Reptiles and Amphibians

Objective:

1. Students will demonstrate knowledge regarding similarities and differences between reptiles and amphibians.

2. Students will be able to identify specific traits of reptiles and amphibians in tropical environments.

Grades: 6-8

Key Vocabulary:

- **Ectothermic**
- **Scutes**
- **Metamorphosis**

Related Literature:

Lizards
Susan Schafer

Amphibians Today
John Coborn

The Hidden
Doug Wechsler

Performance Objectives:

Grade 6: Strand 4 – Concept 1: PO 6
Grade 7: Strand 3 – Concept 1: PO 2
Concept 4: Concept 3: PO 2-3
Grade 8: Strand 1 – Concept 4: PO 2
Strand 4 – Concept 4: PO 1-2 and 6
NGSS: MS – LS 2, LS 3, LS 4,
SS: 6 W. 2; 7. W. 3; 8. W. 3

Background Information:

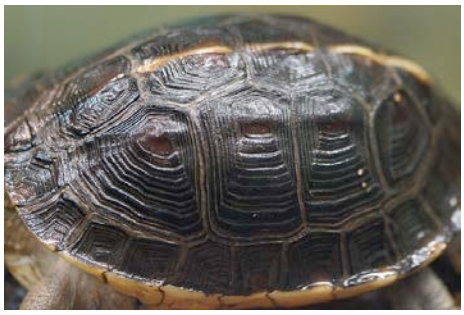
Some of the most interesting and creepy species on earth are reptiles and amphibians. Both reptiles and amphibians have roamed the earth since ancient times. Just thinks about it, these species are found on every continent except Antarctica! That is amazing, and these species also live in various climates and conditions. We might call them versatile and adaptive. Scientists believe that there are over 10,000 reptile species and over 15,000 amphibian species existing today. However, those number may change due to new discoveries and the potential loss of endangered species in the future.

Reptiles and amphibians are considered ectothermic, which means “cold-blooded,” because they do not have the ability to regulate their internal body temperature. What that means is that both reptiles and amphibians absorb heat from the sun and the temperature in their environment. Another interesting trait of both species is that they shed their skin. Amphibians often eat their discarded skin, which gives them nutrients, while reptiles leave their skin behind. Reptiles and amphibians are also vertebrates. In addition, both have excellent eyesight and can use camouflage to hide from predators. A crocodile is a great example of a reptile with super eyesight.

A crocodile has exceptional vision that allows it to see in color, at night and underwater. The positioning of the eye allows the crocodile to see all around him, which is a benefit when searching for his next meal. The thick eyelids protect the eye, and the crocodile can draw his eyeball back into the socket for additional protection. A second membrane on the eye assists the crocodile in seeing underwater.

While reptiles and amphibians share a few characteristics, they are vastly different types of creatures. There are four main groups of reptiles: turtles and tortoises; lizards and snakes; crocodiles and alligators; and the tuatara. While most reptiles spend a majority of their time on land, some are equally at home on land and in water. For example, crocodiles and alligators are found both living on land and spending time in the water.

Reptiles breathe with lungs and are either covered with scales or have a bony external plate to protect their body. Tortoises are a perfect example of a reptile with an external plate, often called a shell.



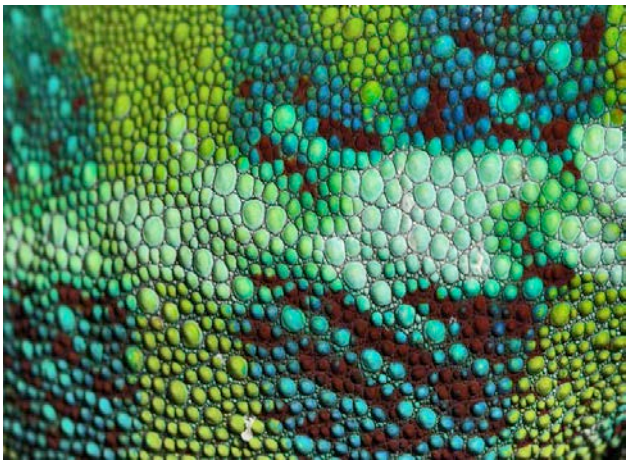
The tortoise’s top plate, or carapace, is made of bones covered with plates of keratin called scutes. The carapace provides protection from most predators and the environment.

Snakes sport massive amounts of scales that cover their body. Notice the difference between the tortoise's plate and the snake's scales.

