

Phylum Chordata

Subphylum Vertebrata

CLASS AMPHIBIA

Ectothermic

No scales (mucous moistened skin, usually w/ poison glands)

Interlocking vertebrae, short ribs, short broad skull (incompletely ossified)

Moveable eyelids (flattened lens)

Internal nostrils

Muscular protrusible tongue

Larvae with external gills (lost at metamorphosis)

Most forms w/ lungs

Right & left atria (auricles) & ONE ventricle

(3-chambered heart)

Kidneys eliminate most nitrogenous wastes -  $\text{NH}_4$  - bladder present

External fertilization (Oviparous)

---

Amphibians first tetrapod - spend time on land - evolved from PREADAPTED crossopterygian fish (Rhipidistia) in the upper Devonian (Greenland). Produced the subclass Labyrinthodont (Ichthyostega)

Modern amphibians still have fish-like brain, lateral line system in larvae, and a primitive limb arrangement.

Locomotion entails an undulation motion of the trunk like those of a swimming fish.

Class Amphibia (2,500 spp -- and declining)

ORDER APODA (Gymnophiona) (160 spp)

"w/o legs" or "naked snake"

Caecilians - earthworm-like, tropical distribution,  
secretive, underground (fosorial), no limbs or  
limb girdle

ORDER Caudata (Urodela) "tailed" (300 spp)

Newts and salamanders - head, trunk, & tail well defined

Two pairs of limbs

Most species in eastern USA

ORDER Anura (Salientia) (2,000 spp)

"w/o tail" or "jumper"

Frogs & Toads

Most successful of amphibians

Close to ancestral stock giving rise to higher tetrapods

### The Shift to the Land

#### HOMEOSTASIS

Behavioral & physiological adaptations to counter new, harsh terrestrial environment

Respiration:

Air contains 20X more O<sub>2</sub> than H<sub>2</sub>O

(210 ml/L vs 3-9 ml/L and a low diffusion rate)

6th aortic arch (last branchial arch) diverts to the diverging diverticulum off of the esophagus - becomes the pulmonary artery - leads to double circulatory system - pulmonary vein goes back to heart - SEPARATE Pulmonary & Systemic systems.

Locomotion:

Water 1,000X more dense than air - need more skeleton support, heavier support muscles

Metabolism:

Water has tremendous thermal capacity - moderates thermal flux - air-exposed body needs enzymes with wider activity range

Sensory:

Sight

Sound

Smell

Touch

Equilibrium

Breeding on land:

All eggs need water, larval stage needs water

(neotenic forms need water)

Parental care very creative to avoid laying eggs where there are aquatic predators

Water conservation poor even in adults (but are some desert forms)