

# Amphibians & Reptiles



Photos courtesy of Ellen Woods and Beth Kinsey

**Amphibians (Amphibia)** and reptiles (**Reptilia**) are two classes of animals that are grouped together because they are considered “cold blooded” however this is an improper term. They are actually considered **ectothermic**, meaning they derive heat from outside sources, most commonly the sun. They must gain heat through the sun to both raise their internal temperatures to perform tasks like digestion and to also make important vitamins and minerals they gain from ultraviolet light. Once warmed by the sun, most amphibians and reptiles can maintain their core temperature until the sun sets or their movement stops. The study of these two groups is called “**herpetology**”.

## **What is the difference between amphibians and reptiles?**

Reptiles and amphibians have major differences in their lifecycles. Amphibians (frogs/toads, salamanders, and a few smaller groups) primarily live in and around water due to the porous nature of their skin. In fact, amphibian is Greek for “being with a double life,” meaning they live parts of their lives in water and on land. Amphibians lay soft shelled eggs, usually in water, where their juveniles hatch. Young amphibians are tadpoles that are completely aquatic and have rudimentary gills. As these animals mature, they **metamorphose** to adult forms and their gills are replaced by lungs.

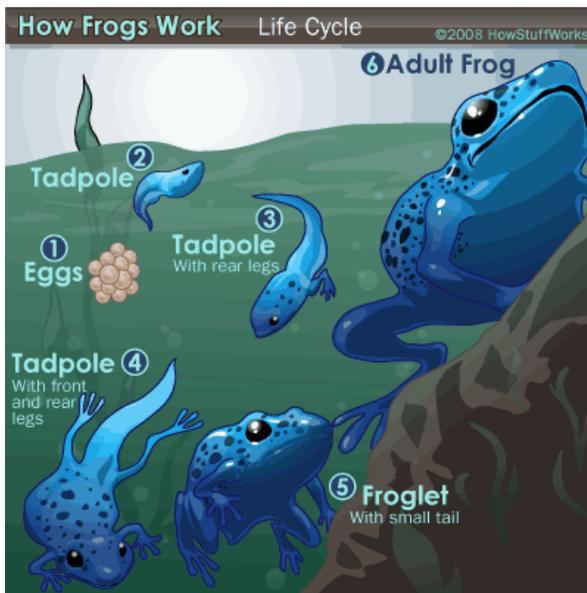
Reptiles (snakes, lizards, alligators, turtles) lay hard shelled eggs and their young are smaller versions of the adults, needing only to gain in size to become adults. Of course there are always exceptions such as snakes giving live birth, especially in colder climates. Reptiles have keratinous skin that is not permeable to water. **Keratine** is the same material as mammalian

hair and finger nails. This allows reptiles like sea snakes and crocodiles to live in saline [salty] environments and to not disrupt their **homeostasis**.

### **Amphibians:**

Amphibians include frogs, toads, newts and salamanders and there are over 5,500 different species with a huge concentration of biodiversity in the tropics however many of them can be found here in upstate New York.

Amphibians are considered “**indicator**” species due to their delicate nature, they are easily disrupted by even minor changes in the environment. The lifecycle of amphibians is very important and is a great way to link amphibians to ecological destruction and wetland conservation. Their eggs are jelly like and permeable to the water around them, allowing growing tadpoles to be easily polluted with chemicals in the surrounding water. Amphibians also have porous skin, allowing chemicals to be introduced to their bodies very easily.



Metamorphosis is another great topic that can be included with amphibians. Their lifecycle is very unique and raising them in a classroom along with butterflies can provide great opportunities to observe each stage of the life cycle.

### **Learning by Touch:**

The best way to teach a student about amphibians and reptiles is to allow them to touch, feel, see, and observe them in their natural environments. Many students may know a lot of information about these groups but they might have never had the chance to actually pet a snake! Saving animals towards the end of a presentation is recommended but having a class pet like a corn snake or tree frogs can provide an educational experience unlike any other.

### **Reptiles:**

There are over 9000 species in Reptilia that include snakes, lizards, crocodiles and alligators, turtles and tortoises. Reptiles present a huge opportunity for a diverse conversation or lesson on reptiles and amphibians. One can present each type of reptile individually as each reptile has many awesome adaptations like a turtles shell or a pit vipers heat seeking organs or

one can present by using one or two representations of reptiles by using corn snakes or tree frogs as physical examples.

An interesting point to make about reptiles is how they incubate their eggs. By digging into sand, dirt, or gravel, they attempt to provide a place where temperature fluctuations are minimal. A great example of this is sea turtles and how they lay their eggs in the same locations as they were born, returning to the same beach year after year. What is so interesting about turtles and crocodiles have temperature-dependant sex determination meaning that in turtles, higher temperatures result in males and lower temperatures result in females. In crocodiles, either hot or cool temperatures will result in females and temperate conditions result in males. In fact, this temperature-dependent sex determination can flip flop depending on the species. It is an interesting way to determine sex that is not dependant on the X or Y chromosomes. A great tie-in to dispel the myth of the uncaring, scaled creatures is how many reptiles take care of their young. Alligators and crocodiles are again another great example of this as many female alligators (see above) build nests, guard them, and then help their babies survive for their first few months by helping to protect them from predators and sharing their kills.



