



Post-Program Resource

Garden Detectives

2nd-5th Grade

Who Survives? Animal Adaptation Story & Craft

Duration: One hour

Objective: To extend student learning from their field trip to Tudor Place by introducing the idea of adaptations. Students will learn what adaptations are through an interactive presentation, practice their knowledge with an interactive story and apply their learning through a craft.

NGSS Standards Met:

LS1.A: Structure and Function

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

LS2.A: Interdependent Relationships in Ecosystems

- Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4)

LS4.C: Adaptation

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

LS4.D: Biodiversity and Humans

- Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)

Materials Needed:

Intro to adaptations exploration presentation

Link to access presentation:

https://docs.google.com/presentation/d/1WEfZVY4Wfp8g8zkSjErXE-GVBaVD-QiM29MsB69Nd_o/edit?usp=sharing

Drawing paper or adaptation creation template

Coloring materials (colored pencils, markers, crayons, etc.)

Intro to Adaptations Exploration Presentation

Link to access presentation:

https://docs.google.com/presentation/d/1WEfZVY4Wfp8g8zkSjErXE-GVBaVD-QiM29MsB69Nd_o/edit?usp=sharing

Tips for the Presentation:

Questions/prompts will automatically appear. Click to go to the next slide or reveal an answer. Everything else is animated. You may want to run through the slides beforehand to become familiar with the presentation.

- (Slides 1-5) Review what the students learned at Tudor Place. Images on each slide will prompt students to review parts of a plant and what they need to grow.
- (Slide 6) Next, there will be images of the dog statues and scratches on the nose of one of the dogs.
 - Ask students: “Does anyone remember what caused these scratches?” (Squirrels like to sharpen their teeth on the statues.)
- (Slide 7) Squirrels, humans, plants and other animals all live together in an **ecosystem**.
 - All of the living and non-living things in an environment make an **ecosystem**.
 - This includes plants, animals, humans and things like rocks and mountains.
 - We know that squirrels, foxes and birds all live at Tudor Place. Could any animal live at Tudor Place? (No)
- (Slides 8-11) Animals are **adapted** to live in certain places.
 - Does anyone know what an adaptation is?
 - An **adaptation** is a physical feature or behavior that helps a plant or animal survive in its specific habitat/environment.
 - This can be a body part, like claws, ears or gills.
 - This can be a body covering, like scales, feathers or fur.
 - This can be a behavior, like hibernation, migration, defense mechanisms, territorial behaviors, etc.
- (Slides 12-14) Beginning on this slide, students will practice identifying animal adaptations with a mini game. Students will discuss what adaptations make the animal suited for life in their specific habitats as well as why they couldn’t live at Tudor Place.
 - Challenge 1: Penguin in the South Pole
 - What specifically does the penguin have that makes it able to live in the cold?
 - Waterproof feathers to keep it warm
 - Lives in group that huddles together during winter
 - Color of feathers: From the bottom it blends in with the sky and from the top it blends in with the ocean to protect it from predators.
 - Why couldn’t it live at Tudor Place?

- Too warm, nothing to eat, they need to live by the ocean
- Challenge 2: Sidewinder rattlesnake in the desert
 - What does it have that lets it live in the desert?
 - Scales keep water in, they can't sweat
 - Cold-blooded, doesn't overheat in the desert
 - Venom for hunting & protection
 - Scales to keep in water
 - Smell with their tongue
 - Can see heat
 - Unique slither for climbing sand dunes
 - Scales blend into the desert
 - Able to open up jaw to swallow prey whole
 - Why couldn't it live at Tudor Place?
 - Too wet, the snake would get sick from all the rain, it's slither wouldn't work because there isn't sand, wouldn't blend in
- Challenge 3: Blue whale in the ocean
 - What adaptations does a whale have that lets it live in the ocean?
 - Really big lungs: They can hold their breath for a long time.
 - Big tail/flippers
 - Blubber to stay warm in the water, thick layer of fat insulates them so that they don't get cold
 - Special teeth to eat krill
 - Why couldn't it live at Tudor Place?
 - No ocean, no food, unable to live on land
- (Slide 15) Review what adaptations are and why they are important
 - Adaptations are a body covering, part or behavior that helps a plant or animal survive in its habitat/ecosystem.
 - Can help it eat, can help it not get eaten, can help it attract a mate or it can help it live in specific climate conditions
 - Can be body covering (scales, fur, feathers, etc.), body part (claws, hooves, eyes etc.) or a behavior (hunting style, specific sound it makes)

