Scales, Scutes & Skins

Program Purpose:
This program teaches the adaptations of reptiles and amphibians while dispelling common myths and possible fears about them through hands-on experiences with live animals.

Program Length: 1-1½ hours

Ages: all ages

Maximum Number of Participants: 35

Objectives:
After completion of this activity students should be able to:
- Explain the difference between reptiles and amphibians
- Identify at least 3 adaptations of reptiles and 3 adaptations of amphibians
- Demonstrate proper herp handling techniques

Preparation:
Before the class arrives:
- Materials provided in program bin can be placed on display at front table and used as props to add discussion. Set up before your lesson.
- Put animals you will be using for the program into easily accessible containers (pillow case, jewel case)

***Note: Do not leave animals unattended.** Either keep them locked in animal room or stay with them.

Basic Outline:
I. Introduction (5 min)
II. "First look" at the herps (15 min.)
III. Adaptations Card Game (15 min)
IV. Bring out other reptiles and amphibians (50 min).
V. Threats to our amphibians and reptiles (5 min)
VI. Conclusion (10 min)
VII. Tour animal room (optional for older youth)

Materials:
1 Dry erase board and marker
1 Spray bottle of water- in animal room
Photos of reptiles and amphibians
2 Hula hoops
1 Set of Adaptation Cards for Game
1 Rubber coral snake
1 Rubber snake in pillowcase
1 Snake skin (yellow)
1 Bag of Snake sheds
Drawings:
- Snake eating mouse
- Snake movement
- Snake organs
- Snake tongue and Jacobson's organ

2 turtle shells
1 Wooden snake jaw
1 Sponge
1 Slinky
1 Flipper
Frog metamorphosis toy (4 stages)

I. Introduction:
Introduce yourself if the group does not know you. Ask students to "turn and talk" to a neighbor and share a personal story about an experience they have had with a snake, frog, or turtle. Ask for one or two people to share what their neighbor shared with them (encourages active listening). Explain that today they are going to be learning about reptiles and amphibians because they are often misunderstood animals but are very important to our ecosystem.

Begin by asking the students to raise their hands if they can name a reptile or amphibian. Make a list of all the types of reptiles on the board, as well as a list of all the types of amphibians.
- **Reptiles**: Snakes, lizards, turtles, crocodiles and the tuatara (lizard-like reptile endemic to New Zealand).
- **Amphibians**: Frogs and toads (grouped together by scientists), and salamanders. Newts and mud puppies fall into the category of salamanders.

II, "First Look" at the animals

Before bringing out any animals:
Next, explain to the students that they will have an opportunity to meet some live reptiles and amphibians. Have the students sit either in a circle or rows with space for you to walk between (whichever you are most comfortable with). Make sure to tell the students that they need to follow directions during this part so that they do not scare any of the animals. You do not want to put yourself, the students, or any of the animals in danger.
As you bring out each animal, explain to the students the proper way of handling it:
- Students should wash their hands or use hand sanitizer between groups of animals (turtles, snakes, frogs) in order to prevent the spreading of disease. This will also prevent the animals from thinking the student smells like food since many of our animals would eat each other in the wild.
- Before allowing the students to touch the amphibians, spray their hands with water. Explain

that amphibians have very delicate skin. It is not covered with scales, fur, or feathers like most other animals. Many amphibians can breathe through their skin and the oils on our hands will clog their pores. Wetting our hands before we touch them will help prevent this from happening. You may also choose to leave the amphibians in a jewel case to pass around instead. Remind the students to hold the case by the bottom (not the lid) and to keep it level and steady. Remember to wet the moss in the jewel case or simply put water in the case before bringing the amphibians out.

- Snakes should only be pet in the direction the scales are lying, from head to toe, never against the scales.
- Students should not pet the snakes on or near the head, and they should not stare the snake in the eyes (human noses make good targets).
- When handling the turtles, students should not touch near the head.
- **DO NOT** let the students hold or touch the snapping turtle.
- Remind the students this is a "challenge by choice" activity. If students feel uneasy about handling the animals, reassure them and allow them to watch their classmates, but don't force them to handle the animals.

"First Look"
Choose one example reptile and one example amphibian to bring out to the group. Beyond identifying the species and if it is an amphibian or reptile hold back on providing additional information.