Kids are most fascinated by snakes, especially if there are a few to interact with. Snakes are always carnivores and the way they attack, eat, and digest their prey is very unusual. They can attack in different ways such as constriction or by using their venom. Venomous snakes have many types of venom and the composition/effects of that venom can be discussed in older groups of students. After attacking and killing their prey, snakes unhinge their jaws, allowing them to swallow creatures much larger than their heads. Snakes do not have to eat very often because their digestion system is off until a snake makes a kill but when it does, blood rushes to the digestive tract and enlarges it, creating a perfect environment for digestion. Anacondas, the largest snake in the world, only eat perhaps once or twice a year after a large meal of a 300 pound + animal, which can take two or three months to digest.

### **Conservation:**

Reptiles and especially amphibians are frequently wild indicators of the health of an ecosystem because of their permeable skin and can acquire high amounts of toxins from smaller creatures. In addition to that, since 1980 over 120 amphibian species have become extinct, mostly in rainforests but also in North America, Europe, and Africa. With thousands

more species thought to be undiscovered, diversity is in jeopardy as well as the natural wonder of the world. Land conservation and higher environmental standards for waste and toxins are needed to help protect the more fragile creatures like frogs, salamanders, and lizards.

Another force moving against the amphibians is the chytrid fungus. This is an invasive fungus thought to have come from African Clawed Frogs that has infected the globe leading to the extinction of multiple amphibians. Research has gone far but no cure has been found for this virus so the most we can do is protect habitat, provide quarantines in threatened areas, and hope the fungus can be adapted to.

### **Websites:**

**National Geographic – Reptiles** – This website gives good overviews with wonderful pictures:  
<http://animals.nationalgeographic.com/animals/reptiles/>

**Smithsonian National Zoological Park** – Comprehensive information on reptiles and amphibians:  
<http://nationalzoo.si.edu/Animals/ReptilesAmphibians/default.cfm>

**Smithsonian National Zoological Park** – Conservation:  
<http://nationalzoo.si.edu/SCBI/SpeciesSurvival/AmphibianConservation/default.cfm>

**Animal Diversity Web – Class Reptilia** – Includes taxonomy, pictures, and evolution:  
<http://animaldiversity.ummz.umich.edu/site/accounts/information/Reptilia.html>

**New York State Department of Environmental Conservation** - Amphibians and Reptiles:  
<http://www.dec.ny.gov/animals/277.html>

**Amphibia Web** – Concentrates on diversity and conservation efforts:  
<http://amphibiaweb.org/>

### **Books:**

**Firefly Encyclopedia of and Amphibians** by Tim Halliday and Kraig Adler; Firefly Books (2002).

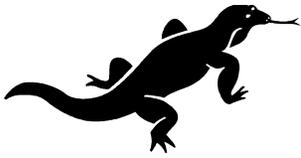
**National Audubon Society Field Guide to North American Reptiles and Amphibians**; Knopf (1999).

**The Amphibians and Reptiles of New York State: Identification, Natural History, and Conservation** by Gibbs, Briesch, Ducey, Johnson, Behler, Bothner; Oxford University Press (2007).

**Crocodiles and Alligators** by Stephen Garnett and Charles Ross; Checkmark Books (1989).

### **Movies:**

**Life in Cold Blood** by Sir David Attenborough; BBC (2008). (*A wonderful documentary on all things amphibian and reptile by one of the best biologist of our time – excellent footage and comprehensive examples.*)



## COOL REPTILE AND AMPHIBIAN FACTS



- \* There are over 9,000 reptile species in the world and over 5,000 amphibian species in the world.
- \* Only two lizards that have a mysterious “third eye” that is located on the top of their heads which is the Green Iguana (*Iguana iguana*) and the Tuatara (*Sphenodon*). The third eye is thought to be able to tell the difference between light and dark which may aide in escaping predators of above.
- \* Snakes are all predators. The smallest snake, the Thread Snake, eats the eggs and pupae of ants. The largest snake, the Anaconda, eats animals as large as deer and wild boar.
- \* Out of the many snakes in New York State, only three are considered venomous. They are the Timber Rattlesnake, the Massasauga (Pygmy Rattler), and the Copperhead. Bites are usually not deadly if treated within a few hours of the bite and are often uncommon due to specific area these species inhabit (swamps and deep forests).
- \* The Wood Frog, sometimes referred to as a Spring Peeper, have special proteins and glucose (sugar) in their blood that allows the frog to freeze during the winter.
- \* Many turtles, lizards, crocodiles and alligators lay their eggs in the sand or soil and allow the warmth from the sun to incubate the eggs. The temperature the eggs are most constantly at determine the sex of the baby; colder temperatures usually produce females and higher temperatures produce males.