Who Survives? Interactive Storytime

To practice what they learned about animal adaptations, students will select an animal character to root for that they think is best able to survive changes in the environment or has the best adaptations. Only one character will survive, but the story will show that they all have special adaptations. Remind students to look out for adaptations each animal has in the story.

The storytime will be a continuation of the Adaptation Exploration presentation, use link from above.

- Characters:
 - Southern Leopard Frog
 - Viceroy Butterfly
 - Red Fox
 - Red-Shouldered Hawk

- Use the script below to tell the story of the ecosystem at Tudor Place. The script will prompt you to switch slides in the Adaptations Presentation to follow along with the story. Stop to interact with students as appropriate. The story is meant to be interactive.

Story Script

Story Overview:

Event 1: Cold winter (all survive)

Event 2: Invasive species in spring (butterfly out)

Event 3: Drought in summer (frog out)

Event 4: Climate change/cold fall & rodent extermination. (fox out)

Winner: Hawk

(Slide 16) The year is 2031 in Washington, DC. Not much has changed: students go to school, grown-ups go to work, plants grow and birds fly. In 2031, a southern leopard frog, a viceroy butterfly, a red-shouldered hawk and a red fox all live together in the same **ecosystem** at Tudor Place. This year, there will be challenges to overcome. You all must pick an animal to root for that you think will come out on top. Who do you think has the best adaptations to survive?

(Slide 17) (Have students vote for their animal)

(Slide 18) It is January, and the leaves have all fallen. The sky is grey, and the world is quiet. The animals at Tudor Place are all hidden for the winter. Some are underground in burrows while others are cozy in their nests. Snow is coming, but can they all survive the chilly storm? The temperature drops to 15 degrees, and the wind makes it feel even colder. School was cancelled and all the people are at home to wait out the weather. The storm will drop over a foot of snow on the garden. While it might be perfect for making snowmen or having snowball fights, it could be too cold for plants and animals outdoors. The water freezes and icicles dangle from the edges of trees and houses. As the sun sets, the snow continues to fall even faster than before.

How will our animals handle the storm? Who do we think will make it through?

(Slide 19) The first animal to survive is the viceroy butterfly. During the cold winter, viceroy butterflies are hibernating. Butterflies have a unique life cycle. They start out as caterpillars in the spring before going into their chrysalis, where they turn into a butterfly. The butterflies lay eggs in the summer and fall. Each year, there are three generations of viceroy butterflies. The third generation of caterpillars is born in the fall. This generation is special because they **hibernate**. They go into a sleep-like state where their bodies need very little water or food. Their hearts and brains slow down so they can survive all kinds of weather without needing shelter or food. During the winter storm, our butterfly is hibernating on a tulip poplar tree in the garden, and it survives.

(Slide 20) The second animal to survive is the red-shouldered hawk. The hawk takes shelter in its nest in a tulip poplar tree. The hawk also has lots of feathers that keep it warm, even when it's really cold. It can puff up its feathers to make itself even warmer.

(Slide 21) The third animal to survive is the red fox. In the winter, foxes grow thicker and longer fur that keeps them warm. If it is too cold to hunt in the storm, the fox will go underground into a den. It digs its den using long sharp claws. Being underground is warmer than being out in the snow. They survive because of their fur and their dens.

(Slide 22) Will the frog make it through? (Have the students vote.) The frog survives. Like the viceroy butterfly, frogs hibernate during winter. They go underground near water and wait for the weather to warm back up. When it gets really cold and the water in their bodies freeze, they can still survive. Their blood can freeze. When they warm up and defrost, their hearts will start beating faster and they wake up. Frogs also breathe through their skin, so even if their mouths or noses are frozen shut, they can still survive because their whole body can breathe. When they are hibernating, frogs need very little food because their whole body slows down. Their body temperature can be as cold as 19 degrees and they will still survive.