- Guide students through a series of observations about each animal. "What do you notice" "Tell me more about the different parts of it's body?" "Why might _____ be useful to this animal?" "Does this remind you of anything?"
- After observations have been made about each example animal introduce the Adaptation card game and ask students to think about the animals they just observed while playing the game

Adaptations Card Game (Venn diagram Game):
Explain that amphibians and reptiles have broad similarities including birth, growth, reproduction and death, but have unique features within their respective lifecycles (3-LS1-1). This next game will help us recognize these features. To prepare, set two hula hoops on the ground to create a Venn diagram. Ask what a Venn diagram helps us compare (similarities and differences). Explain that one of the outer circles will represent adaptations of a reptile and the other of an amphibian. "Turn and Talk": Ask students to share with a neighbor what they think of when they hear the word "adaptation". Explain that an **Adaptation** is something an animal has or does to help it survive in its environment. Another way to describe an adaptation is an internal or external structure that functions to support survival, growth, behavior, or reproduction (4-LS1-1). In this activity the middle of the Venn diagram will represent adaptations the two share. Explain to the students that as a group we will be creating a Venn diagram display to understand these adaptations and whether each is specific to reptiles, amphibians, or both (SL.4.5, SL.5.5, SL.8.5).

Next, hand out the adaptation game laminated cards. Each card has an adaptation of either reptiles, amphibians or both. You can hand out one per student in a small class or have students share cards in a large class. For younger students, instead consider going through each card as a group. Give students a few minutes to think about the adaptation they were given and decide which category it fits in. Explain that this is not a test but rather a chance to learn something new; it is ok to take an educated guess. Have each student or group of students present their card to the rest of the class and place it in the category they think it belongs (SL.4.5, SL.5.5, SL.8.5). If they are struggling to come up with a decision, encourage them to think of an example reptile and amphibian, such as a snake and a frog, to see which animal the adaptation seems to fit best. Be sure to describe that each fact is an adaptation and discuss what function it has (4-LS1-1).

Reptiles:

- Have claws (exception: snakes)
- Young look like adults
- Scales & scutes
- Lay eggs on land

Amphibians:

- No claws (exception: African clawed frog)
- Moist skin
- Lay shell-less eggs in water
- Young have an aquatic stage

Both

- Shed skin
- Cold blooded
- Have backbone

Background Information
The term herp is a broad term for all reptiles and amphibians. Herpetology, the study of reptiles and amphibians, comes from the Greek word "herpeton" which translates to "creeping animal or thing." Next, explain that amphibian means "double life," referring to the fact that most amphibians go through metamorphosis before becoming adults, while reptiles are a group of animals evolved from amphibians. Also explain why the lesson is called "scales, scutes, and skins." A **scale** is a plate-like unit on the skin of reptiles that helps protect them. A **scute** is any plate on a reptile including the belly plates on a snake and the plates that form a turtle's

shell. The reason **skin** is in the title of this class is because of the special adaptations of amphibian skin we will be discussing later in the class.

IV. Bring out other animals

While the students are handling the animals, discuss the range, habitat, gender, diet, specific adaptations, and other interesting facts that each of the herps have (found in Appendix B). Use props from Appendix A to facilitate the discussion. Include a discussion about the different effects that a wild versus captive environment will have on each animal. A secure, captive environment protects against predation and provides a secure source of food. However captive animals may not be able to grow as large as animals in a natural environment because of enclosure constraints (MS-LS1-5). This is also a good time to answer any questions the students have. As you bring animals out, students will often recount past experiences they have had with reptiles and amphibians. Encourage descriptive, relevant stories in which you can bridge connections to the adaptations you have discussed (SL.3.4). Be sure to only bring one animal out at a time and to put all animals away before beginning a discussion of herp importance and threats.

Optional: Digital Inclusion:
Pass the thermal imagers out to the group. Have one recorder who writes observations on the board. The recorder may also switch out. Have students look at the animals through the thermal imager and camera. Ask them to state one observation as they look at the animals. Include the temperature measurements in your observations on the board. During that time, ask questions to help start group discussions as well as answering any questions from students. (Optional: Have students give a brief presentation about what they observed, and a few unique adaptations it has and how they used the tools to further observe the animal. Each group of students can present on a different animal at the end of the live portion of the lesson.) Use the observations written on the board and the digital artifacts gathered in class to create your scientific story.

- Thermal Imager: The thermal imager can be used to help explain the difference between warm-blooded and cold-blooded animals. Students can measure their own skin temperature and compare it to that of the animals. Also, students can take the temperature of the animals immediately after they are taken out of the enclosures and compared to the temperature of the animal right before it goes back in to see how their temperature changes. This can help the students understand that these cold-blooded animals need a source of external heat, unlike mammals similar to us. For some students it might be fascinating to write down how fast the animals cool down and compare different species. Examples of questions to ask:
    - What do you notice about the animals' temperature compare to yours?
    - How much did the animal's temperature change while it has been out of its enclosure?
    - How does the animal's temperature compare to the other animals we looked at? What might this say about its enclosure or its natural habitat?
    - Why might a cold-blooded adaptation be helpful for these animals in the wild?
- Digital Camera: The digital camera can be used throughout the live animal portion of the lesson to simply document the students' observations and experiences with the animals. They can zoom in the animals' skin, scales, or scutes. It is important to make sure the flash is off on the camera to not disturb the animals.

