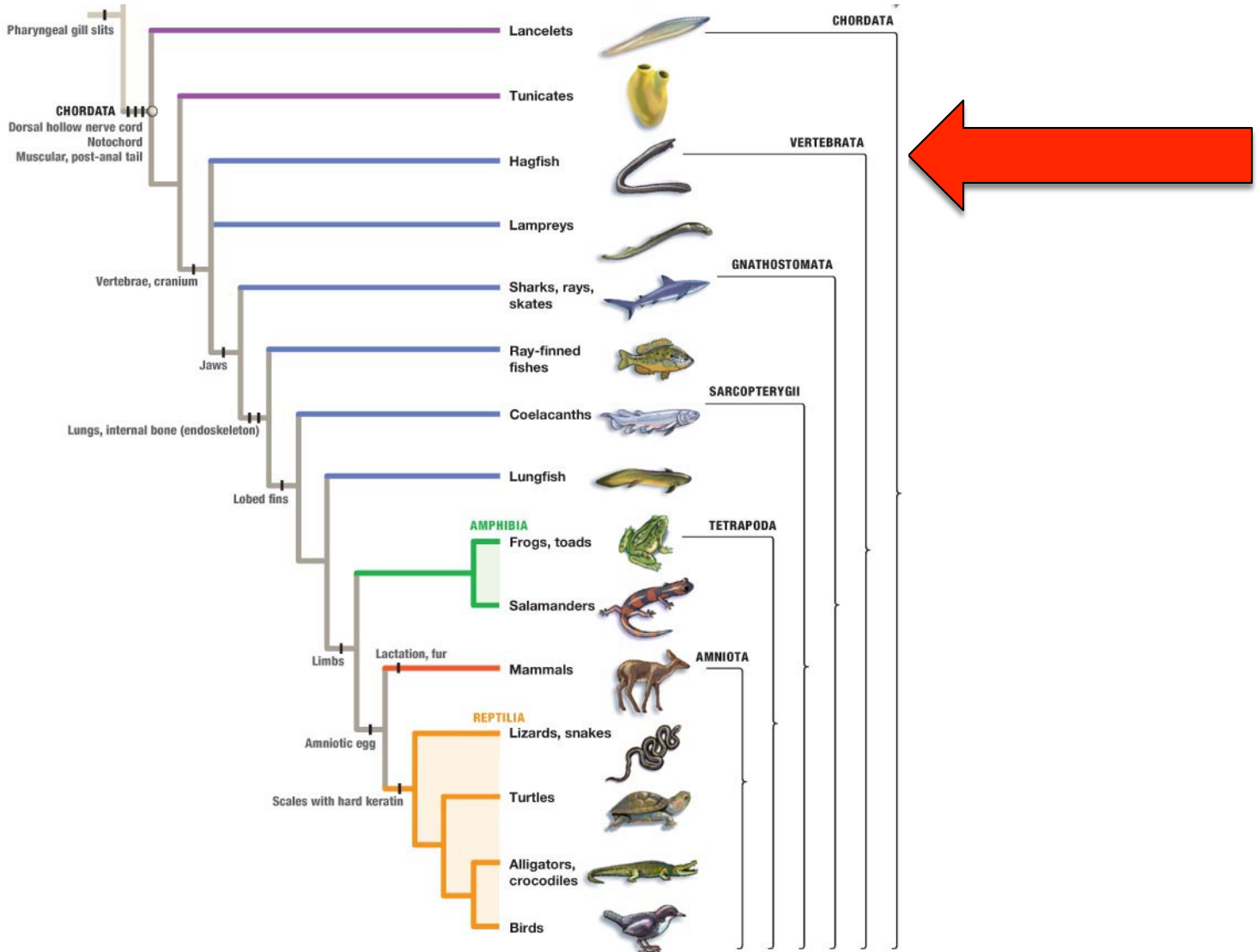


Chordata: Urochordata

- Sea squirts
- Characteristics
  - *Tunic*
    - Exoskeleton-like coat
  - U-shaped gut
  - Two siphons

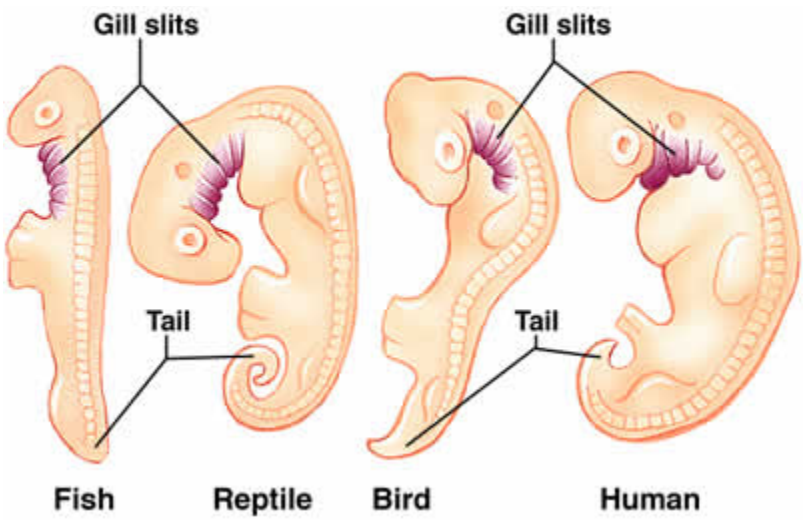


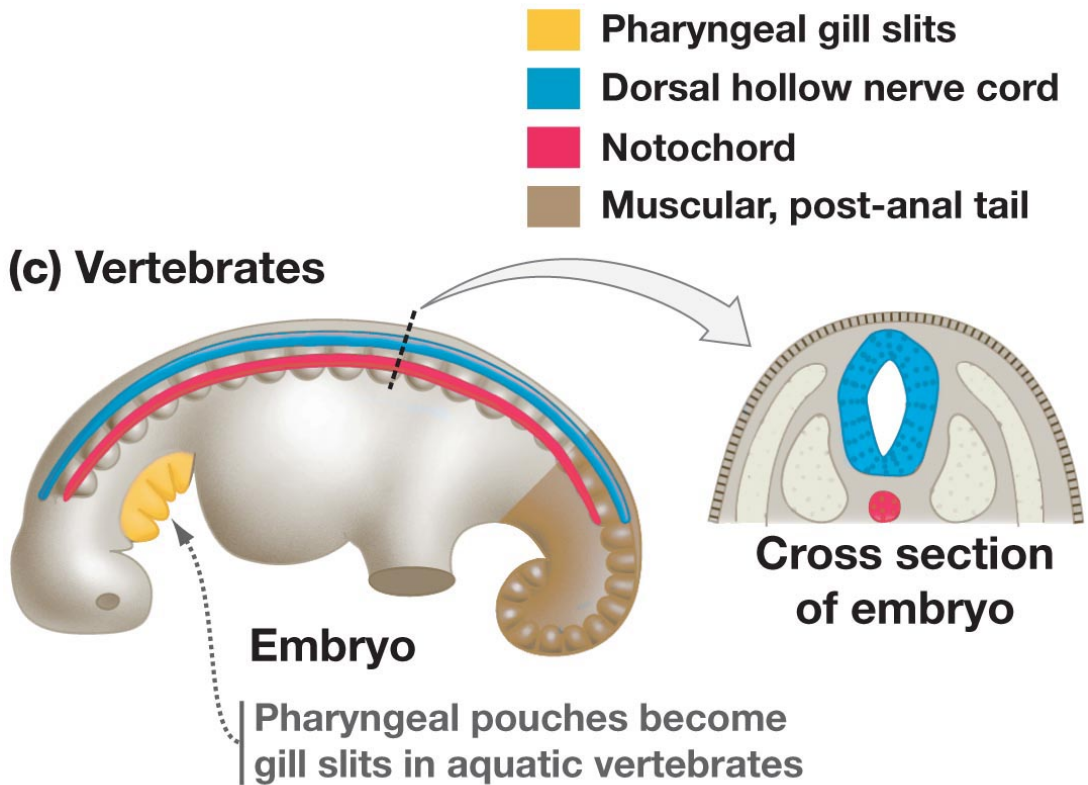
Deuterostome phylogenetics



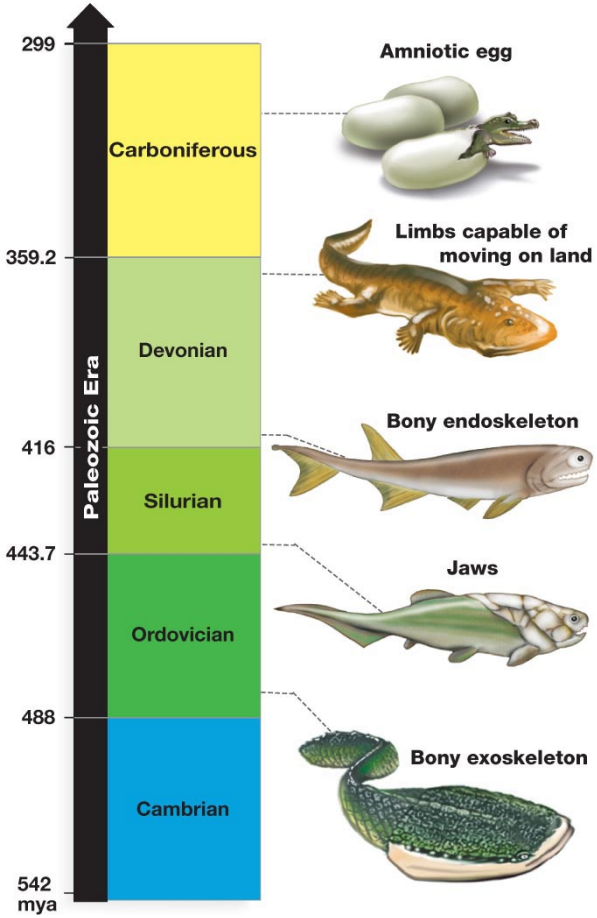
Chordata: Vertebrata

- Nerve cord developed to spinal cord
  - Not hollow
- Pharyngeal gill slits
  - Aquatic spp.
    - Become gills