Most reptiles lay shelled eggs that can be soft, leathery or hard. Depending on the type of reptile, eggs may be laid on land or held inside the body until hatching. A tortoise lays her eggs in a burrow she digs out of dirt. The soft shells harden quickly and the eggs remain in the burrow, covered with dirt, until they hatch. Baby tortoises dig out of the dirt and begin their life on land. In contrast, the anaconda and the boa constrictor are reptiles whose eggs hatch internally, which allows the mother snake to give birth to live baby snakes.

Reptiles can also defend themselves in various ways. Camouflage and avoidance are two effective ways to evade predators. Many reptiles can alter their color to blend in well with their surroundings. In dangerous situations, reptiles can make a hissing sound to warn predators. Biting is another defensive measure used by reptiles when predators get too close. Reptiles have managed to defend themselves well and are thought to have existed on Earth for over 320 million years.

Many reptiles live in Earth's rainforests. For example, the panther chameleon is a colorful reptile whose natural habitat is the tropical rainforest. The color may vary depending upon the plants in each individual's habitat. Colors can include red, green, blue and orange.



Chameleon skin

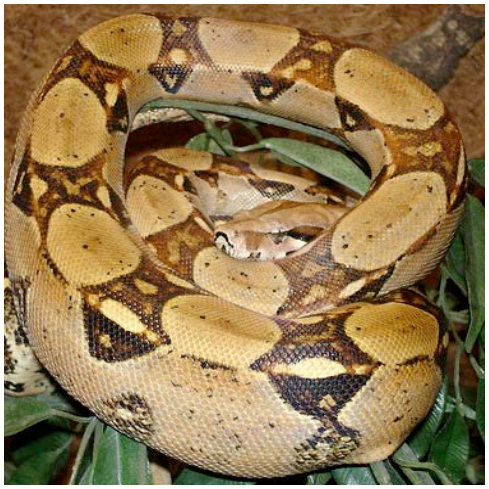
The color of the chameleon's skin helps it blend in with the habitat. Chameleons that live in trees are usually green. Camouflage is not the only reason for the chameleon's color changes. Chameleons can darken their color to absorb more heat or lighten their color to stay cool. They can also change color to communicate with other chameleons. Using bright colors can warn enemies away or attract another chameleon.

A chameleon's eyes are quite unusual. Their eyes can move in two different directions at the same time. This panoramic view allows the chameleon to see everything going on in all directions. Chameleons can rotate and focus their eyes separately, which can help them find even the smallest bug dinner at a distance.

Chameleon eye

Panther chameleon

Among the most well-known reptiles in the rainforest is the red-tailed boa. Boa snakes make their home in the branches of trees as well as in the vegetation of the forest floor. Large boa constrictor snakes can hang from tree limbs, make their way across the rainforest floor and swim in nearby streams. Boas are known as constrictors, which mean that they squeeze their prey to death before swallowing it whole. Primarily nocturnal, boas are carnivores that hunt their prey in the dark of night.



Another interesting characteristic of these snakes is their ability to disjoin their jaws to swallow large prey whole. Their meal of choice might be rats, birds, mice, rabbits or other similar animals. Boa constrictors can live many years and can grow to lengths of 10 to 13 feet and weigh as much as 60 pounds. These snakes prefer the temperature of the humid rainforest but have also been known to live long lives in captivity.

The crocodile skink and green basilisk are two interesting lizards who like to live in the tropics. While not on the list of endangered species, both types of lizards depend on their habitats to provide shelter and food for a long life.

The crocodile skink prefers to live along creeks in the topical rainforest. His triangle-shaped head has spikes that can look fierce to predators. These reptiles have a prehistoric appearance and bony protrusions from their back to their tail. Crocodile skinks grow 8 to 10 inches long. Most have an orange ring around their eye and they can make a squawking sound when alarmed. They also sometimes freeze and “play dead” when frightened. These egg laying reptiles can live 5 to 7 years and are also sometimes kept as pets.

The green basilisk lizard is another reptile with interesting features. These brightly colored lizards are in abundance in the tropical rainforests and spend most of their time in trees near water. The green basilisk shows off its amazing ability to “run on water” as it navigates the habitat of the rainforest. When alarmed, the basilisk’s long toes with unfurling threads of skin help it to skip across water for as far as 15 feet. The impressive back crest on the male basilisk is a striking adornment for this lizard, which can grow to over 2 feet in length. Green basilisk lizards are omnivores that eat plants, insects, fruits, and even small rodents if given the opportunity. Female basilisks can lay up to 20 eggs at one time. Once hatched, the baby lizards are fully capable of running, climbing and swimming on their own. While their natural predators are birds and snakes, green basilisk lizards are plentiful in the tropics and not considered endangered.