V. Threats to our Amphibians and Reptiles
Reptiles and amphibians are very important to our ecosystem but many people think of them as pests or as a nuisance. Before going through the benefits of herps, take some time to describe or draw out a food web of Wisconsin. Discuss how certain reptiles and amphibians are at higher trophic levels than others. Explain the idea of predators and prey. Describe the movement and cycling of matter and energy among plants, animals, decomposers, the environment, and non-living components (5-LS2-1, MS-LS2-3). This will help the students understand the bigger picture that herps are a part of. Ask the students if they can pinpoint specific ways herps are important. Examples may include:

- Play important roles as predators and prey
- Keep insect and rodent populations in control
- Act as indicator species of local environmental conditions
- Provide aesthetic appeal

Examples of questions to ask the students:

- What do you think are the biggest threats to Wisconsin's amphibian and reptiles? Some threats include habitat loss, road and automobile use and production, energy and fuel extraction from natural resources (4-ESS3-1), an increase of predators, the spread of invasive species, climate change, and pollution from a variety of sources (mercury, acid rain, salt, nutrient loads, and fossil fuel spillage).
- Can you hypothesize what the effects will be on populations of plants and animals (MS-LS2-4)? (Impact quality of livelihood, survival, reproduction, etc.)
- What do you think some of the causes of these threats are? Unfortunately, many of these threats are caused by environmental changes

brought on by humans. As of 2014 in Wisconsin, several species are in danger:

Reptiles

- Two of the 11 species of turtle are listed as threatened or endangered (Ornate Box Turtle-threatened; Wood Turtle-endangered). An additional three are listed as of special concern.
- Four of the 21 species of snake are listed as endangered (Queen Snake, Massasauga Rattlesnake, Western Ribbonsnake, and Northern Ribbonsnake). An additional ten are listed as of special concern.
- One of the four species of lizard is listed as endangered (Slender Glass Lizard). The other three are listed as of special concern.

Amphibians

- One of the 12 species of frog is listed as endangered (Blanchard's Cricket Frog). An additional four are listed as of special concern.
- Two of the seven species of salamander are listed as of special concern.

Until 1975 there was a bounty (a fee paid to people who kill "pest" species) in Wisconsin on rattlesnakes, paying up to five dollars a tail. In 1975 the bounty was lifted and the massasauga was placed on the Wisconsin endangered and threatened species list.

Explain that there are ways that the students and their families can help protect Wisconsin's amphibians and reptiles. It is possible to create and apply solutions to counteract the impacts on animals brought on by human caused changes. Ways to help reptiles and amphibians:

- Leave fallen trees and woody debris along the edges of prairies and in prairie open areas. As leaves and trees decompose, they provide lizards with valuable nesting and feeding areas.
- Leave fallen trees in place along shorelines so turtles have places to bask in the sun.
- Be on the lookout for reptiles crossing roadways.
- Leave wild animals in the wild! Don't try to bring a turtle or lizard home as a pet.
- Don't let your dog or cat run free where they can kill wildlife. Keep them on a leash.
- Help scientists monitor these animals by helping with inventories (e.g. citizen science)
- Report injured and deformed animals that you find to the DNR or a licensed wildlife rehabilitator.
- Prevent soil erosion by seeding for grass or planting shrubs, especially with native species!
- Avoid dumping chemicals and medicine down drains.
- Be cautious of buying and using soaps with micro-beads; some are not biodegradable and end up in our lakes and waterways.

Ask the students which methods they think would have the biggest impact and why (3-LS4-4)?

Conclusion:

Answer any last questions that the students have and ask some review questions. Encourage the students to draw on information from the class. (RI.5.7, WHST.6-8.9)
Concluding questions:

- What are some differences between reptiles and amphibians?
- What are some specific adaptations reptiles and amphibians have?
- Why are reptiles and amphibians important?
- Name some species that are of special concern in Wisconsin.
- What are some ways to help these animals?
- What are a few observations that you made about the animals while using the tools?

Consider presenting some broader discussion based questions as well:

- What behaviors do reptiles and amphibians exhibit that affect their probability of successful reproduction?
    - Consider the behavioral adaptations discussed throughout the program and how these adaptations might help or hinder reproduction. An example could be a turtle laying her eggs in an inconspicuous location to protect the young. Recall that painted turtles bury their eggs in sandy soils to hide the eggs from predators. (MS-LS1-4).
- How are the traits of reptiles and amphibians influenced by their environment? Discuss both local and exotic environments. Can the students think of examples?
    - Example: Recall that in the wild, both painted and box turtles exhibit temperature dependent gender determination. The gender of the offspring is determined by the temperature of the environment they were incubated in.
    - Example: The growth and development of a captive animals can be impacted by the size of its enclosure. Both native and nonnative species may not reach maximize growth in a captive enclosure. (3-LS3-2).
- If a painted turtle and a leopard gecko traded environments but kept their same traits, would they survive? Recall that painted turtles have adaptations for an aquatic environment and leopard geckos have adaptations for an arid environment. Discuss how in particular habitats some organisms survive well, some survive less well, and some cannot survive at all (how would a fish do out of water?!) (3-LS4-3).