Innovations in vertebrates

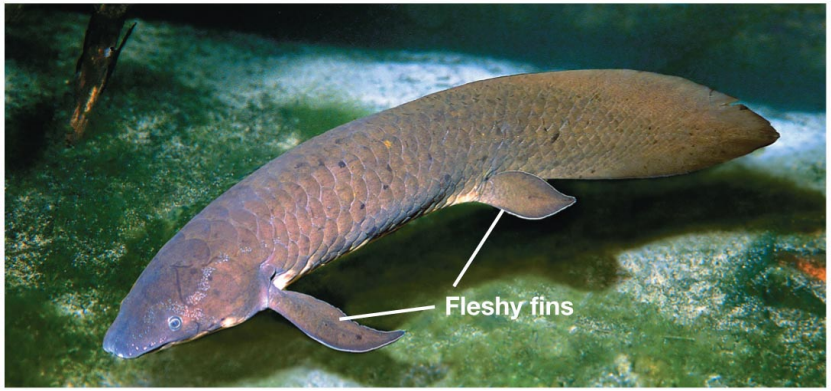


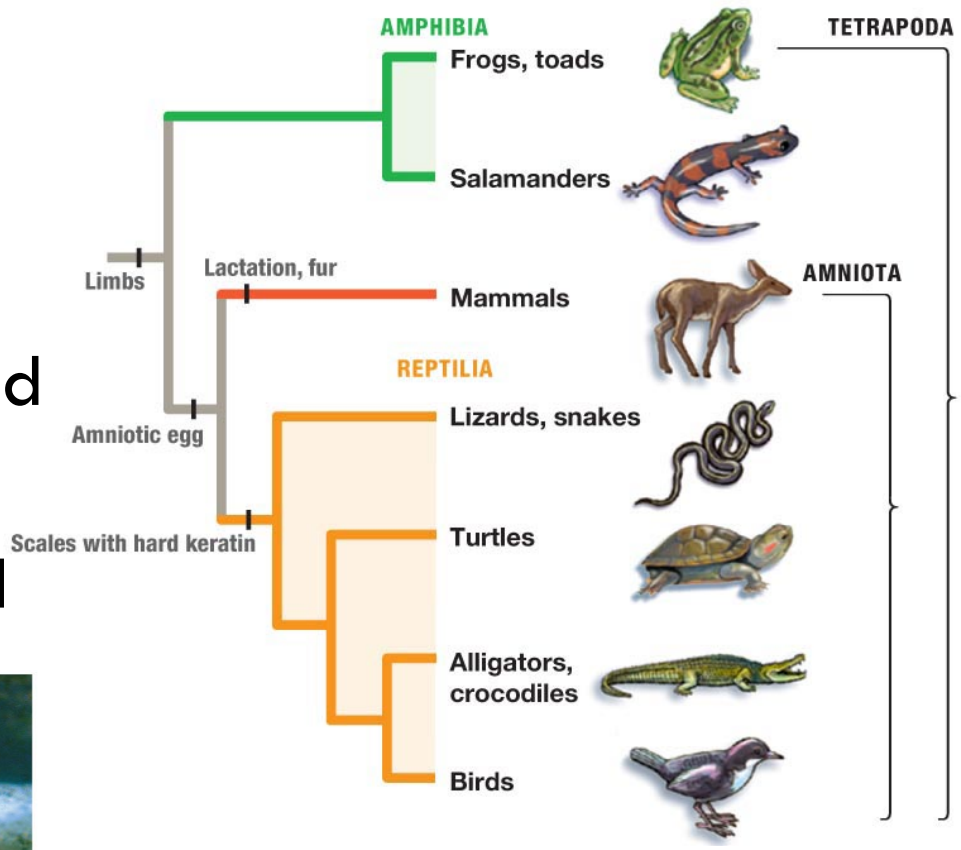
- Amniotic eggs
  - Resists deydration
- Tetrapods
  - Walking
- Bony endoskeleton
  - Rapid swimming
- Jaws
- New method of feeding
- Bony exoskeleton
  - Scale-like pattern, protective

time

Vertebrate phylogenetics

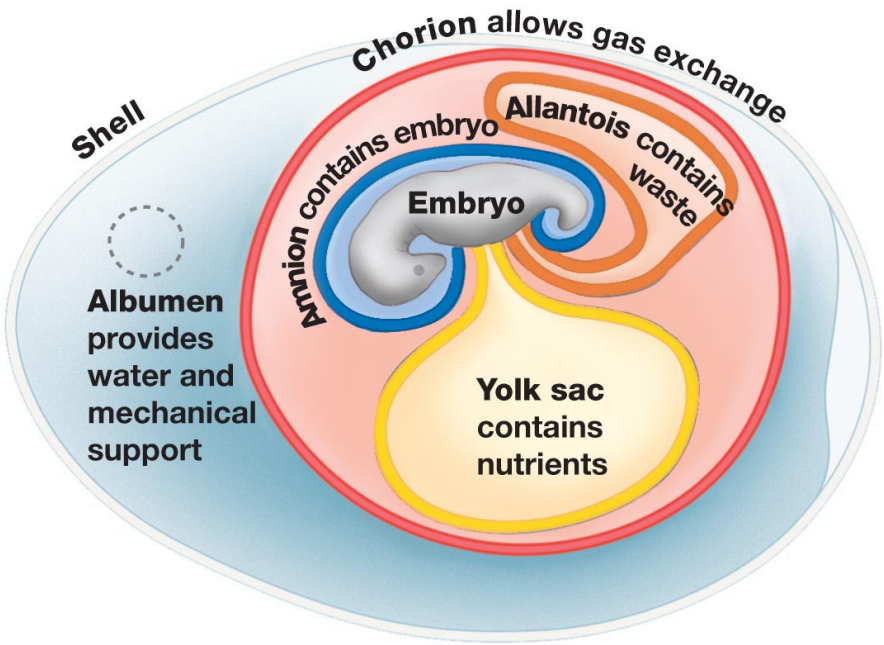
- Limbs developed 1st
- Lungfish
  - Fleshy fins
- Natural selection favored limbs over fins
- Terapods dominate land

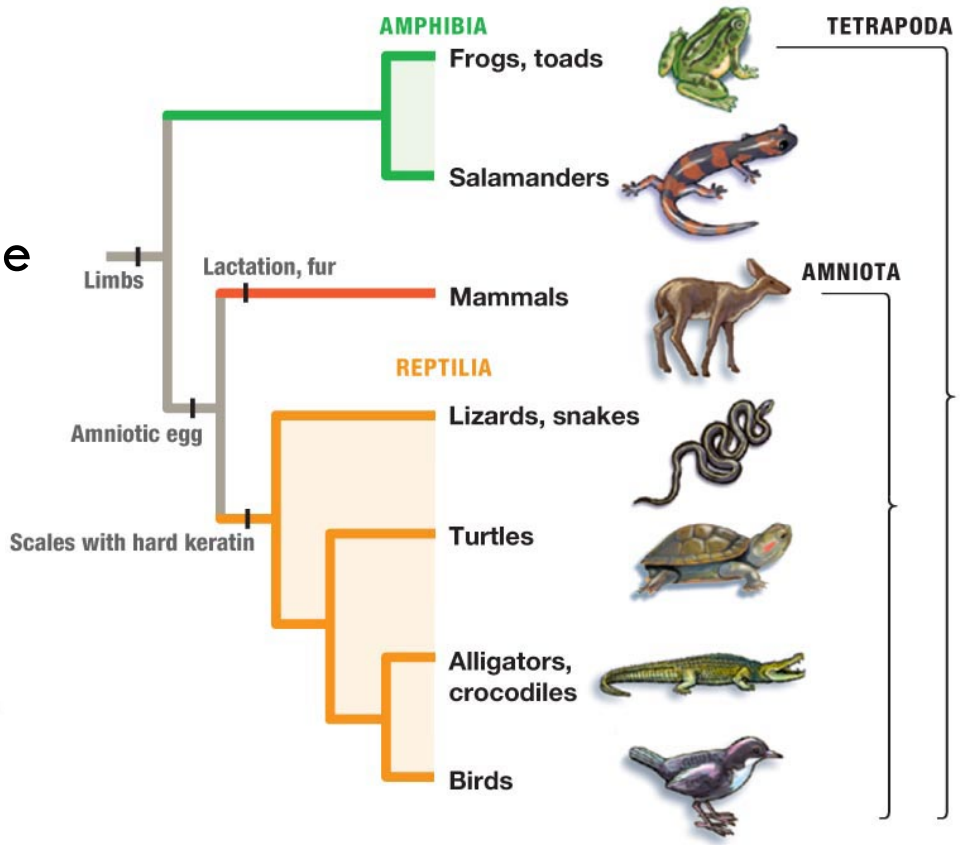




Vertebrate phylogenetics

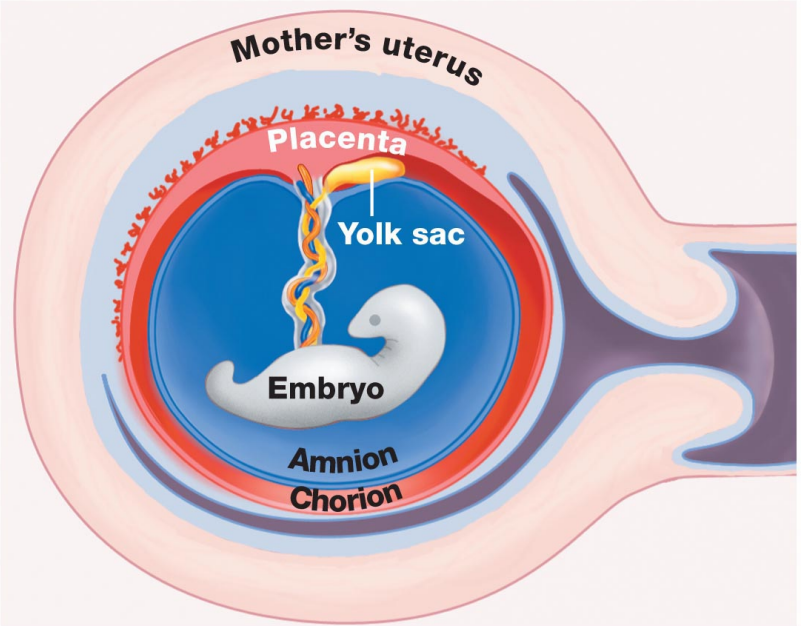
- Amniotic egg
  - Amnion
    - Protective inner membrane

