

Reptiles & Amphibians

Objectives: Students will recognize that

- Different animals have different lifecycles,
- Young animals sometimes look different than their parents
- Reptiles and amphibians both an important part of and live in a variety of habitats around Colorado
- Amphibians can be an indicator of environmental health in an area.

Overview: During this program students will learn to recognize different characteristics of reptiles and amphibians. Students will discover the similarities and differences between reptiles and amphibians at different times in their life cycles. By looking at these life cycles students will learn how these animals survive in their habitats.

Materials: (the items that should be inside the kit or taken off the shelves in the storage building)

In Kit: Pictures of local reptiles/amphibians, Frog lifecycle, Snakeskin, Snake eggs (see if reptile center in Lgmt has some)

On Shelves: Turtle shell

Before Class Prep: Read background information. Get kit from staff (or storage building). Set up at arranged area where students can sit off trail as well as get up and move around. Arrange teaching items in a way where it is easy for you to present them and reset between groups.

Background Information: (multiple pages)


Background information is for your knowledge and contains much more information than needed to share during school programs but may help answer your or participants questions.

Whether an animal is a reptile, or an amphibian can often be confusing in fact there is a branch of biology that studies these two classes of animals called herpetology. So, it is easy to see how herptiles are often miscategorized. Their similarities are that both amphibians and reptiles are vertebrates (have a backbone), ectothermic (get their heat from their external environment) and live on every continent around the world except for Antarctica. Most are omnivores or insectivores, have four legs and many use poison or toxins as a defense mechanism. Members of both categories also change their color to camouflage with their environment or use mimicry to copy colors of their venomous or poisonous counterparts.

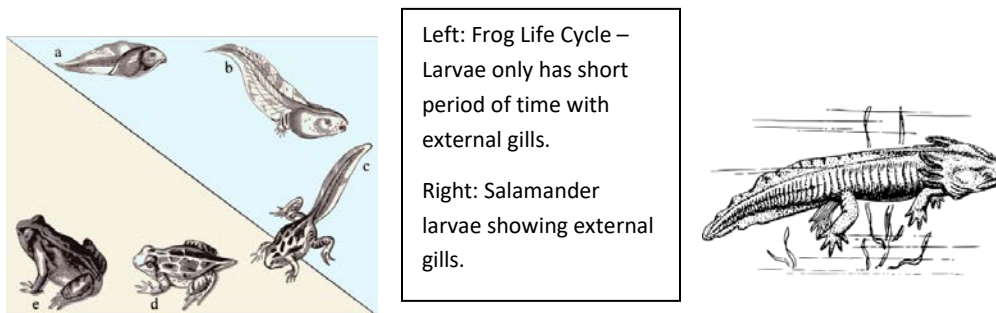
Amphibian and Reptile dormancy in winter: When the weather in Colorado turns cold and dry in winter herptiles will go into a dormancy much like hibernation called brumation. Reptiles like snakes will gather in a hibernaculum with other snakes of many species, turtles will burrow into the mud at the bottom of bodies of water or burrow into the soil. Many reptiles may emerge on warm days during brumation. Although they will emerge to drink water and bask, they will not eat during this time. Some amphibians will burrow in the mud at the bottom of a body of water during the winter, they are able to exchange oxygen and CO₂ through their skin,

while other burrow in the ground.

So how are they different?

 Amphibians: (Kingdom – Animalia, Phylum – Chordata, Class – Amphibia) There are three Orders in the Class amphibia: Anura; frogs (toads are also in the order), Caudata; salamanders and Gymnophonia; caecilians. Colorado has approximately 20 frogs and only 1 salamander (no caecilians).

Amphibian lifecycle: Most amphibians go through metamorphosis starting life in the water and ending life at least partially on land. Amphibian means both kinds of life referring to the fact that they can live in water and on land. They lay their eggs and have a larvae stage that lives in the water, they often move to land for part of their adulthood and then return to the water to breed. Amphibians lay their eggs in the water in a jelly like masses each with their own distinct characteristics. Egg masses may contain 100's-1,000's of eggs depending on species). There are no known amphibians in Colorado that care for their eggs or larva. They hatch in the water and begin life breathing through gills. Larvae can look very different as frog larvae (tadpoles, pollywogs) may temporarily have external gills but they will become encased early in development while salamander larvae have bushy external gills. Larvae development may take from a few weeks to more than a year. Larvae of frogs mainly eat organic material and salamanders eat small vertebrates. Adults eat invertebrates and some will eat small vertebrates. They will hunt by movement as well as smell and their mouth parts are adapted to grasping prey but not for chewing so prey is generally swallowed whole. As their legs develop most amphibian have four front toes and five hind toes.