Tour Animal Room (Optional):

If time permits, ask another adult to supervise the other students while you tour the animal room with about three youth at a time. Make sure students do not touch things

in the animal room. While students are touring the animal room the others can inspect the "A Herp Never Forgets" items again or begin washing their hands.

Make sure all of the materials from "A Herp Never Forgets" are returned if they were passed around. Give the students time to wash their hands.

Technology Connection

- Thermal Imager and Infrared Thermometer: Both of these tools can be used to look more closely at the temperature of both the enclosures and the animals while they are in the enclosures. Have the students compare the temperature of the animals while they were in the classroom and the temperature of the animals while in the enclosures. It is extremely important to mention to the students that the laser from the infrared thermometer could harm the animals eyes if pointed anywhere near their heads; therefore, with a younger group of students the thermal imager may be the only tool to use in the animal room tour. Questions to ask the students:
    - How do the different enclosures differ in terms of temperature? What might that tell you about that animal's native habitat and climate?
    - Are some spots in the enclosure warmer than others? Why might it be important to have warmer and cooler places within the enclosure?

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Appendix A
Props

Drawing of snake eating mouse – shows how a snake can unhinge its jaw and open to 180 degrees to fit whole prey animals into its mouth. Each side of the lower and upper jaw can move independently to work the food down into the throat.

Flipper – shows the webbed feet of some reptiles and amphibians which are useful in an aquatic habitat.

Frog Metamorphosis Toys (4 stages) – an example of all amphibians starting their lives in the water. The obvious part of metamorphosis is the formation of four legs in order to support the body on land. But there are several other changes as well:

- The gills are replaced by other respiratory organs
- The skin changes and develops glands to avoid dehydration
- The eyes get eyelids and adapt to vision outside the water
- An eardrum is developed
- In frogs and toads, the tail disappears

Goggles – some reptiles and amphibians have a third transparent eyelid called a nictitating membrane. This eyelid both moistens and protects the eye, and in some amphibians it works as a pair of goggles so they can see underwater while swimming.

Photo of snake on tree – shows the ability of snakes to use their scutes to climb up trees. The scutes act like tire treads, gripping the ground and giving the snake the traction necessary to push itself forward and protect the snake as it moves along rough surfaces.

Rubber venomous snake – provides for a discussion of how to tell if a snake is venomous or not. One way to tell is by the shape of the pupils. Vertical pupils (slit-like) indicate a venomous snake while round ones do not. Coloration can also be an indicator for some species. For example, the red by yellow is a common way to recognize the venomous coral snake, while red by black appears on the harmless milk snake, even though both can contain red, yellow, and black. A rhyme to help remember this is:

Red touches black, friend of Jack
Red touches yellow, a dangerous fellow

It is important to note that not all venomous snakes have these colors.

Ask the students how many venomous snakes are found in Wisconsin. There are only two: the timber and massauga rattlesnake. Rattlesnake related deaths are very uncommon in Wisconsin.

Rubber snake in a pillowcase – this shows the proper way of transporting a snake so that it cannot escape and it feels safe. Make sure the top of the pillowcase is twisted before the knot is tied so the snake cannot crawl up into the knot and escape..

Slinky – used to represent the motion of snakes. Use the drawings of snake movements to show how snakes move in several different ways. They can push off nearby rocks and sticks to propel themselves (serpentine), they can coil and spring (concertina), they can move sideways (sidewinding), or they can crawl like a caterpillar. (rectilinear). This is a good time to have younger students move like a snake. Have them lie on their stomachs while holding their legs behind them with their hands on their ankles. Now have them move to a certain point in the room. This is good for some laughs, plus it will help students realize how useful scutes are.

Snake skin – the snake skin will show the color that the snake was (it contains pigment) while a shed will not. The only way to get the skin is to take it off of the (dead) snake.

Snake shed – use this to compare to the snake skin. Use the shed to demonstrate how a snake crawls out of its skin when it grows. The snake shed is inside-out when the snake is done crawling out. The snake will begin shedding by snagging the skin around their head on a rough object (log, rock, etc…) and then begin crawling out of its skin. All amphibians and reptiles shed their skin, but some will even eat the skin after it is shed (see the photo of the shedding leopard gecko)! The discovery of a shed is another way to determine if reptiles are living in the area that you are exploring.

Drawing of snake tongue/Jacobson's organ – used to demonstrate that snakes smell using their tongues. When a snake flicks its tongue out, it brings a scent back into its mouth and inserts the tips of its forked tongue into the two little holes in the roof of its mouth called the Jacobson's organ. This information brought in by the snake's senses is processed in the brain and the snake can respond appropriately. Be sure to point this out when handling the milk or corn snake (4-LS1-2).

