

# Amphibians

Land and Water Dwellers

# Amphibians

- Most amphibians do not live completely in the water or completely on land and most must return to water to reproduce



<http://potch74.files.wordpress.com/2007/09/amphibians.jpg>



[slybird.blogspot.com/.../hellbender-survey.html](http://slybird.blogspot.com/.../hellbender-survey.html)

# Characteristics

- They go through metamorphosis from an aquatic larval stage to the adult terrestrial form.
- Skin is smooth, thin, and usually moist.
- No scales, fur, or feathers.

# Characteristics

- Feet, if present, are usually webbed.
- Toes are soft and lack claws.
- Larval stage is herbivorous. Adults are usually carnivorous.
- Respiration is through gills, lungs, and/or skin.

# Characteristics

- Larvae have 2-chambered heart. Adults have 3-chambered heart
- Have well-developed circulation.
- Eggs usually laid in water and fertilized externally as soon as they are laid.

# Salamanders and Newts

- Amphibians with tails.
- Have narrow bodies, long tails, short legs, and clawless toes.
- Skin is soft and moist.
- Most cannot survive in dry areas and are found in damp regions under logs and stones.



# Salamanders and Newts

- Most are egg layers.
- Most have internal fertilization.
- Some have skin glands that secrete a bad-tasting substance. Others change color to match their environment. Most have very little protection from predators.
- Ex. mud puppy

<http://www.marshall.edu/herp/images/mudpuppy1.jpg>



# Frogs and Toads

- Amphibians without tail.
- Found in many different environments including deserts, mountains, and ponds.
- Frogs have smooth, moist skin and live near water.
- Toads have rough, warty skin and are better adapted to living on land.
- Have strong hind legs for leaping.
- Most lay eggs (external fertilization) which hatch into larval forms called tadpoles.



# Frogs

- Most common frog in the U.S. is the leopard frog. Live in ponds and marshes.
- Display countershading camouflage.
- Ventral side is white (blends in with reflecting water)
- Dorsal side is grayish-green blending in with grassy ponds.
- The bullfrog is more aquatic. Have large webbed feet that make them excellent swimmers.
- Tree frogs live in trees. Have suction disks on the tips of their toes.
- Frogs help control the insect population, since insects are a major part of their diet.

# Toads

- Most live in loose, moist soil.
- Hind legs are useful for digging and leaping.
- They hide from heat and predators by digging into dirt.
- Color and texture of skin provide good camouflage.
- Best defense is its poison glands in the skin that secrete an irritating, foul-tasting substance.
- Major enemy is the snake.
- They eat insects and worms.

# External Anatomy of Frog

## ■ Frog skin

- is thin, moist, and loose.
- No scales for protective covering.
- Skin is richly supplied with blood vessels allowing for gas exchange. Glands in skin secrete mucus that helps to prevent water loss.
- Most  $\text{CO}_2$  leaving the blood passes through the skin rather than the lungs and mouth.

# External Anatomy of Frog

## ■ Front legs

- Short and well adapted to absorb shock from jumping.
- Front feet are not webbed and are not used for swimming.
- They are used to prop up its body on land.
- Male frogs have thumb pads on their inner toes that are larger than females and are used to clasp the female (called amplexus)

# External Anatomy of Frog

## ■ Hind legs

- Are suited for swimming and jumping.
- Bones of lower hind legs are fused giving added strength.
- Flexible web membrane connects the five long toes.
- This makes for very efficient swimming.

# External Anatomy of Frog

## ■ Frog's Head

- Eyes very large allowing it to see above water while floating on the surface.
- Have eyelids and blink to protect against dust and dehydration. Also have 3rd eyelid called **nictitating membrane** which keeps eyeball moist when frog is on land.
- It also protects eye when frog is underwater.
- Nostrils on top of head allow frog to breathe air when most of it is underwater.
- No external ears. Do have eardrums (**tympanic membranes**) located on body surface just behind the eyes that enables them to hear.
- Do not have teeth for chewing. Instead, have 2 **vomerine** teeth projecting from bones in the roof of the mouth and small, cone-shaped **maxillary teeth** in upper jaw.



# Internal Frog Anatomy

## ■ Circulatory System

- Frogs have a 3-chambered heart and 2 separate circulations: (lung circulation and general body circulation)
- The 3 chambers are made up of a left and right atrium and a single ventricle.
- The left atrium receives oxygenated blood from the lungs. The right atrium receives blood from the rest of the body. Both contract at the same time forcing blood into a single ventricle. The ventricle then contracts, pumping blood to the lungs and to the rest of the body.

# Internal Frog Anatomy

## ■ Respiration System

- Adult frogs use both mouth breathing and lung breathing.
- Inactive frogs can stay underwater for a long time. (During winter) Frogs respire through their skin. The skin absorbs  $O_2$  from the water and gives off  $CO_2$ .

# Amphibian Development

## ■ Eggs

- Once fertilized, the jelly-like coat that surrounds each egg swells in the water. This binds the eggs together. It protects the eggs from injury and makes it harder for predators to eat them. It also keeps them at a constant temperature and serves as food for the young tadpoles

# Amphibian Development

## ■ Metamorphosis (tadpole to adult)

- The tadpole breathes by means of gills, has a fin, a 2-chambered heart, and a lateral line.
- The change to adult occurs in about 10-12 weeks.
- First, hind legs appear and front legs begin to form. As front legs grow, the tail starts to disappear. The mouth broadens and adult teeth and jaws appear.
- The heart develops a 3rd chamber. The gills stop functioning as lungs have developed. Sense of smell adapts for land use. Eyelids and tear glands develop to keep eyes moist when out of water.