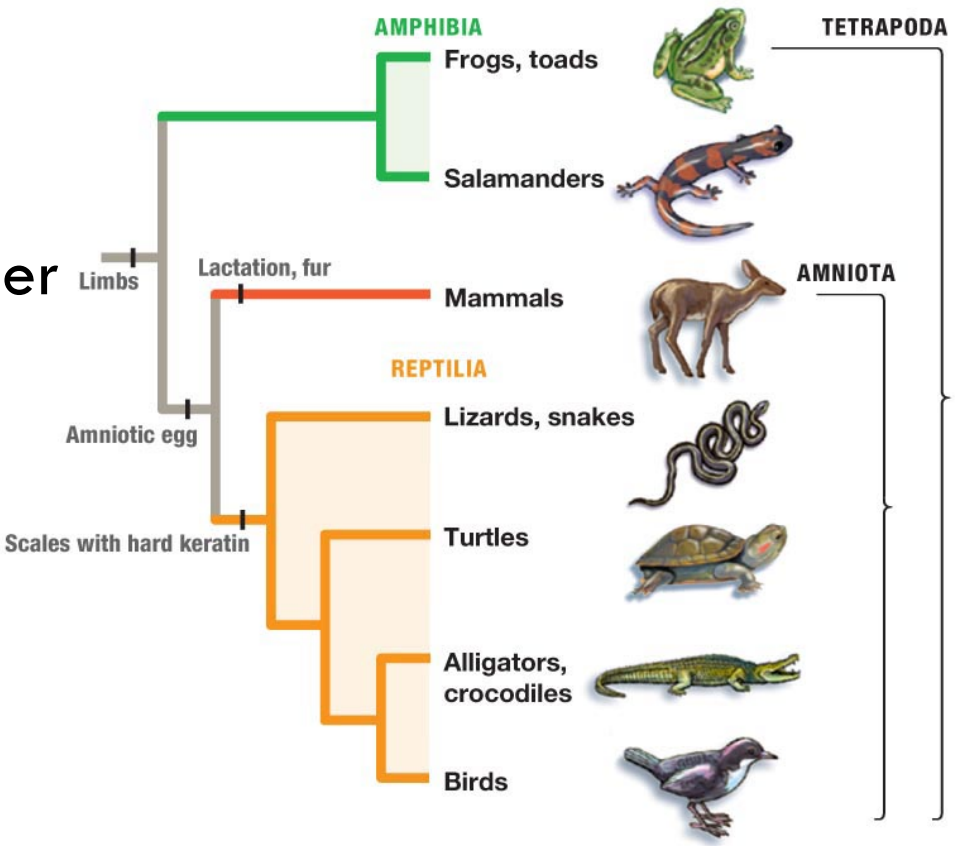




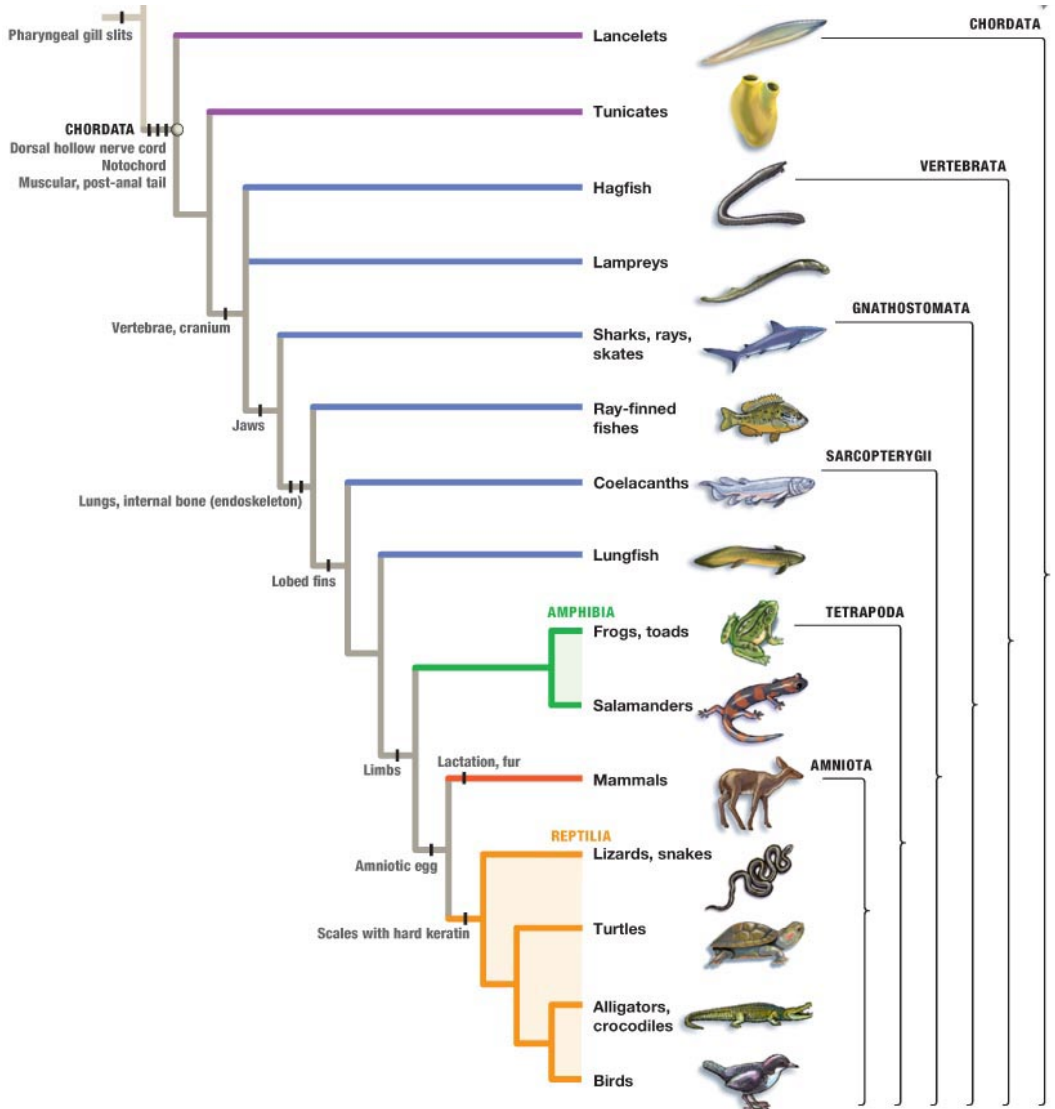
Vertebrate phylogenetics

- Modified amniotic egg
- Placenta
  - Oxygen & nutrients mother to embryo





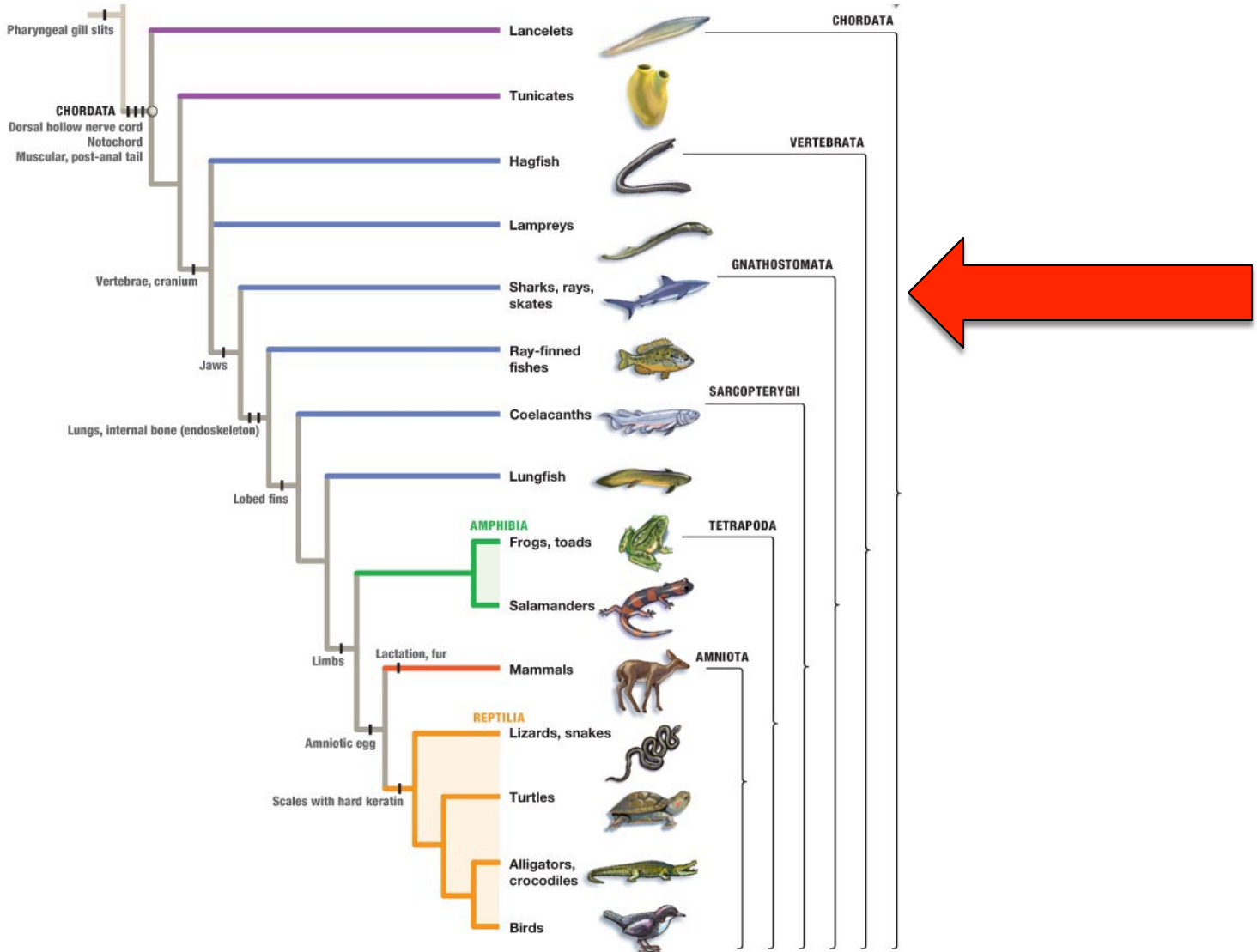
Deuterostome phylogenetics



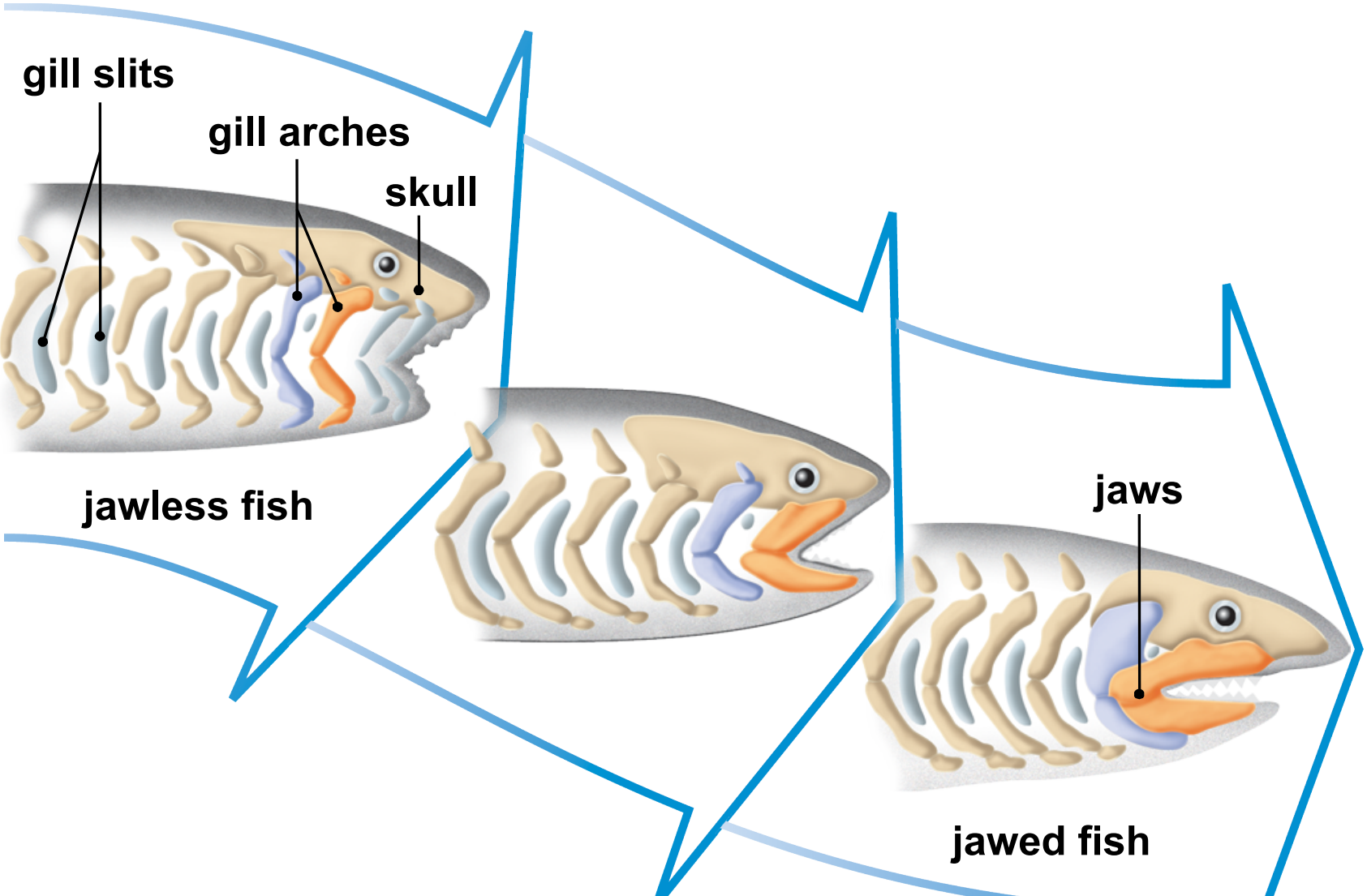
Vertebrata: Hagfish & Lampreys

- Lack jaws
- Hagfish
  - Lack vertebral column
  - Scavengers & predators
- Lampreys
  - Pieces of cartilage along nerve cord
  - Ectoparasites