Adult amphibian skin is moist, glandular and does not contain any scales, fur or feathers. The glands often secrete mucus or toxins. The mucus helps keep the skin moist, may protect against microbial infections and may also aid in evading predators due to its slipperiness. In some species the mucous is toxic to help with dissuading predators. Toxic glands have a protective function such as the large glands behind the eyes of many toad species. The alkaloid substance can taste terrible and may be noxious or toxic if ingested (handling toads does not cause warts in humans). The skin of amphibians loses water very easily when exposed to dry air so they may live close to water and find shelter in moist microclimates like underground burrows. Terrestrial species lose water at a slower rate than aquatic species. Amphibians also gain oxygen through their skin including the lining of their mouth (there are salamanders that rely solely on this method of oxygen exchange, lungless salamanders).

Amphibian senses: Most amphibians have good vision (Colorado does not have caecilians or the salamanders with poor sight) but color vision is poor or nonexistent. They hear low frequency sound through their bodies which gives them good sensitivity to vibrations. Frogs also have a tympanum that allows them to hear higher frequency sounds. Their olfaction (taste and smell) is well developed as they have a Jacobson's organ (a chemoreceptor organ) and some frogs and toads have been known to recognize the odors of their home pond

water after several months.

Amphibians populations are in decline around the world. Here in Colorado habitat loss, pesticide application, disease and climate change are all factors that impact our amphibian populations. One, the boreal toad, is on the state endangered species list and 7 others are on the state species of special concern list.



Reptiles: : (Kingdom – Animalia, Phylum – Chordata, Class –Reptilia) There are four Orders of reptiles: Testudines; turtles, Squamata; lizards and snakes, Crocodylia; crocodylians (inhabiting tropical and subtropical areas around the world), and Sphenodontia; tuataras (only found near New Zealand). Colorado has approximately 6 species of turtles, 19 Lizards and 28 snakes.

Reptile lifecycles: Reptile eggs are a shelled oval or elongated egg. The shell is leather like and somewhat flexible (not as hard as a bird egg) that are laid on land. Some lizard, water snakes and garter snakes give birth to live young (are viviparous). Most reptiles do not care for their or young or eggs (that are generally laid in the spring and born in summer). In general ages that reptiles in Colorado reach maturity – Lizards 1 to 2 years, Snakes 2-4 years, turtles take several years. The larger the reptile the longer they tend to take to mature.

Adult reptile skin is covered in scales made of keratin and does not have glands within the skin or act as a respiratory function other than in a few species. Reptiles with legs have five clawed toes on each foot. Reptiles shed their skins dead outer layer possibly several times a year and juveniles will shed more frequently as they are rapidly growing. Turtles will shed scutes /sk(y)oot/ (specialized scales that make up their shells) from once a year to gradually throughout the year depending on species. As snake sheds its skin usually in one piece by gradually crawling out of the loosened skin and rubbing against rocks and other objects.

Reptile Senses: Vision is good in most reptiles. The mostly monocular vision is best at close distances to watch for predator or prey movement and foraging. Turtles and some lizards can have good color vision, but most nocturnal reptiles tend to be color blind. Hearing is generally not well developed in most reptiles or focused on certain levels of sound (such as some snakes who are sensitive to sounds around 100-177 cycles per second). Most snakes are sensitive to ground vibrations at the same air born frequency. Some snakes also produce sounds when under duress. The bull snakes distinctive hiss (sounding like a rattle snakes rattle) is produced by air passing over a piece of cartilage in their throat. Lizards and snakes have a Jacobson's organ, sensory cells in the nasal cavity that detects pheromones and other chemical "smells". Snakes flick out their tongue to collect smells and touch it to the Jacobson's organ when the tongue is retracted. Painted turtles use their Jacobson's organ to smell under water. Some snakes have heat sensing organs. Some boa's and pythons they have heat sensing organs in their lips. Pit vipers (in Colorado that is the rattle snakes) have these organs in pits between their eyes and nostrils. Since they can sense heat they can hunt in darkness if the prey has a higher temperature then the surrounding air temperature.