The golden thread turtle is another reptile that spends its time in and around the water. Known for living in varied environments, this turtle prefers a habitat along tropical streams or rivers. The golden thread turtle sports yellow stripes along its head and neck. The underside of the turtle shell is swirled with yellow color, enhancing its attractive appearance.

An active swimmer, the golden thread turtle has muscular limbs and fully webbed feet to help it swim and maneuver on land. These turtles can also be seen basking in the sun to keep their body temperature warm.

Once hatched from the egg, the golden thread turtle is an independent reptile. As omnivores, these turtles can eat aquatic plants, insects, and small fish. Due to a loss of habitat because of human development, and because they are considered by some to be a food source for humans, the golden thread turtle has found its way to the endangered species list.

Keeping in mind that reptiles and amphibians share a number of common traits, amphibians are in a class of their own. Amphibians are animals that live part of their lives in the water and part on land. Most amphibians have soft, moist skin that is protected by a layer of mucus. Amphibians have what is called 'water-permeable' skin and generally live near water, which keeps their skin from drying out. There are three main groups of amphibians: caecilians and salamanders; newts and mudpuppies; and frogs and toads.

Like reptiles, amphibians are vertebrates, which mean they have a backbone or spine. These cold-blooded animals cannot regulate their body temperature, so they must rely on the sun to keep warm. Many amphibians will bask in the sunlight during the morning hours and seek shade or a burrow when the temperature gets too hot.

Amphibians differ from reptiles in one major way; amphibians go through a metamorphosis. Most amphibians hatch from eggs that are laid in the water. As part of their short aquatic life, amphibians develop gills and begin their metamorphosis in the water. As it changes, the amphibian looses its tail, and external gills, and begins to grow strong legs and lungs to accommodate life on land. Due to their limited ability to process large amounts of air through the lungs, amphibians can absorb small amounts of oxygen through the skin. Depending on the species or stage of metamorphosis, amphibians can breathe through gills, lungs or through the skin. For example, a lungless salamander breathes through its skin and tissues in its mouth. On the other hand, a toad can breathe with lungs or through its skin. When hibernating, a toad breathes only through its skin.

The Asian toad is an amphibian that prefers a warm, marshy environment of ponds and rivers suitable for survival. After the rainy season, the Asian toad's tadpoles emerge from eggs and begin their metamorphosis. Soon they will journey from life in the water to spending time on land.

These toads have bony ridges on their heads and generally have yellow or brown spiny warts on their sides. Their first finger is longer than the others and toes are half webbed. Asian toads are common in their part of the world and can be found under leaf litter,

logs or rocks along the sides of ponds and rivers. Mainly nocturnal, their main food source is insects found in the shadows of the night.

The features of the horned frog are striking to most people. The horn-like protrusions above the frog's eyes draw attention while the frog's very large mouth seems out of proportion for the size of the body, which can be about 7 inches. The horned frog's color can vary from green to brown, but the throat is always black. Using camouflage to hide on the leafy ground, these carnivorous frogs eat other small frogs, snails, mice, and tadpoles that frequent their habitat. Horned frogs hunt prey by ambushing them as their prey crosses the frog's path. Found in the tropical rainforests like the Amazon, horned frogs spend most of their time on land in the heavy plant material of the forest floor. As egg laying time approaches, the horned frogs move to watery edges of ponds and rivers to deposit their eggs. Laying as many as 1,000 eggs at a time, females wrap their eggs around a water plant to protect them. Once their eggs are laid, the horned frog adults return to their regular habitat, leaving the young to begin their metamorphosis and independent life.

Some of the most beautiful colors of the rainforest are found on the skin of the bumblebee dart frog and the azureus dart frog. These amphibians have vibrant colors and distinctive patterns on their skin, which appears glossy and moist. Dart frogs prefer the moist, damp, foliage covered rainforest with plentiful vines, leaves, and flowers. Dart frogs cling on plants, especially bromeliads, but can also be found on rocks and fallen tree trunks.

The bumblebee dart frog is beautifully marked with bright yellow and black patterns. These tiny "jewels of the forest" grow from one to two inches and only weigh about 11 ounces. Bumblebee dart frogs live in small groups and protect their habitat by making a warning sound and acting fierce toward intruders. Like many amphibians, dart frogs have a sticky tongue that extends out to catch prey, which consists mainly of small insects such as flies, ants, and beetles. Another distinguishing feature of the dart frog is the toxin secreted by the skin. The toxin can vary from species to species of dart

frogs, but some can be very poisonous when touched or eaten, and can be deadly to other animals. Pretty to look at, but do not touch!