Sponge – this is used to represent an amphibian's skin. Amphibians have unusual skin because unlike fish, reptiles, birds, and mammals, amphibian skin has no covering of scales, feathers, or hair. Amphibian skin contains numerous glands, the two major kinds being mucous and poison glands. The mucous glands help to keep the skin moist, even slippery to help escape from predators. One way that amphibians regain moisture in

their body is by sitting in water or sitting in damp soil, absorbing water through their skin like a sponge! The poison glands will secrete toxin during stressful situations.

Sunglasses with lenses covered – these are to show that snakes are blind while they are shedding. Snakes have no eyelids, so when the skin on their heads is ready for shedding, the skin over their eyes also begins to separate, thus they cannot see through this layer of skin.

Turtle shells – show the various turtle shells. The shells (the carapace-top and plastron-bottom) are actually made of many fused bones. The scutes, which are made of keratin, do not precisely overlap these bones. Instead they are staggered which helps give the shell more rigidity and helps protect the turtle. Most turtles cannot close their shells all the way, but box turtles have a hinge that allows them to close their shell further than other turtles (a good defense since they live on land and cannot swim away from their predators).

Wooden snake jaw – shows the backward angle of teeth that holds prey in the snake's mouth. These curved teeth force prey into the mouth and prevent escape. The angle of the teeth acts to resist slippage as swallowing proceeds.

Demonstrate the retractable fangs in poisonous snakes. The fangs are hinged and are folded back when not in use. They can be rotated together or independently during a strike. This action is lightning fast and can be described as more of a stab than a bite.

Appendix B

Specific Animal Facts

Corn Snake: *Popcorn*

Range and Habitat: Corn snakes are found throughout the southeastern United States and are not native to Wisconsin. Corn snakes may be found in wooded groves, rocky hillsides, meadowlands, woodlots, barns, and abandoned buildings. They are very secretive and spend most of their time underground prowling through rodent burrows. They often hide under loose bark and beneath logs, rocks, and other debris during the day.

Food: In the wild, corn snakes do not need to eat on a daily basis. Young hatchlings normally feed on lizards and tree frogs, while adults feed on larger mammalian prey, such as rats, mice, birds, and bats. In captivity, Upham Woods staff feed Popcorn fuzzies (small mice).

Gender: The most foolproof way is to "probe" the snake in the vent area to figure out if it is a female or a male in which a hemipenes will be found. Only a professional should attempt this!

Another way is to examine the "tail" area - from the vent back to the most posterior part of the snake, you may see larger bulges in the male due to the hemipenes just behind the vent. The male's tail will also generally be slightly longer and broader at the vent because of these organs. Lastly, the males may be thinner overall than the typically more bulky females.

Other Facts:

- Corn snakes are known to live up to 23 years in captivity.
- Corn snakes are primarily nocturnal but are also active in the early evening.
- They are not naturally found this far north.
- They are extremely popular pet snakes and are the most commonly bred snake for the pet trade.
- The name corn snake is believed to have originated from the similarity of the markings on the belly to the checkered pattern of kernels of maize or Indian corn.
- They are also sometimes called the red rat snake.

Honduran Milk Snake: *Leche*

Range and Habitat: The Honduran milk snake is found in Honduras, Nicaragua, and even parts of northeast Costa Rica. They reside in low to mid-elevation leaf litter in rainforests.

Food: Milk snakes feed on a variety of small mammals such as mice, rats, voles, birds, lizards, and even other snakes. In captivity, Upham Woods staff primarily feed Leche full size mice.

Gender: The most foolproof way it to "probe" the snake in the vent area to figure out if it is a female or a male in which a hemipenes will be found. Only a professional should attempt this!

Other Facts:

- Honduran milk snakes are a subspecies of a broader grouping of all milk snakes.
- They tend to be nocturnal in the summer, diurnal in the spring and fall, and hibernate in the winter.
- They can live up to 15 years in the wild and occasionally over 20 years in captivity.
- They are known for their markings which mimic a venomous coral snake (though milk snakes are non-venomous).
- In the wild, females gather communally to lay their eggs in early summer.
- Their name originates from the false belief they drank milk directly from cow udders because they are often found in barns and stables. In actuality,

they are often hunting rodents which live in barns and stables.

Painted Turtle: *Big Mama, Little Mama, and Junior*

Range and Habitat: The painted turtle is one of the most common turtles in Wisconsin and North America. They are found as far south as northern Mexico and as far north as southern Canada. They are found in shallow and quiet habitats, such as marshes, ponds, shallow bays in lakes and even in the backwaters of some rivers.