(Slide 23) All four of our animals made it through the winter at Tudor Place. They all had **adaptations** that helped them make it through the cold winter storm. They survive winter by hiding out in their nests, dens and burrows.

(Slide 24) It is now March of 2031, and the air is getting warmer. The sun stays up longer and all the plants in the garden begin to bloom. Bees fly around the garden when flowers start to grow. What new challenge awaits our animals?

(Slide 25) The garden continues growing. Bushes and trees get bigger and taller. The viceroy caterpillar emerges from hibernation and begins eating the leaves of the poplar trees. The frog defrosts and starts to sing by the water. It comes up from underground to lay its eggs in a fountain. The hawk begins to build a new nest in a walnut tree where it will lay eggs. The fox starts to shed its thick winter coat, leaving clumps of hair around the garden as the weather gets warmer. The gardeners make sure to plant all kinds of flowers, especially ones that birds and bugs like to visit.

(Slide 26) The viceroy butterfly emerges from its chrysalis. Once its wings dry, it visits the flowers in bloom. A hungry bird eyes the butterfly from a nearby tree. The bird thinks about eating the butterfly, but sees its bright orange wings and stays away.

(Slide 27) The viceroy butterfly looks almost exactly like a monarch butterfly. The easiest way to tell them apart is by looking at their bottom wings. The viceroy has a horizontal line that monarchs don't have.

(Slide 28) As caterpillars, monarch butterflies can only eat milkweed. Milkweed is a little bit poisonous. It tastes bad to many animals, especially those that like to eat butterflies. Monarch butterflies become poisonous when they eat the milkweed, and it makes them taste really bad to their predators. Because of this, birds and other animals know to stay away from monarch butterflies. On the other hand, the viceroy butterfly is super tasty. Viceroy butterflies are not poisonous at all, but they borrow the monarch's appearance so predators think they are poisonous too.

(Slide 29) This is called **mimicry**. Mimicry is an adaptation where one animal looks like another, borrowing the animal's adaptations for itself. The viceroy butterfly mimics the monarch. Lots of animals do this. So, the viceroy butterfly survives the birds because of **mimicry**!

(Slide 30) But something new is growing in the garden, something that doesn't belong. A species of vine called wintercreeper starts growing at Tudor Place. Wintercreeper is originally from Central China, where it grows in forests. It was brought here to DC and started growing at Rock Creek Park. At Rock Creek Park, it covered all of the other plants and made it so they can't get any sunlight. Wintercreeper can grow in the sun or in the shade, in any type of soil. Wintercreeper made its way from Rock Creek Park all the way to the garden at Tudor Place, and it smothers the plants growing there. The flowers get covered by thick green vines, so they struggle to reach the sunlight. Wintercreeper is an **invasive species**. An **invasive species** is a plant or animal that is not native to a place. They get introduced to an ecosystem where they don't belong. Invasive species don't have any of their natural predators. Animals there won't eat them and the plants in the garden can't keep up.

Who will survive the wintercreeper? Who can adapt to this invasive species?

(Slide 31) The first animal to survive is the red fox. The red fox is an **omnivore**, which means it eats both plants and animals. Foxes mostly eat rodents, like mice. The loss of the flowers doesn't affect the fox's ability to survive.

(Slide 32) The second animal to survive is the frog. The frog lives by the water and eat insects like snails, slugs and worms. Their food isn't affected by the invasive species so the frogs survive without a problem.

(Slide 33) The third and final animal to survive is the hawk. The hawk is a carnivore, which means it eats only meat. They fly around using their wings. Hawks have hollow bones and feathers which allow them to fly. The hawks also have really good eyesight: they can see a mouse in a field from a mile away. Even when the vines cover the garden, they are able to find food. So, the hawk is our final animal to survive the winter creeper.

(Slide 34) The viceroy butterfly couldn't make it. The viceroy butterfly is an herbivore: it only eats plants. It depends on the flower's nectar to live. When the invasive wintercreeper took over the garden, the butterflies had nothing to eat. All of the viceroy butterflies either left the garden to find a new source of food or perished. This removes the butterfly from our ecosystem, so the butterfly is out.