Deuterostome phylogenetics

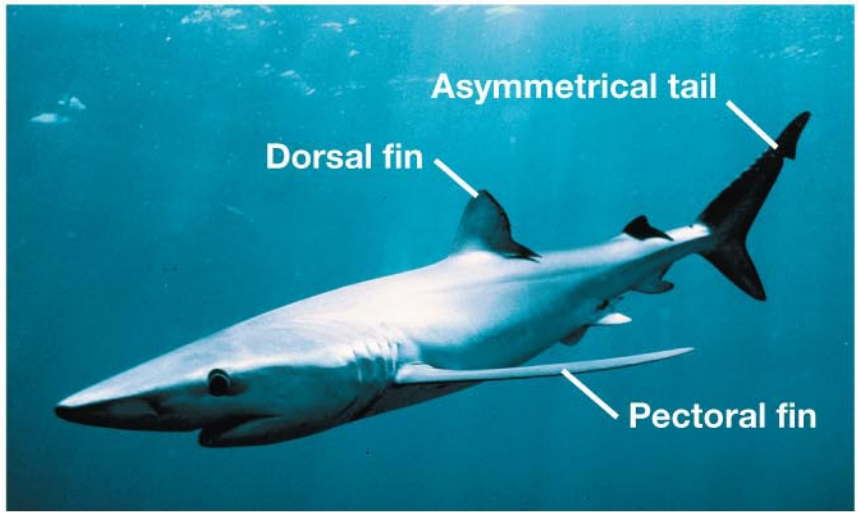


Evolution of jaws

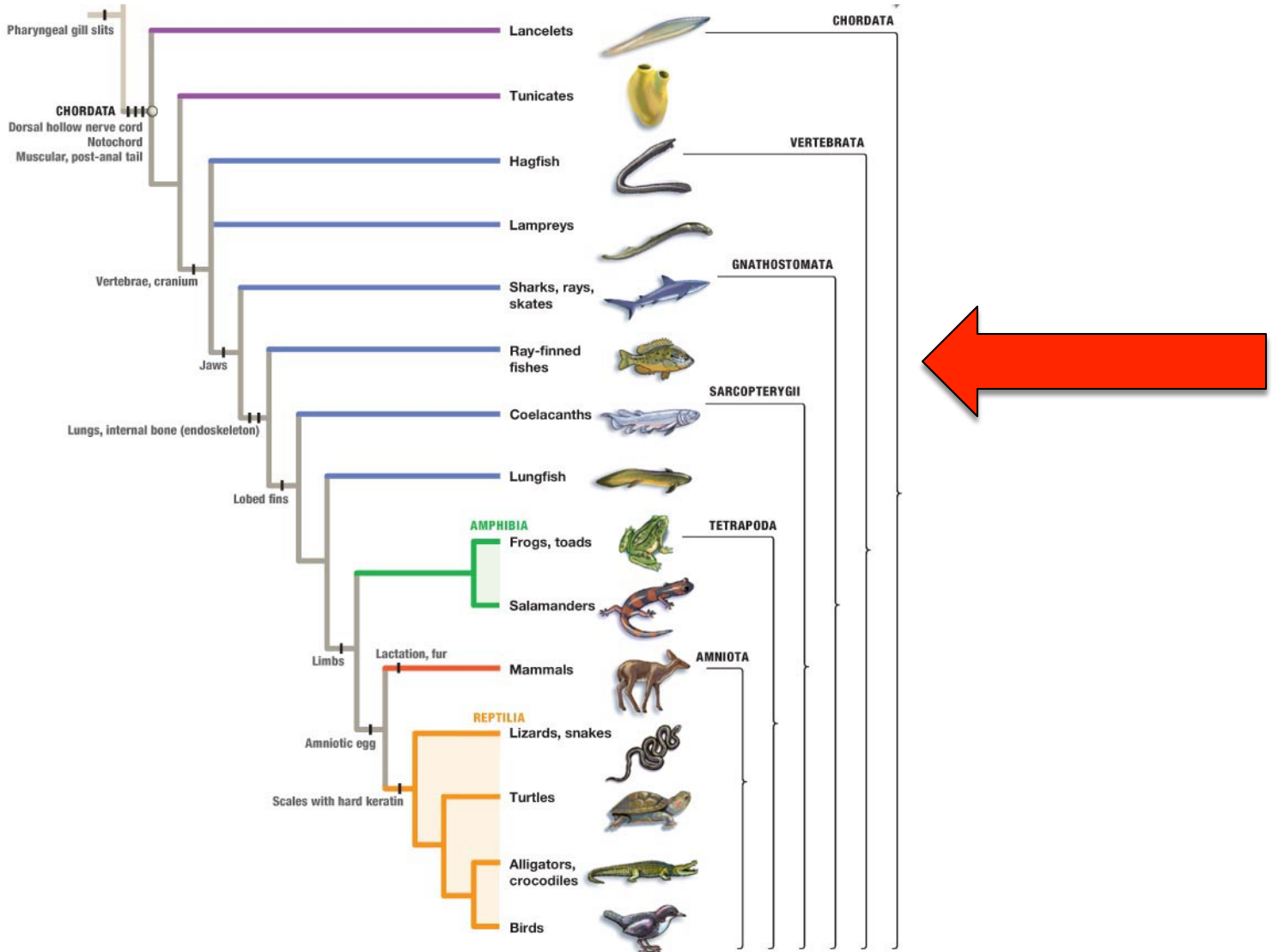


Vertebrata: Chondrichthyes

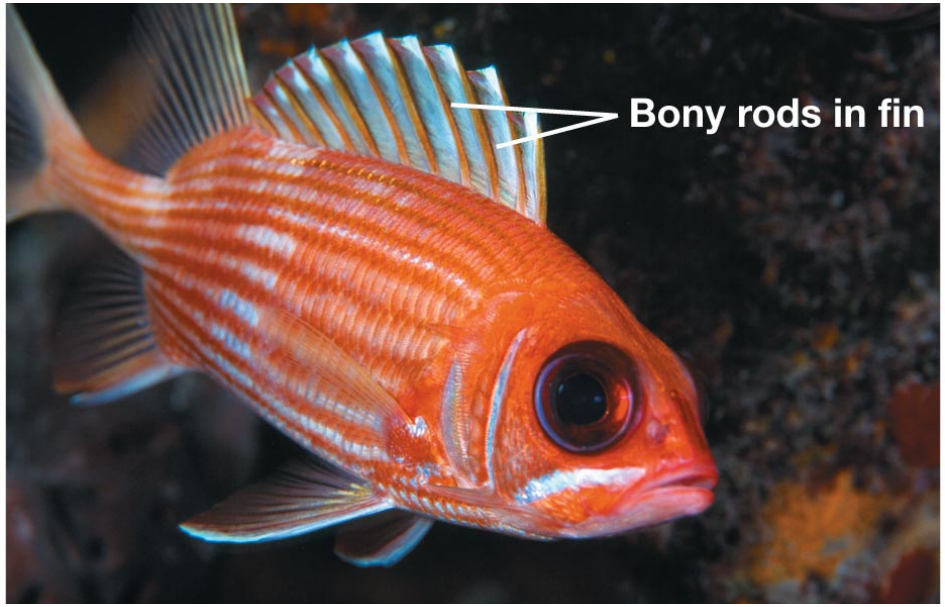
- Sharks, rays, skates
- Characteristics
  - Cartilaginous skeleton
  - Jaws
  - Paired fins



Deuterostome phylogenetics

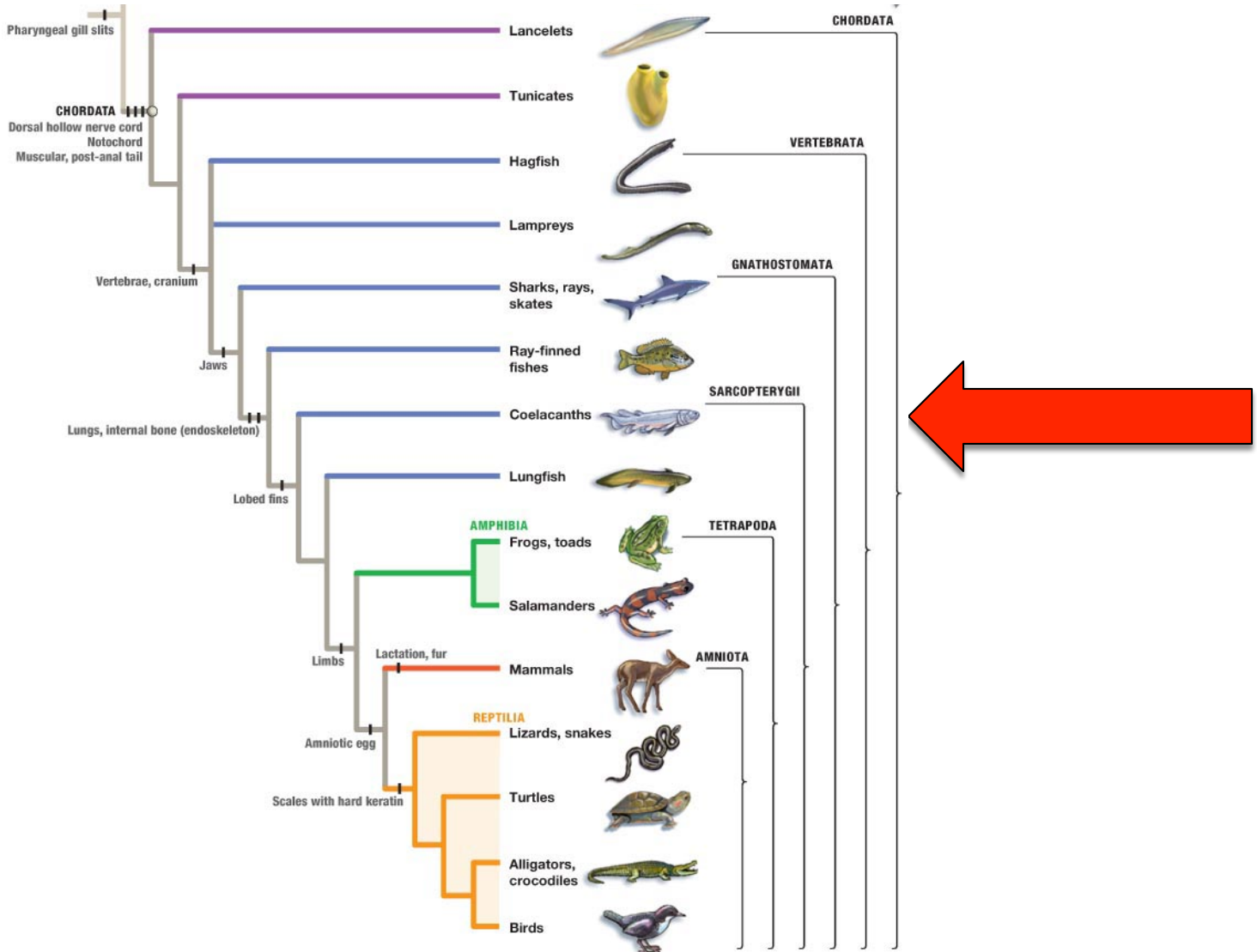


Vertebrata: Actinoterygii



- Ray-finned fish
- Characteristics
  - Fins supported by long bony rods
  - Swim bladder
  - Bony skeleton
- Most successful vertebrate lineage
  - # of spp.