Food: Like all turtles, painted turtles are toothless. They have sharp, horny beaks, similar to a bird beak, which allows them to grip food. Painted turtles feed on plants, fish, insects, crustaceans, and even carrion. Younger turtles tend to be carnivorous while adults incorporate more vegetation into their diet. In captivity, Upham Woods staff feed them minnows, crickets, fruits, vegetables, worms, and other insects as available.

Gender: On male turtles, the vent is located beyond the rear edge of the carapace with the tail extended. Males also have long claws on the forefeet. The female turtles' vent is inside or at the rear edge of the carapace and the claws on her forefeet are comparatively short.

Other Facts:

- The painted turtle is the most common turtle in Wisconsin.
- Painted turtles spend a lot of time basking in the sun on logs, as well as on mats of floating plants. This helps the turtles keep warm, speed up egg development, maintain their shell, and digest food.
- Female turtles lay and bury four to 15 soft-shelled eggs in sandy soils once a year. The young dig themselves out after hatching and are immediately independent.
- The sex of the hatchling turtle depends on the temperature that the egg was incubated at. Males need incubation of 25-27 degrees C and females need incubation of 30-32 degrees C. Climate change may have a big impact on painted turtle sex determination.
- These turtles can live 35 to 40 years, but most will not live this long in the wild.

Further Discussion: The variation in the three painted turtles provides an excellent opportunity for a discussion of genetics and competition. Discuss how the three turtles are the same species, but have inherited different traits from their respective parents, providing each turtle with slightly different characteristics and features (size, coloration, behavior, etc.) (3-LS3-1). These variations may provide advantages to one turtle as compared to another. They may be able to more successfully survive, find a mate, or reproduce (for example- a stronger turtle may out-compete a smaller one for resources) (3-LS4-2). Even amongst Upham's three painted turtles, competition can become aggressive enough that they occasionally need to be separated!

Common Snapping Turtle: *Egor*

Range and Habitat: "Snappers" can be found in most aquatic habitats throughout Wisconsin. They are common in the eastern and central United States, but do not range out west. They extend north into Canada and far south into the coastal states. They prefer ponds, lakes and the backwaters of rivers.

Food: Snapping turtles eat mostly aquatic animals and plants. However, they are not picky and will eat just about anything they can find. This includes carrion, fish, invertebrates, small mammals, birds, amphibians, and a large variety of vegetation. In captivity, Upham Woods staff feed Egor shiners, worms, fruits, and vegetables.

Gender: Male turtles' anal opening is farther from the base of the tail than the females'. The female anal opening is under the rear edge of the carapace. Males grow larger than females and tend to be more aggressive.

Other Facts:

- The common snapping turtle is Wisconsin's heaviest and largest of all the 11 turtle species.
- Snapping turtles lay 30-80 eggs at a time.
- Raccoons, foxes, skunks, and other animals eat many of their eggs resulting in a 60% to 100% loss of eggs before hatching. The hatchlings are also at high risk of predation.
- The plastron (bottom of shell) of snapping turtles is considerably smaller than the carapace (top of shell), leaving a lot of the underside exposed.
- Snappers live an average of 30 years in the wild, but considerably longer in the captivity.
- They may seem calm while in the water, but they can quickly turn vicious while out of the water- be cautious!
- They are able to communicate with mates via leg movements.

Three-Toed Box Turtles: *Larry and Midge*

Range and Habitat: Three-toed box turtles are found in south-central United States and are native to North America, but not to Wisconsin. They inhabit woodlands, marshy meadows, and pastures, often in close proximity to streams and ponds.

Food: Three toed box turtles are omnivorous, though more carnivorous when young and mainly herbivorous with age. They are known to eat insects, berries, fungus,

worms, roots, fish, frogs, salamanders, eggs, and occasionally carrion. In captivity, Upham Woods staff feed them fruits, vegetables, crickets, mealworms, waxworms, and even canned pet food.

Gender: Males are a little larger on average, their rear claws are short, thick, and curved, their tails are longer and thicker, and the posterior lobe of their plastron is concave. Females are slightly smaller, they have straighter and thinner rear claws, their tails are smaller, and the posterior lobe of their plastron is flat or slightly convex.

Other facts:

- Like some other turtles, box turtles exhibit temperature dependent gender determination. 22 to 27 degrees C produce males and above 28 degrees C produce females.
- Box turtles have a hinged plastron at the ventral part of the shell. This allows the turtles to almost completely close off their shells and provides protection to the turtle.
- They are a long lived species known to live over 100 years in the wild.
- They hibernate in mud, stream bottoms, stump holes, or mammal burrows and may return to the same site every year.

Gray Tree Frog: *Marv*

Range and Habitat: The gray tree frogs' range forms a square from Manitoba to Maine, Florida to Texas, including their native range in Wisconsin. They prefer wooded areas near water sources such as swamps, ponds, lakes, old fields, suburban neighborhoods, and forests.