Resources:

Youtube presentation The Boulder County Audubon Society page. [The Reptiles and Amphibians of Boulder County – Joe Ehrenberger](#)

Boulder County Herps presentation on the VN Website

Guiding Questions:

What adaptations do reptiles/amphibians have to help them survive in their habitats?

How do reptiles and amphibians maintain their body temperature?

Do baby amphibians look like their parents? How about baby reptiles?

Colorado Academic Standards:

Preschool: Life Science 2.1 - Recognize that living things have unique characteristics and basic needs that can be observed and studied.

Preschool: Life Science 2.1 - Recognize that living things develop in predictable patterns.

Kindergarten: Life Science 2.1 - To live and grow, animals obtain food they need from plants or other animals, and plants need water and light.

First Grade: Life Science 2.1 – All organisms have external parts that they use to perform daily functions

First Grade: Life Science 2.2 – Young organisms are very much, but not exactly, like their parents, and also resemble other organisms of the same kind.

Second Grade: Life Science 2.2 – A range of different organisms lives in different places

Third Grade: Life Science 2.1 – Organisms have unique and diverse life cycles

Fourth Grade: Life Science 2.1 - Organisms have both internal and external structures that serve various functions.

Lesson Outline

<p>Opening/Introduction (~3 min)</p>	<p>Welcome students to station and what you will be talking about today. Ask questions to gain an understanding of the group's knowledge and start point.</p> <p>Guiding questions: Are amphibians and reptiles the same? How are they different? Can the habitat around you help identify an amphibian or reptile?</p>
<p>Key Talking Points (~5 min)</p>	<ul style="list-style-type: none"> • How are these animals similar/different? • What characteristics help define amphibians/reptiles? • Describe the life cycles of amphibians/reptiles • What adaptations do amphibians/reptiles have to help them survive in their habitat
<p>Hands-on Activity (15 -20 min)</p>	<p>Choose an activity based on age group and time. Further instructions on next page.</p> <ul style="list-style-type: none"> ➤ List Amphibians and Reptiles. Utilize pictures and biological items to pass around to help students understand the differences.
<p>Conclusion (~3 min)</p>	<p>Amphibians and reptiles are similar in many ways, but their life cycles and physical characteristics can help distinguish between the two groups.</p>
<p>Assessment Questions</p>	<p>Share one characteristic of an amphibian.</p> <p>Share one characteristic of a reptile.</p> <p>What is the life cycle of an amphibian? Reptile?</p> <p>Why is it important to understand how amphibians and reptiles are different?</p>

Hands-on Activities

Activity & Materials

Instructions

Reptile & Amphibian Exploration

- Laminated Amphibian & Reptile Photos
- Turtle Shell
- Snake Skin
- Frog Life Cycle
- Snake Eggs

Ask students to give you examples of types of reptiles and then follow with a list of types of amphibian. Write these lists side by side on a white board. Once you have your list of reptiles and amphibians discuss if any are in the wrong column. Ask students how these animals are similar? Different?

Now discuss each group individually. What characteristics do they have that make them different? Use the items from the kit to allow students to carefully touch (you hold delicate items they may touch) or pass around items.

Reptile & Amphibian Relay

- 2 Sets: Laminated Amphibian & Reptile Photos
- 2 Sets: Reptile & Amphibian Cards
- Rope for start line

After discussing differences between amphibians and reptiles. Split the group into two teams (or have them all work together as one team)
Create a start line then put the words Reptile Amphibian at the finish line at an appropriate distance from the start line. Use two sets of cards if you have two teams.

Directions: Each team will receive a set of pictures. One at a time the students will take their picture, run it to the finish and place it in the correct pile matching it as either belonging to reptile or amphibian. They will then return to the start and tag (hands only) the next student in line to run their picture to the finish area while the original student goes to the end of the line to either wait or get another picture. Both teams continue like this until all pictures are placed at the finish. Have students sit down and retrieve the pictures