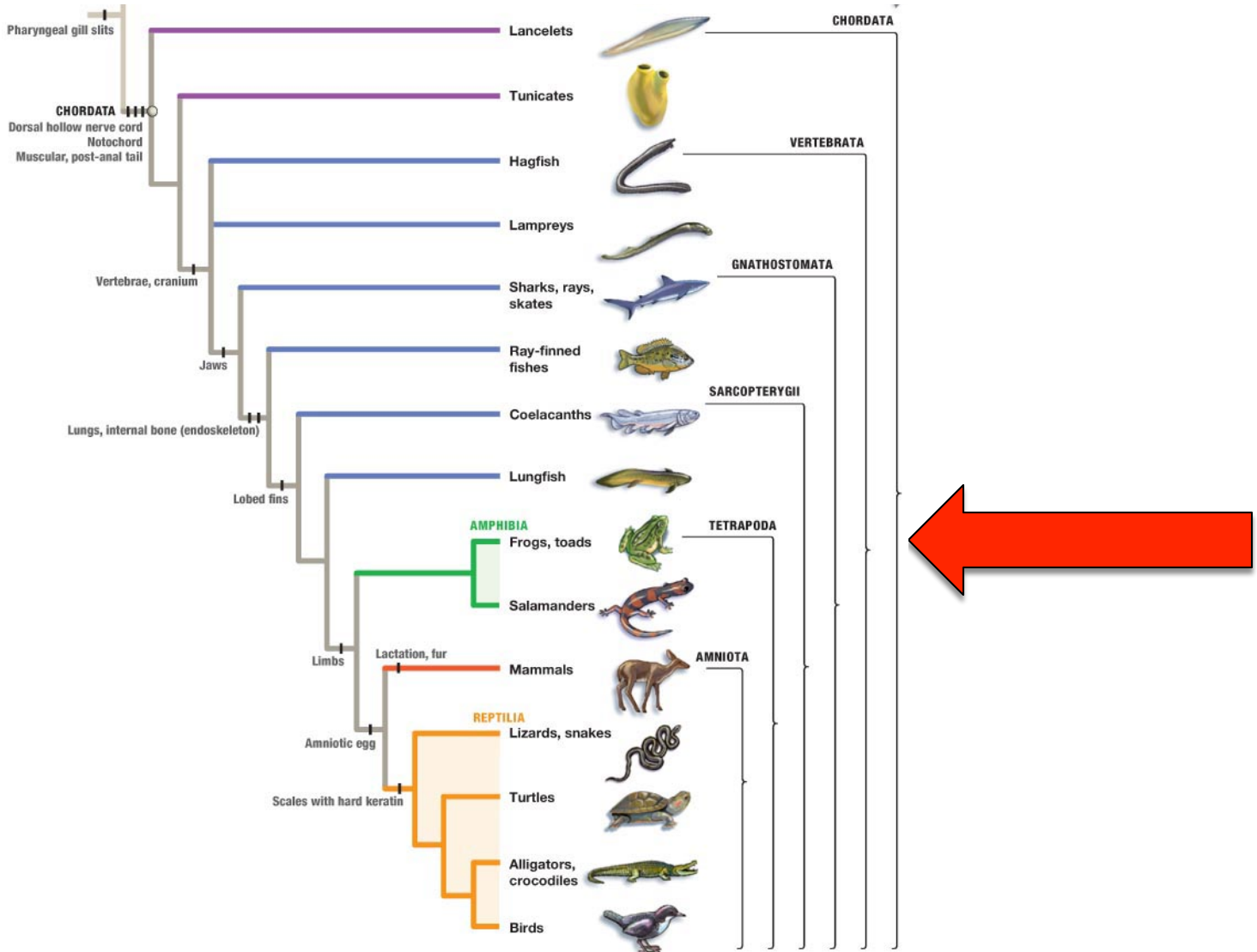
Deuterostome phylogenetics



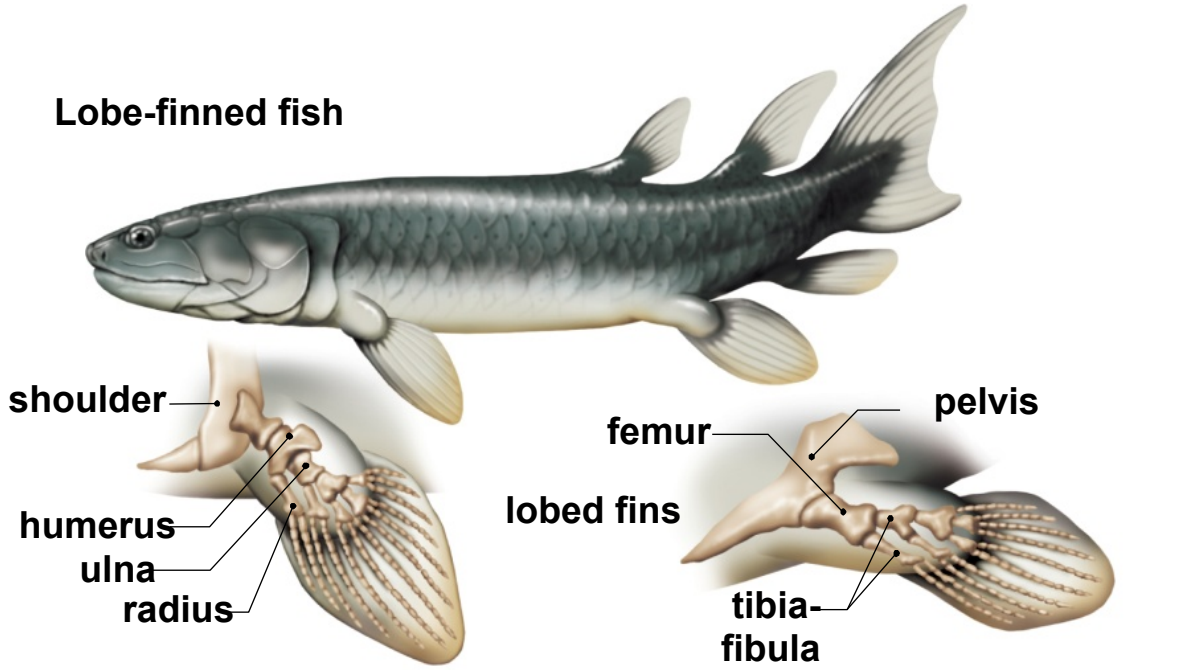
Vertebrata: Actinista & Dipnoi

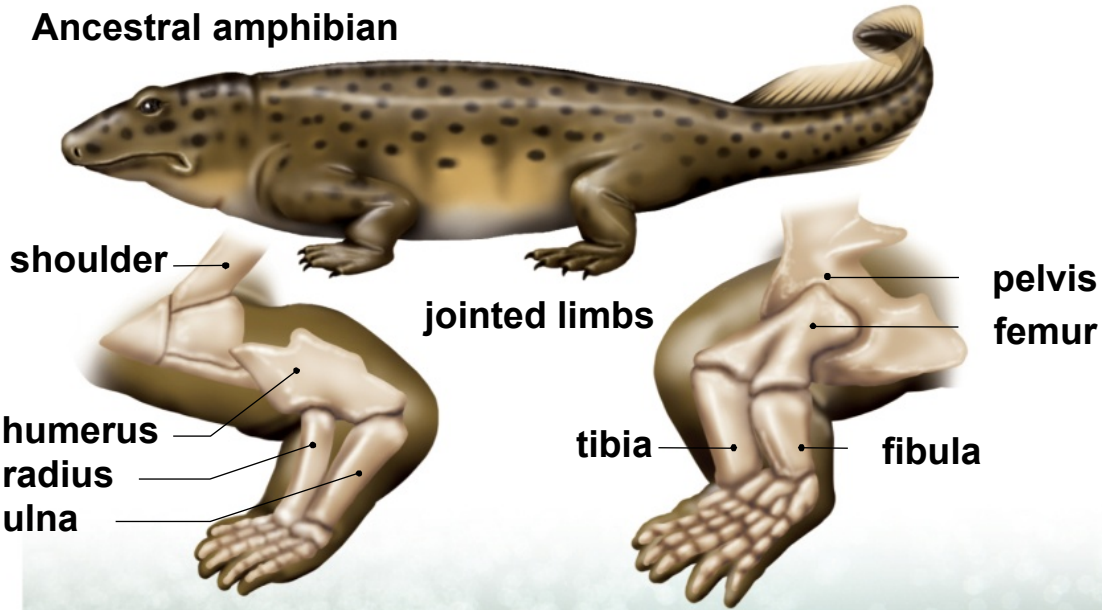
- Lobe-finned fishes
  - Lungfish
    - Shallow ponds
  - Coelacanths
    - Ocean
- Link b/n fish and terapods
  - Lobe-shaped fins
    - Linear arrangement of bones
    - Similar to terapods