Food: Adults prey on a variety of insects and larvae, as well as mites, spiders, lice, and snails. They mainly hunt in the understory of woody areas. Tadpoles feed on algae and other detritus in ponds. In captivity, Upham Woods staff feed them wax worms, mealworms, red worms, crickets, fruit flies, and other invertebrates as available.

Gender: Females and males are very similar in appearance. Males will call in the spring on warm nights from April/May until June/July. Females will select males to mate with that have the longest and most frequent calls.

Other Facts:

- The gray tree frog hibernates on land under available woody debris such as leaf litter and logs.
- Gray tree frogs have high tolerance for freezing because they have a substance called glycerol in their blood.
- About 80% of their body freezes during hibernation and their breathing and heartbeat are temporarily stopped.
- There is no sexual dimorphism (distinct size or appearance differences between males and females of the same species) in gray tree frogs.
- Gray tree frogs are known to live up to 7 years in captivity.
- Gray tree frogs have a variety of predators, including larger frogs which stalk their calls.

Eastern Tiger Salamander: *Squishy*

Range and Habitat: Tiger salamanders have the most wide-spread range of any other North American salamander. Their range goes from southeastern Alaska through Canada to the southern part of Labrador, and south throughout the United States down to the southern edge of the Mexican Plateau. All adult tiger salamanders will live a terrestrial life and depending on what range they inhabit they can be found in forests, grasslands, or marshy areas. These animals also need to have enough moisture and humidity, therefore they require soil to burrow underground and close, permanent access to fresh water for breeding.

Food: Tiger salamanders eat worms, snails, insects, slugs, frogs, other salamander species and almost anything else they can catch and swallow. Salamander larvae will feed on small crustaceans and insect larvae. After they grow, they will eat tadpoles, smaller salamander larvae and even small fish. In captivity, they are fed meal worms, red worms, crickets, and other invertebrates when available.

Gender: Male and female tiger salamanders are very similar in appearance. Males are usually longer with a more compressed tail and thicker and longer hind legs than the females.

Other Facts:

- This amphibian can be a number of different colors or patterns depending on where it lives within its range. The most common coloring is black with yellow stripes, spots, or blotches on its head, body and tail.
- The name 'tiger salamander' comes from the yellow or orange stripes along the animal's body resembling tiger stripes as well as its ferocious appetite.
- The tiger salamander is a type of "mole salamander" because it spends most of its time underground in burrows that it digs. There have

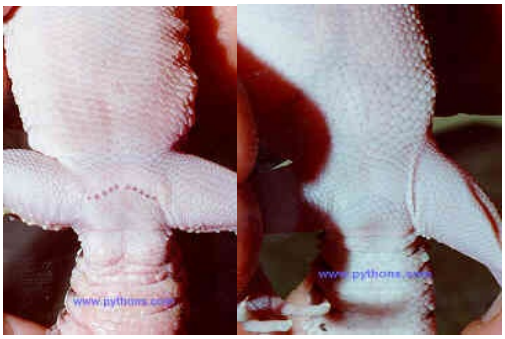
been tiger salamanders found over 60 cm below the surface!
- Tiger salamanders are the largest salamander in North America and can grow to 35 cm long!
- These amphibians are squirmy, quick and have the tendency to bite when disturbed or threatened.
- Tiger salamanders in the wild can live up to 16 years. Captive salamanders can live up to 25 years.
- These salamanders have an overall positive effect on its surrounding ecosystem because they are food for other animals like badgers, snakes, bobcats, and owls. They also help control insect pests.

Leopard Gecko: *Aldo*

Range and Habitat: Leopard geckos are native to dry areas such as India, Pakistan, Afghanistan, Iraq, and Iran. They are not naturally found in Wisconsin. They prefer dry and semi-dry desert habitats and arid grasslands.

Food: Leopard Geckos are mainly carnivorous. They eat spiders, scorpions, centipedes, and beetles. In captivity, Upham Woods staff feed Aldo crickets, mealworms, wax worms, and other insects as available.

Gender: Males and females are similar in appearance. Males generally are stouter with a slightly broader head and thicker neck compared to females. Males have a V shaped row of pre-anal pores which produce a waxy secretion. Males also have hemi penile swelling at the base of the tail.