Another “jewel of the forest” is the azureus dart frog. Named for its vibrant blue color, the azureus dart frogs exist in small groups and prefer the rainforest environment. The azureus dart frog is only about one to two inches in size, but they can live for five to seven years.

These tiny creatures have four toes on each foot with a suction pad at the tip of each toe, which gives them superior gripping power. They stay close to water and enjoy hopping from leaf to leaf during the day. Azureus dart frogs are very territorial and use their color and toxin to warn off predators.

The female azureus dart frog lays between five and ten eggs, which are often guarded by the male frog. After about ten weeks, the frogs have completed their metamorphosis and are fully developed and ready to begin life on land. While not considered endangered, dart frogs rely on the existence of their rainforest habitat to survive in the wild.

The natural world embraces creatures surviving on land, in water, on trees, rocks and leaves. Just imagine how all of the reptiles and amphibians manage to live in varied environments on planet Earth!

Sources: Aquarium of the Pacific; National Geographic; Sciencing.org; Smithsonian National Zoo; Animaldiversity.org; Mannago bay. Pictures are in public domain.

Procedures and Pre-Activities:

1. State the learning objective.

2. Read related literature and discuss the general characteristics of reptiles and amphibians. Refer to classroom science text to clarify.

3. Discuss and give examples of the anatomy of reptiles and amphibians with a focus on bone structure, lungs, heart, brain and sensory organs.

4. Ask open-ended questions to check for understanding related to the similarities and differences of reptiles and amphibians.

5. Present the background information, review related vocabulary and involve students in discussions.

6. Discuss the fieldtrip to the reptile and amphibian exhibit.

Activity: Discuss the IUCN Red List and its purpose. Ask students to use the computer to research a reptile and an amphibian that is on the endangered list. Students gather their research and write a summary of including a description of the reptile and amphibian, their placement on the endangered list, their habitat, and the possible causes of placement on the endangered list.
This activity can be presented to the class. After each presentation, the students can discuss how humans might intervene to help the animals survive.

Activity: Students use the charts to identify similarities and differences between reptiles and amphibians. They draw conclusions following the activity.

Take Along Activity: The species identification card is designed so that each student can take a card and complete it at the exhibit. Students are able to select a reptile or amphibian that they like and record the information on the card. Once back in the classroom, students can share their species identification cards

and discuss characteristics. This activity can be a classroom guessing game by reading the characteristics and student try to guess what species is on the card.

Activity: Students use technology to investigate a reptile or amphibian of their choice and write an expository essay about their selection. Essays must include the specific characteristics of their selection, habitat, region of the world, temperature, food source, etc., and if the species is endangered. Students may also include how their species interacts with humans and how humans may play a role in the species survival.

Reflection and Assessment: Students are assessed on various levels depending on the activity. Participation, grade standards, and percentages may be applied to each activity. Activities are designed for flexibility and use pre and post fieldtrips.

Reptiles and Amphibians

Which one are you?

Directions: On the charts below, list the traits of reptiles and amphibians to make a comparison.

Reptile

Describe

Give example

Breathing

Metamorphosis

Defense

Limbs

Skin

Eggs

Food

Amphibian

Describe

Give example

Breathing

Metamorphosis

Defense

Limbs

Skin

Eggs

Food

What is your conclusion about the similarities and differences of reptiles and amphibians?

Species Identification Card

Common Name: _____

Scientific Name: _____

Natural Habitat: _____

Facts about the species: _____

_____

_____

Notes:_____

Species Identification Card (Example)

Common Name: Blue Morpho Butterfly

Scientific Name: Morpho peleides

Natural Habitat: South America – rainforest areas

Facts about the species: The blue color on the wings is an example of iridescence, which means that the wing scales reflect light at a wavelength that appears blue.

Notes: These butterflies do not live in Arizona because they require a very humid climate.

WRITING AN EXPOSITORY ESSAY

Name: _____Date: _____

Paragraph #1 – Introduction

Topic Sentence:

_____

_____

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Major Idea #1:

_____

Major Idea #2:

_____

Major Idea #3:

_____

Closing Sentence:

_____

_____

_____

Paragraph #2 – Major Idea #1 is discussed completely and with evidence

Topic Sentence:

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_____

Major Idea #1:

_____

Major Idea #2:

_____

Major Idea #3:

_____

Closing Sentence:

_____

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Paragraph #3 – Major Idea #2 is discussed completely and with evidence

Topic Sentence:

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Major Idea #1:

_____

Major Idea #2:

_____

Major Idea #3:

_____

Closing Sentence:

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