Deuterostome phylogenetics



Fins to Limbs

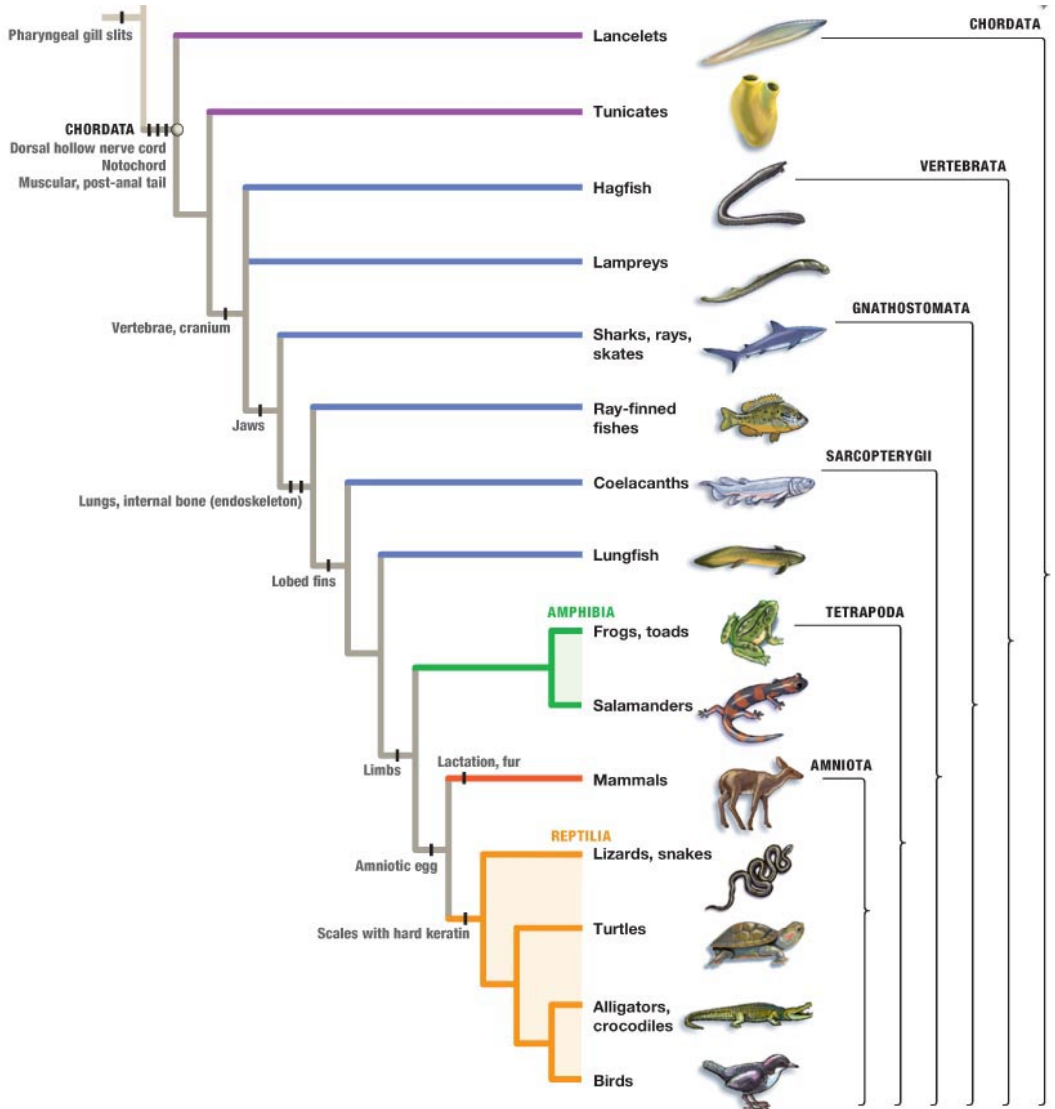




Vertebrata: Amphibia

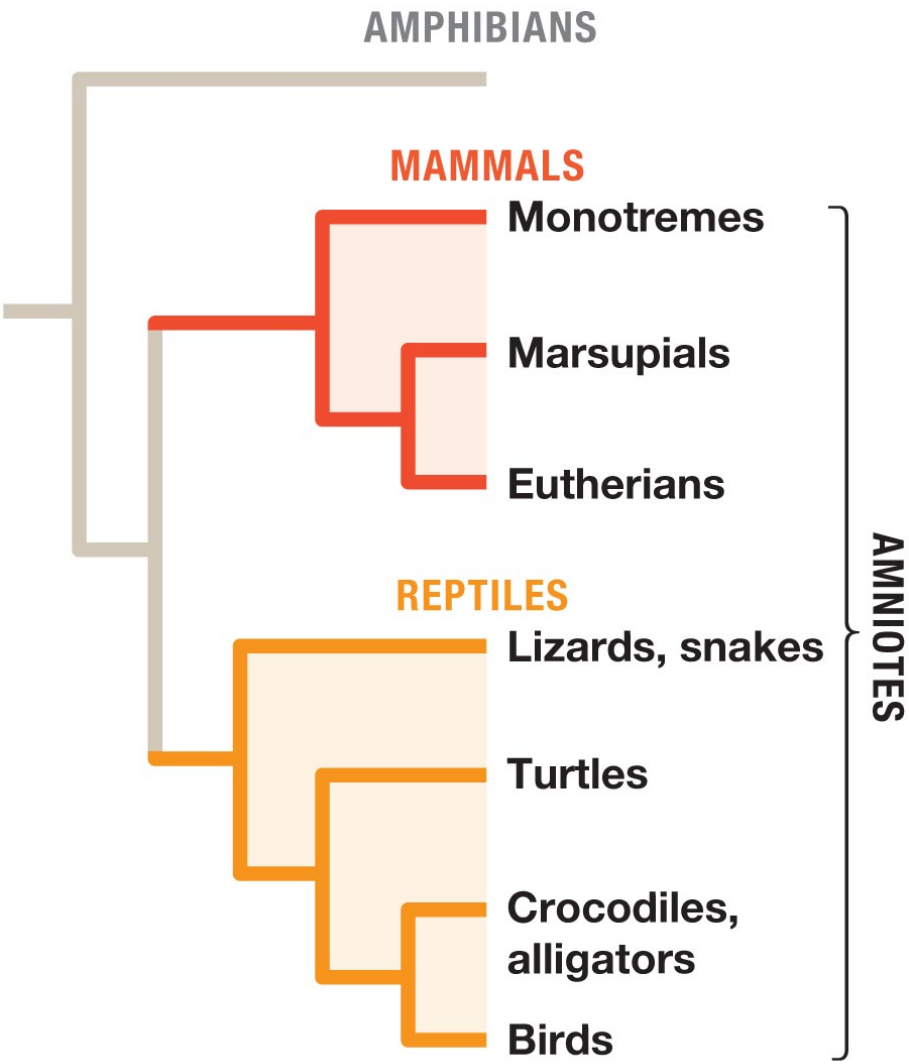
- Frogs/toads, salamanders, caeclians
- Characteristics
  - Gas exchange over skin
  - Carnivores
  - Lay eggs in water
  - Four limbs
    - Caeclians lack limbs & eyes

Deuterostome phylogenetics

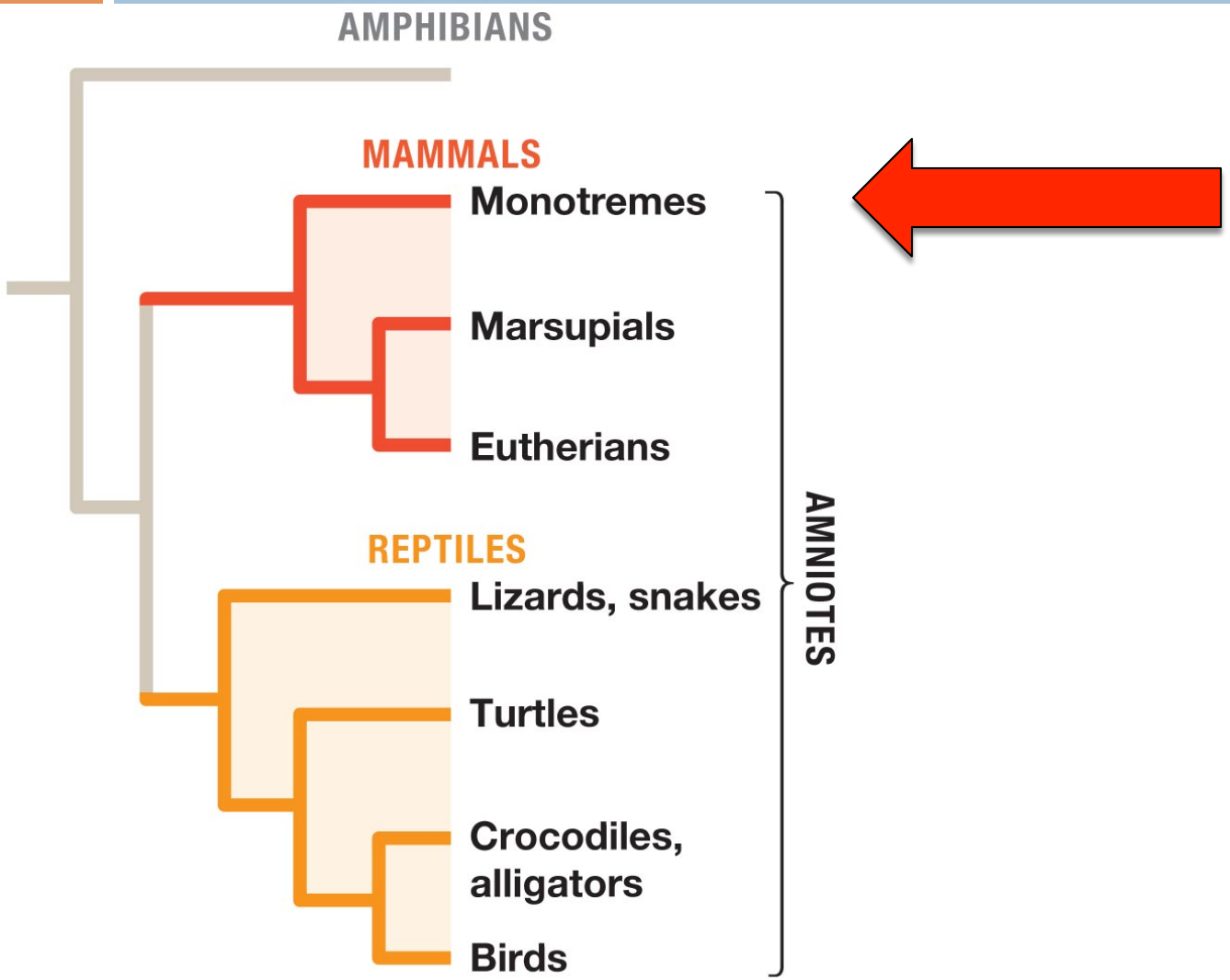


Vertebrata: Mammalia

- Characteristics
  - Hair
  - Endothermic
  - Mammary glands



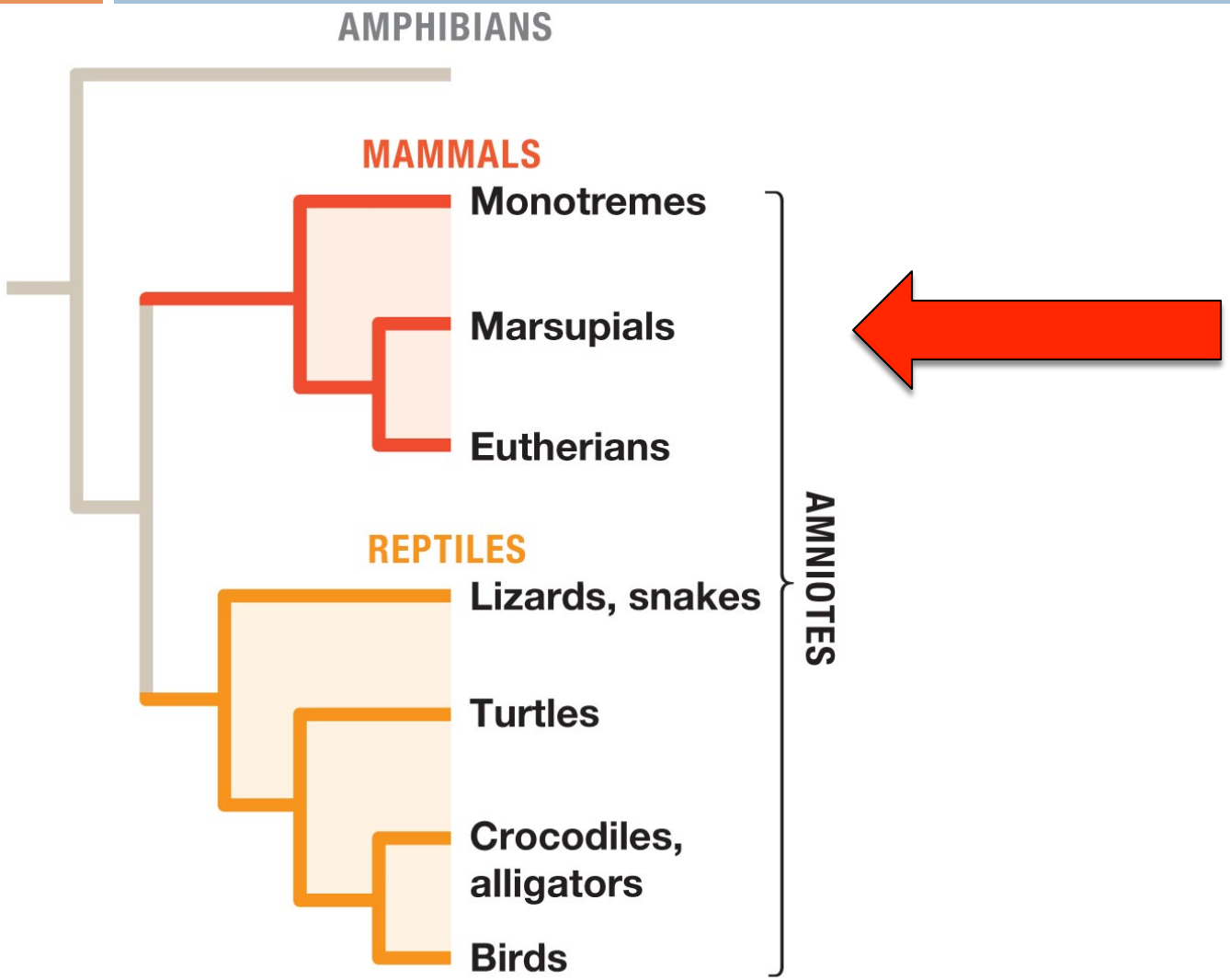
Vertebrata: Mammalia



Mammalia: Monotremata

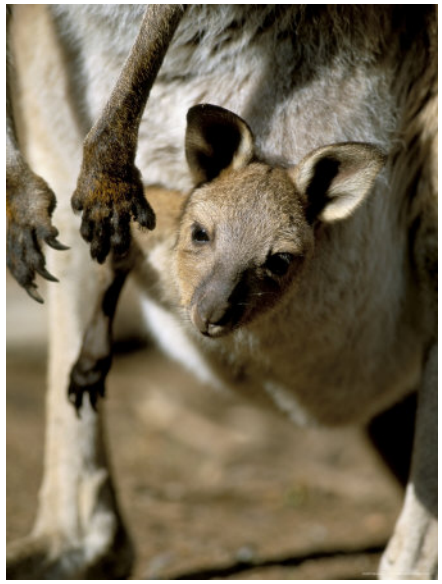
- Characteristics
  - Lay eggs
  - Leathery bills
- 3 spp.
- Platypus
- Echidnas