Male Female

Other Facts:
- Leopard geckos are mainly nocturnal, spending the daytime under rocks or in burrows.
- Leopard geckos are named after leopards because the adult geckos have spots. These spots, along with their coloration, allow them to blend in with their native environment.
- Leopard geckos are members of the sub-family Eublepharinae, or the eye-lidded geckos. It is not uncommon for geckos to lack eyelids, but the leopard gecko has eyelids which are movable. This allows them to blink and close their eyes.
- Leopard geckos lack toe pads, which may be useful for climbing. Instead they have small claws at the ends of each of their toes.
- They can live over 20 years in captivity.
- Leopard Geckos can store fat in their tails and can release their tail to distract a predator or escape from a predator's grasp. The release process may involve the following:
  - The tail releases at a vertebra crack and the surrounding muscles easily and neatly separate.
  - Muscles then clamp the surrounding arteries to prevent significant blood loss.
  - A newly lost tail will still twitch, providing a distraction for the gecko to escape.
  - A new tail is likely to regrow, but this is expensive energy and the loss forces the gecko to abandon stored energy.
- Leopard geckos have better vision than any other lizard studied. Their vision is similar to that of a cat.
- Leopard gecko ears have a unique auditory system: when you shine light through one ear, it shines through to the other ear.
- As is true with some other herps as well, leopard geckos consume their sheds (see laminated picture)!

Appendix C

Frequently Asked Questions

Information directly cited from the website listed below the question.

Can you tell how old a turtle is by his shell?

As a shell grows, the number of scutes generally does not change, but their size does. In some turtles, old scutes are shed and replaced by larger, new ones. In other species, including box turtles, tortoises, and wood turtles, scutes enlarge in diameter as new keratin is laid down. The "growth rings" in scutes have been used be some experts to help determine the age of a turtle. Age estimation based on growth layers, however, can be erroneous for several reasons:
- Some turtles produce multiple growth zones per year.
- Growth is determined by changes in the environment (seasons), so age determination by examination of growth rings would be more accurate in wild turtles, than those kept in captive environments, which do not change significantly.
- Growth layers may wear with age, so older turtles may be estimated to be younger than they really are.

Where do turtles go in the winter?
http://eekwi.org/critter/reptile/turtlesofwisconsin2.htm
Ten of Wisconsin's 11 turtle species spend the winter under water. Some bury themselves under the bottom while others lie on the bottom and remain motionless. Recent studies show that many turtles don't actually hibernate. They remain semi-active, moving about during the winter. Because winter takes a toll on body reserves, many species begin to emerge as soon as the ice starts to melt around lakes, ponds, and stream banks. Turtles will come to bask on sunny days in early spring when air temperatures near 50 degrees Fahrenheit. Of course, the ice has to have melted enough so that they can get to the shoreline.

Where do other animals go for the winter?
http://dnr.wi.gov/org/caer/ce/eek/nature/snugsnow.htm
Since cold-blooded animals can't warm themselves up, they need to find a way to protect themselves from the cold. Frogs and turtles bury themselves in the mud below the frost line. They get oxygen from air trapped in the mud. In the spring when the sun warms the mud, out they'll come. Some snakes head underground to hibernate, others gather together in sheltered places like rotted out logs.

So what's the difference between a frog and a toad?
https://ed.fnal.gov/projects/frogs/froggiesfaq.html
There are no hard and fast rules but in general: Toads have dry, warty skin and relatively short legs for hopping. Frogs have smooth, damp skin and long legs for swimming or leaping.

Can toads *really* give you warts?
https://ed.fnal.gov/projects/frogs/froggiesfaq.html
Toads do not give people warts. Amphibians have many glands in their skin, and several species produce highly toxic secretions for protection. Toads do secrete a substance from the skin that can be very irritating if it comes into contact with mucous membranes like the eyes, nose, mouth, etc.

How do frogs make their calls, or "ribbets"?
https://ed.fnal.gov/projects/frogs/froggiesfaq.html
In some species, such as Spring Peepers, the lower part of the mouth can become a large resonating vocal sac. When the frog closes its mouth and nostrils, and then forces air from the lungs over the vocal chords, the sac inflates and vibrates like a drum, producing long, loud trills. Other species just produce calls with the vocal chords.

Why do frogs call?
https://ed.fnal.gov/projects/frogs/froggiesfaq.html
Frogs and toads make a variety of sounds, depending on the situation. The most common are "advertisement" calls, and "alarm" calls. Frogs and toads advertise their presence either to ward off challengers to their territories or to attract mates. Alarm calls serve to startle predators.

How fast can a turtle move?
http://hypertextbook.com/facts/1999/RachelShweky.shtml
The average turtle swims at a pace of 10 to 12 mph and walks at 3 to 4 mph.

Appendix D
Standards Alignment

Wisconsin's Model Academic Standards
Science:
F.4.1
F.8.2
F.8.7
F.8.8
Environmental:
B.4.6
Agricultural:
D.4.3
D.8.3
D.8.6

Next Generation Science Standards
3-LS1-1
3-LS3-1
3-LS3-2
3-LS4-2
3-LS4-3
3-LS4-4
4-LS1-1
4-LS1-2
4-ESS3-1
5-LS2-1
MS-LS1-4
MS-LS1-5
MS-LS2-3
MS-LS2-4

Common Core State Standards
RI.5.7
SL.3.4
SL.4.5
SL.5.5
SL.8.5
WHST.6-8