NATIONAL AQUARIUM IN BALTIMORE
Conservation Education Department
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Baltimore, MD 21202

Ask the Aquarium

Fact Sheets from the Conservation Education Department

AMPHIBIANS

Red-eyed treefrogs display bright colors to mimic poison dart frogs. The likelihood of being eaten by a predator is greatly reduced.

FAST FACTS

- Frogs and toads are both classified as frogs.
- Frogs, toads, and salamanders do not chew their food; instead they press their eyeballs down on the roof of their mouth to swallow food whole.
- True toads do not have any teeth.
- An African clawed frog was successfully cloned thirty years before Dolly the sheep.

KEY TERMS

Herpetology - the study of amphibians and reptiles.

Indicator species - animals that are extremely sensitive to changes in their environment.

Camouflage - the technique of using colors, shapes, or behaviors to help blend in with an environment.

Metamorphosis - the process amphibians undergo to change from their aquatic larval stage to adulthood.

OVERVIEW

Did you know that there are almost 6,000 species of amphibians? Amphibians are unique animals that include frogs, toads, salamanders, and caecilians. The word amphibian is derived from the Greek word, *amphibios*, meaning "both" and "life". Most amphibians are four-legged vertebrates that do not have amniotic eggs. Amniotic eggs have a membranous sac, which serves to protect the embryo during development. Amphibians lay their eggs in or around water until they hatch. Amphibians are also ectothermic, which means that they use external sources, such as the sun, air, or water to regulate their body temperature. Because of this, they can be found in almost every climate on Earth, from the sweltering deserts to the frozen arctic. Most amphibians can not fully exist on land for their complete life cycle. Therefore, all species of amphibians go through a stage in their life known as metamorphosis. Metamorphosis is a biological process in which an animal will completely change its body structure. Usually with metamorphosis, the animal encounters a change in its behavior as well as its habitat.

FROGS

Frogs start their life as eggs usually laid in water or moist areas. After hatching from the eggs, they are called tadpoles. Tadpoles are "fish-like" in shape and have gills for breathing underwater. The time that it takes a frog to go through metamorphosis depends on the species. During this time, the tadpoles develop hindlimbs followed by forelimbs. Their gills turn into lungs and their tails are absorbed into their bodies. Frogs are able to breathe with lungs and absorb oxygen through their skin, which is covered by mucous glands. An adult frog's skin is very sensitive to its environment. The health of the environment directly impacts the health of frogs. This is why frogs are considered indicator species.

FROG OR TOAD?

Frogs and toads are often mistakenly identified. However, they are both placed in the same order, Anura. Frogs have moist skin, while most toads have dry, bumpy skin. Frogs generally stay near water. Toads can wander away from wet habitats. The legs of a frog are longer than those of a toad. Therefore, a frog can jump farther than a toad. The toad tends to hop or walk rather than jump. Frogs also lay their eggs in large masses and toads lay their eggs in strings. However, there are exceptions to this rule.

SALAMANDERS AND CAECILIANS

Salamanders, which are also a type of amphibian, have a slender body, smooth damp skin, limbs without claws, and a tail. They too, live in wet habitats and spend most of their life on land only to return to the water to breed. Some salamander larvae have external gills, which look like frills sticking out from their neck. As the salamander matures, the gills absorb into their body just like a frog's tail reabsorbs into its body. There are some salamanders that do remain in their larval stage for most of their life. Because of their moist skin and external gills as larvae, it is generally a good idea to not pick up one of these animals if you come across it in nature. Caecilians do not have any legs, but they do have grooves in their skin, which form rings around their body. They can be found in moist tropical habitats buried under the ground. All caecilians, except *Atretochoana eiselti*, have lungs and can absorb oxygen through their skin and mouth. Caecilians also have internal fertilization, unlike the rest of the amphibians. Most of the caecilians are egg layers. The word *Caecilian* comes from the Latin word *caecus*, meaning blind.

THREATS FACING AMPHIBIANS

According to the 2006 IUCN Global Amphibian Assessment, 32.2% of all amphibians are globally threatened. Major threats for these amphibians come from habitat loss, degradation, human settlement, industrial development, collecting for food, scientific, and pet industries, pollution of water and air, insecticides, parasites, pathogens, diseases caused by the iridovirus and the chytrid fungus, *Batrachochytrium dendrobatidis*, and global warming. Habitat loss and degradation are the greatest threat facing amphibians. These factors affect almost 4,000 species of amphibians. Habitat loss and degradation are so detrimental that they affect four times the number of amphibian species than pollution alone. Diseases are not the main source for amphibian decline, but when they strike a certain population, they can have an overwhelming effect leading to sudden extinctions. Scientists speculate that global warming is playing a role in the decline of amphibians because warmer air is raising clouds, which then pass over the mountains instead of sinking beneath the canopies of the rainforests to deposit moisture. Since the weather patterns are changing, pathogens are finding ways to survive in dry or moist habitats. When cloud cover is thick, the sun does not get through the canopy to dry out plant matter that the pathogens grow on. The chytrid fungus is pathogenic at cooler temperatures, however, it thrives in moist conditions. Only complete dryness will kill the chytrid fungus. Increased cloud cover, allows nighttime temperatures to remain warm and moist. Thus, providing optimal growth for the chytrid fungus. Warm years due to global warming are promoting the survival of pathogens and causing a decline in amphibian species. Declines are no longer isolated to amphibians living in the rainforests. They are a worldwide occurrence. Acid rain is also having a tremendous impact on amphibians. The acidity is caused by sulphur dioxide emitted from power plants and nitrogen oxide seeping out of car exhausts. The trouble with acid rain is that it affects the small breeding pools of amphibians. The acidity of the small breeding pools has been blamed for deformities and the reduction of a frog's immune system to several types of bacteria. Scientists are also discovering that the high levels of UV light penetrating Earth's surface is affecting the eggs of amphibians, which inevitably kills the embryos inside. In addition to high levels of UV light, fertilizers decrease the fertility of frogs and affect the larval stages of amphibians. Fertilizers increase algal growth, which benefits trematodes, parasitic flatworms that bury into frog larvae and adults. These trematodes cause diseases in frogs as they grow and mature.

HOW YOU CAN HELP

There are many organizations that participate in amphibian conservation. Frogwatch USA is a dedicated program designed by the National Wildlife Federation (NWF) in partnership with the United States Geological Survey (USGS). Frogwatch is designed to allow the public to assist scientist with their research on the trends of amphibian populations. This program is designed for everyone, even if you are not a frog-fanatic. To learn more about the program and how you can help, visit their website at www.frogwatch.org. You can also Aquadopt an Aquarium frog at www.aqua.org/aquadopt.html or call 410-659-4204.

We can also help our amphibian friends by using less water, recycling, protecting their habitats, not using lawn chemicals, and simply learning more about frogs and their cousins.

Come visit us here at the National Aquarium in Baltimore to learn more about the 21 species of frogs and toads in our new exhibit, *Frogs! A Chorus of Colors.*