Vertebrata: Mammalia

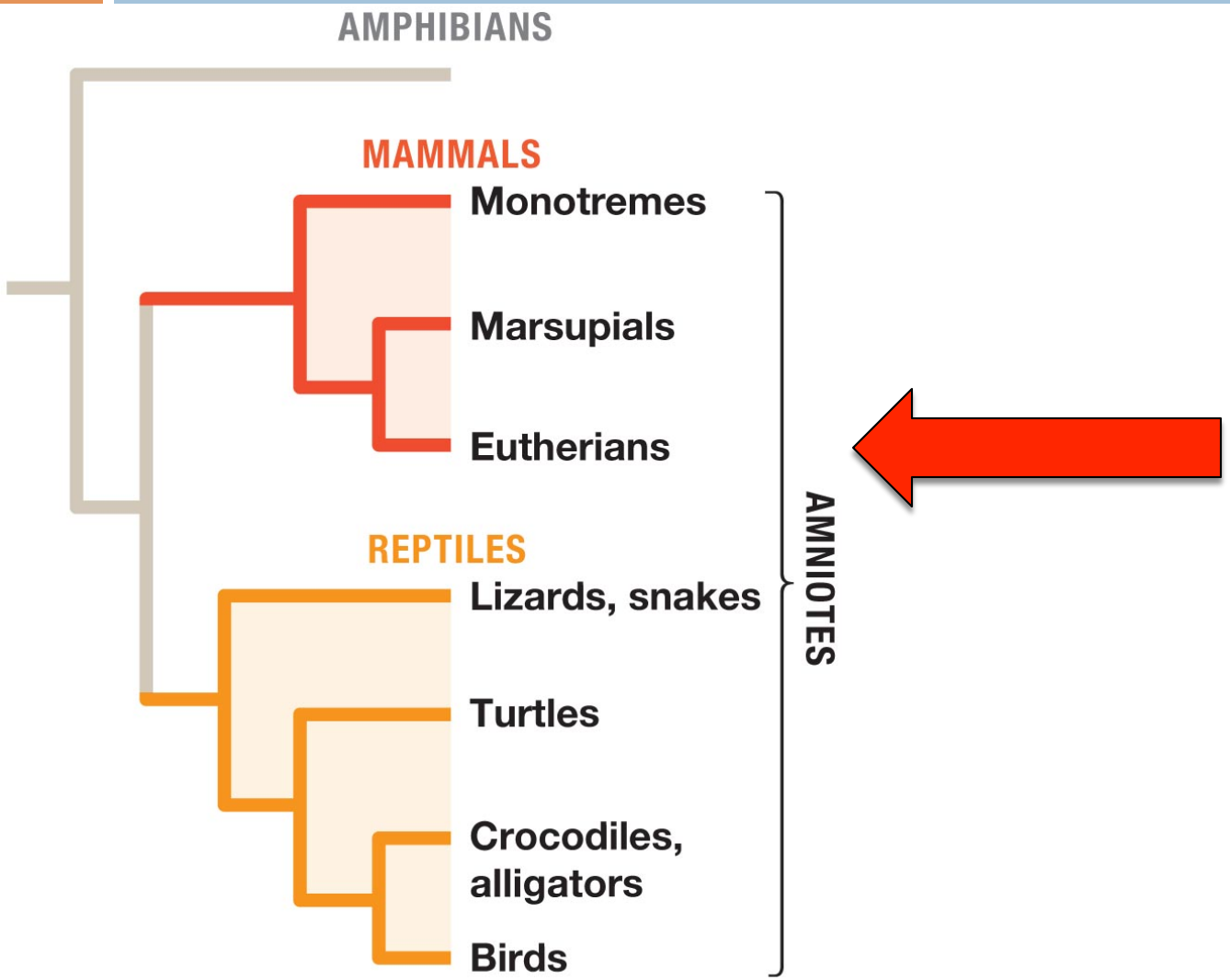


Mammalia: Marsupiala

- Characteristics
  - Placenta
  - Short embryonic period
  - Attach to mother's nipple



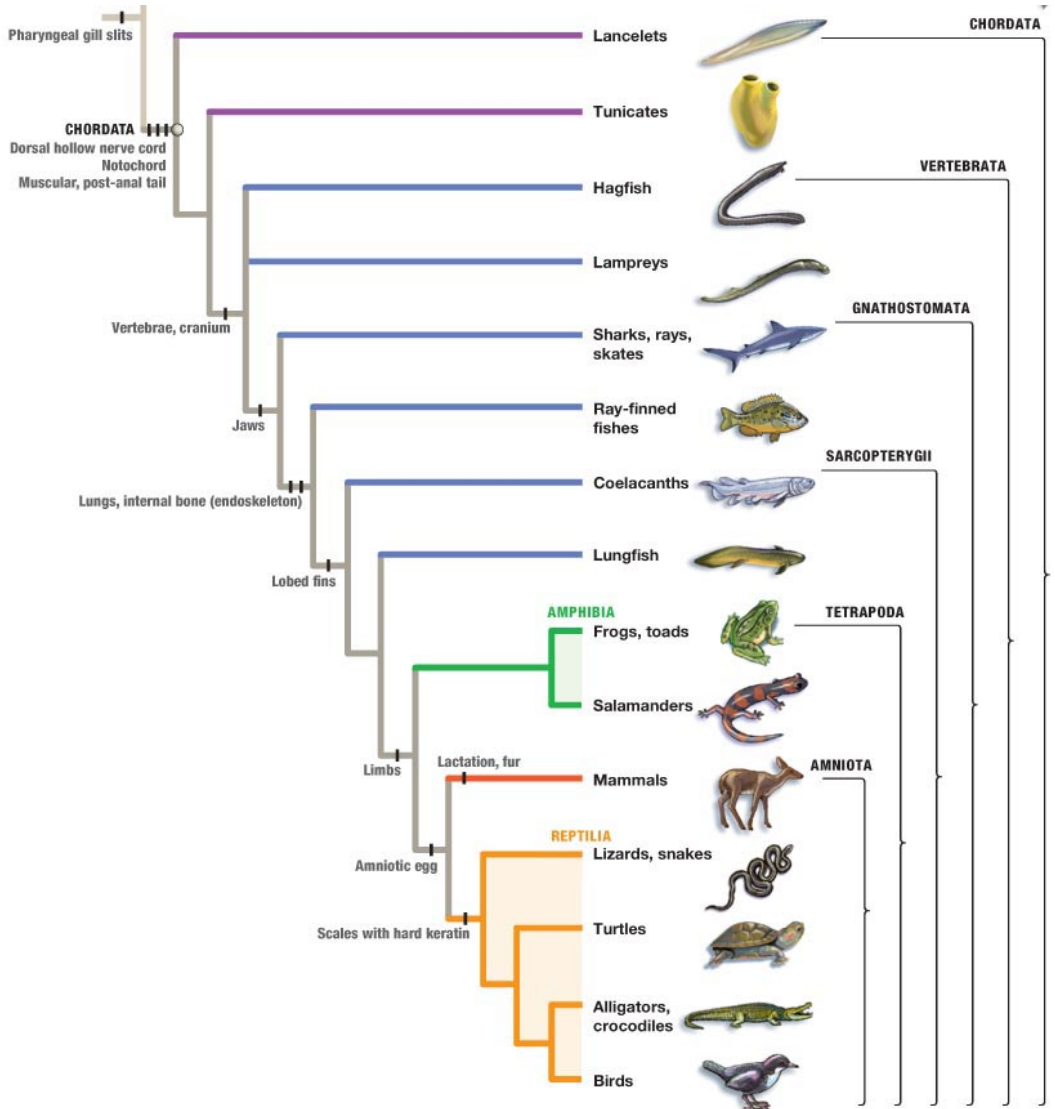
Vertebrata: Mammalia



Mammalia: Eutheria

- Characteristics
  - Highly developed at birth
  - Develop in placenta

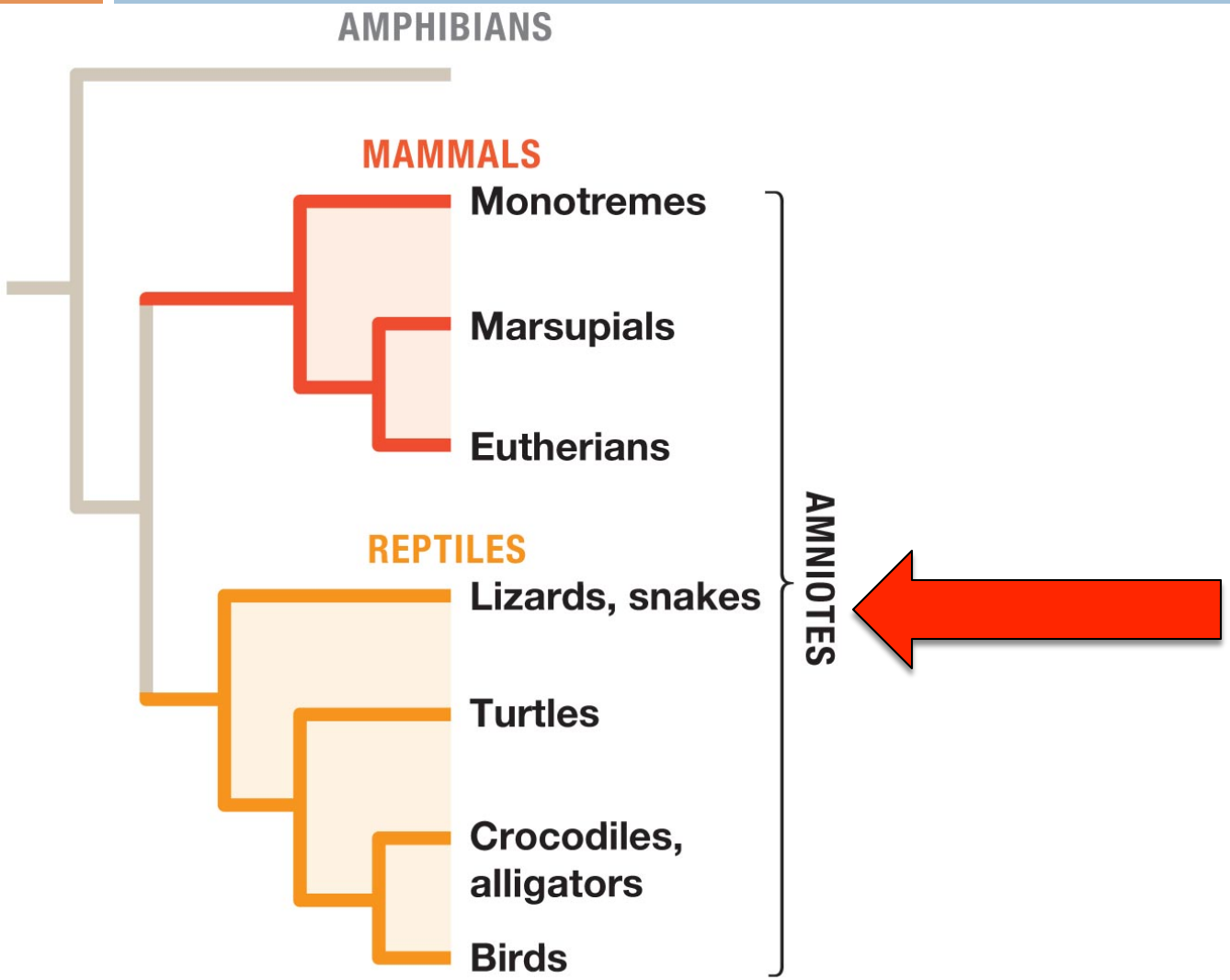
Deuterostome phylogenetics



Vertebrata: Reptilia

- Characteristics
  - Scales
  - Lungs
  - Amniotic eggs
  - Ectothermic
    - Except birds

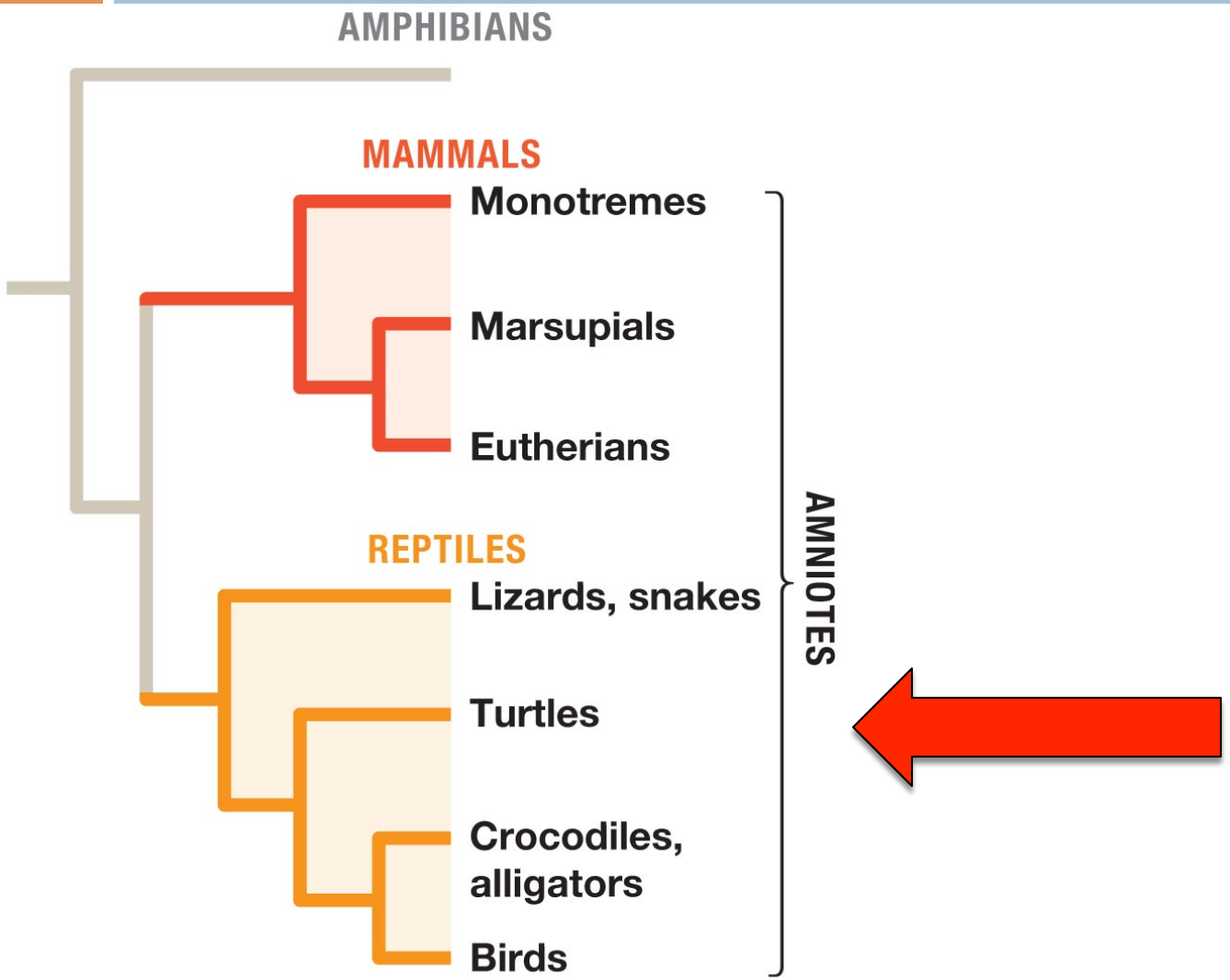
Vertebrata: Reptilia



Reptilia: Lepidosauria

- Characteristics
  - Elongated bodies
  - Scaly skin
- Lizards
  - Jointed legs
- Snakes
  - Limbless
  - Some have vestigial legs

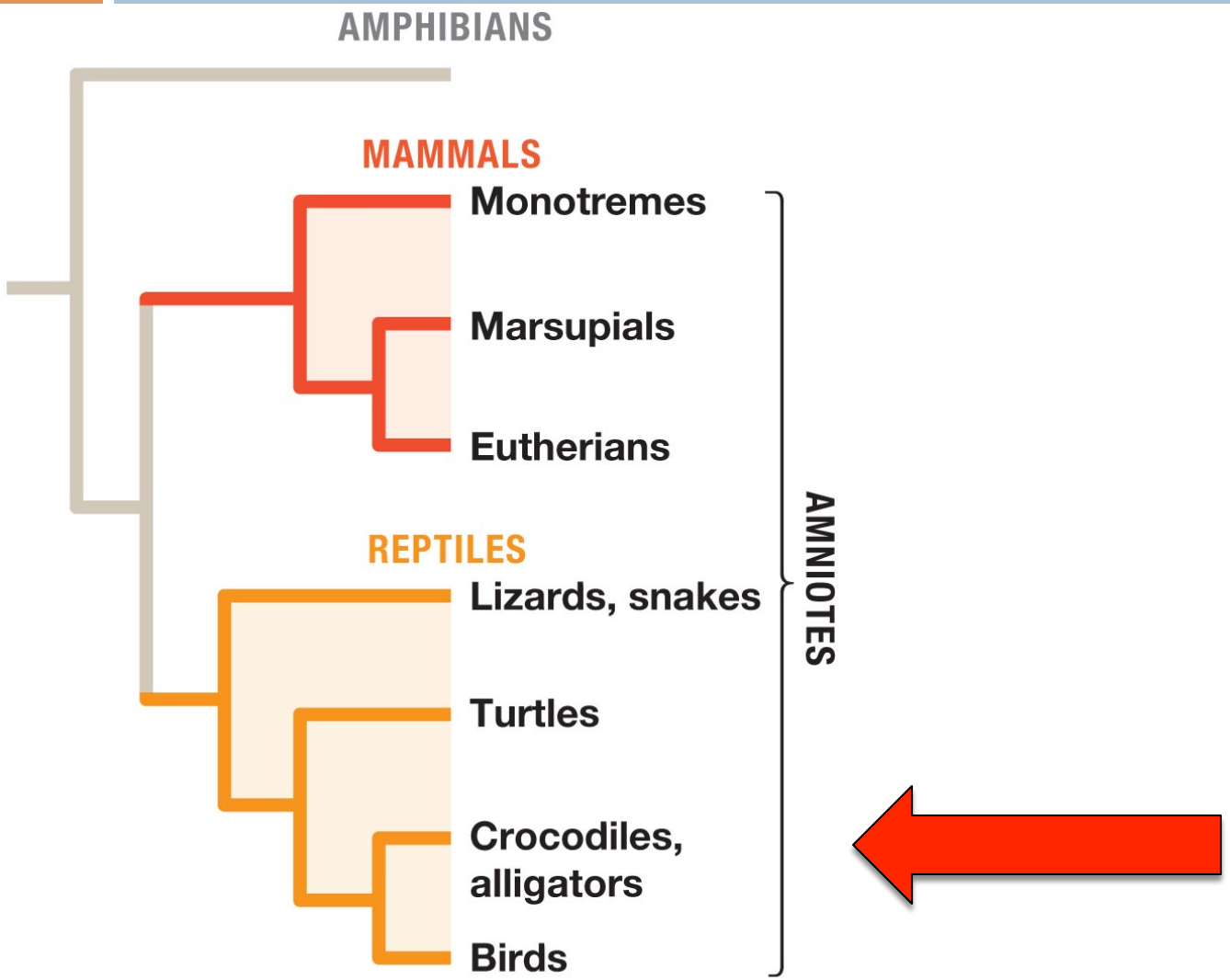
Vertebrata: Reptilia



Reptilia: Tetsudinia

- Characteristics
  - Shell of bony plates
  - Lack teeth, have bony beak
- Turtles & tortoises

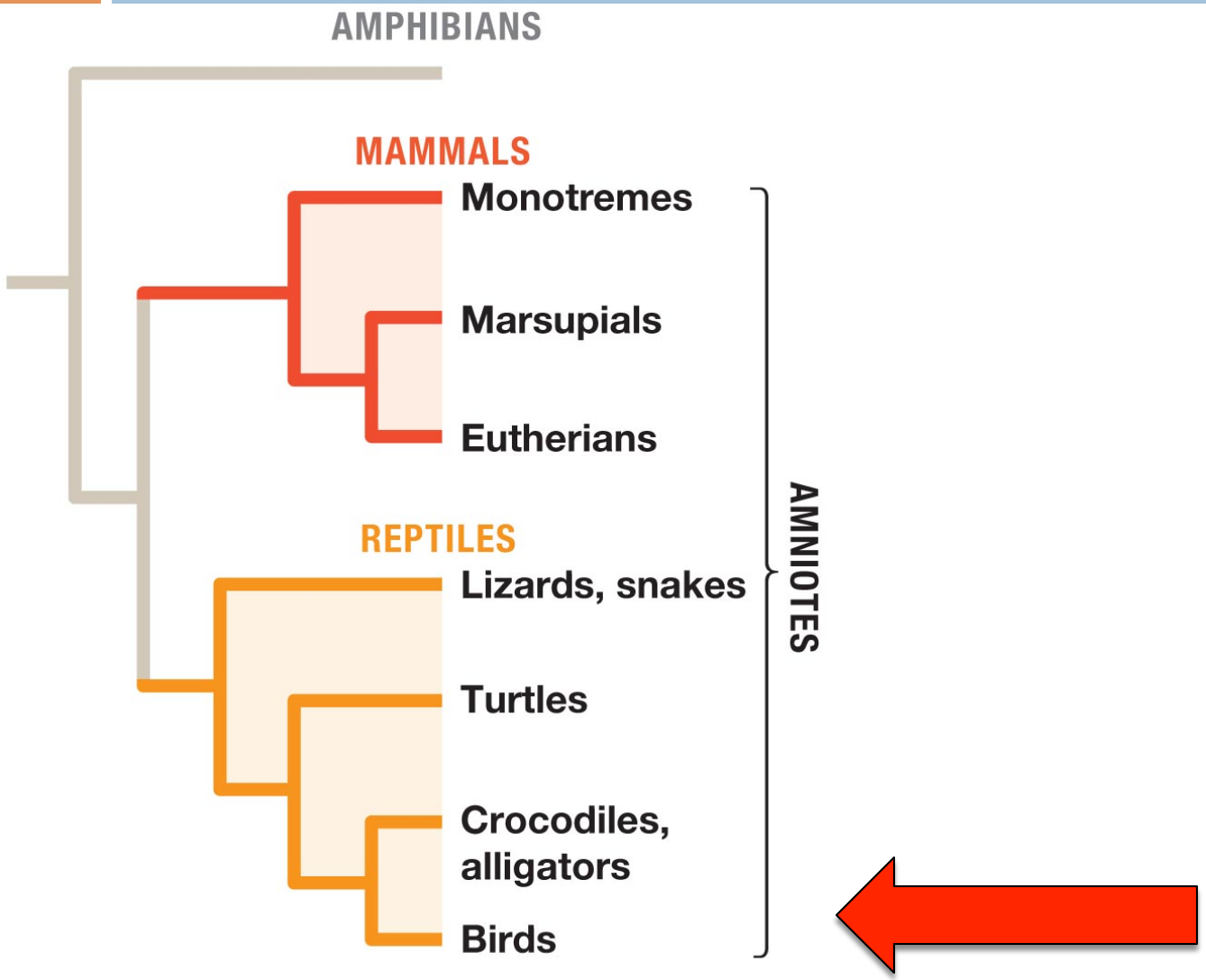
Vertebrata: Reptilia



Reptilia: Crocodilia

- Characteristics
  - Eyes on top of head
  - Nostrils on top of snout
- Crocodiles and Alligators

Vertebrata: Reptilia



Reptilia: Aves

- Characteristics
  - Feathers
  - Lightweight bones
  - Endothermic
- Birds