(Slide 35) Three animals still survive in the garden: the frog, the red fox and the hawk.

(Slide 36) Spring comes and goes. Blossoms cover the trees before later falling to the ground. Pollen in the wind makes us all sneeze. The nights get shorter and warmer as summer approaches. Fireflies flicker at sunset. Students get out of school, just in time to catch the fireflies. What new challenge awaits? Usually, the summer promises rain. Thunderstorms normally flash and bang and pour water on the garden. But summer 2031 is different. The thunderstorms are missing. There is enough rain to keep plants alive, but ponds and fountains dry up. The air is hot and humid. By the end of July, the situation is extreme. Every single plant and animal needs water to live.

(Slide 37) Who is best adapted to survive this drought?

(Slide 38) The first animal to survive is the hawk. Using its hollow bones and feathers, the hawk flies to search for water. They also get water from the prey they eat, like mice, rats, squirrels and even other birds. Who else can make it?

(Slide 39) The second and final animal to survive is the fox. The fox can travel to find water or drink out of water bowls left out for cats or dogs. It can also get the water it needs from berries or other plants. Because the fox can get water from other sources, it can survive the summer drought.

(Slide 40) The frog couldn't survive. Frogs are **amphibians**. An amphibian is a type of animal that is specially adapted to live both on land and in the water. Frogs lay eggs in water. The eggs hatch as tadpoles. Tadpoles live in the water until they grow legs. Frogs can breathe with lungs, like us, but, they can also breathe in water through their skin, kind of like fish. Amphibians, like the frog, are really sensitive to changes in the environment. They can only exist when conditions are just right. Scientists study frogs to check on the overall health of an environment. If amphibians can survive, the ecosystem is doing alright because frogs are one of the first species to disappear when the environment changes- like during this summer drought. Because there was very little rain this year, there are no pools of water for the frogs to live in or lay eggs. All of the frogs will either leave Tudor Place to find pools of water or die. They can no longer make it in the ecosystem, so they are eliminated.

(Slide 41) Two animals remain: the fox and the hawk. Who will be the best adapted for the fall of 2031?

(Slide 42) After the drought of summer, falls brings much-needed rain. By October, temperatures have plummeted. The plants drop their leaves- going dormant weeks earlier than usual. The tree branches and bushes are empty sticks, depriving animals of important food sources.

(Slide 43) The seeds, flowers, nuts and berries eaten by mice and rats are gone sooner than normal. Looking for food, the mice wander into the museum. The museum doesn't want mice or rats in the house. They hire an exterminator to make the rats disappear. But the exterminator did *too* good of a job and there are no more mice or rats in the garden at all. Both the hawk and the fox eat mice and rats as a main source of food. Who will overcome this problem?

(Slide 44) The fox doesn't have much to eat anymore. Its stomach is empty, craving the mice and rats from summer. Luckily, the fox is an **omnivore**, so it eats both plants and animals. It starts eating more rabbits and berries instead. But, the fox is still hungry. It starts sniffing around and smells something really good coming from these big dark green bins. Inside are bags full of yummy food. The fox begins eating from the trash cans. The fox is a **scavenger**. Animals that are scavengers, like raccoons, coyotes and vultures, will eat just about anything. Scavengers can even eat dead animals. The fox used its strong sense of smell to find the food in the trash cans and its sharp teeth and claws to open the bags.

(Slide 45) Because the fox is going through trash looking for food, someone calls animal control. Animal control captures the fox and relocates the fox to Rock Creek Park. This takes the fox out of the ecosystem at Tudor Place. The fox is eliminated.

(Slide 46) That means our winner is the hawk. The hawk was able to survive the great mouse extermination because of its adaptations. Its wings let it fly around the neighborhood to find rodents in other places. The

hawk used its sharp talons to pick up its prey and its sharp beak to eat its food. Its exceptional eyesight lets it hunt from far away. The hawk eats all kinds of things like lizards, frogs, snakes and bats. When the mice and rats went away, it still had plenty of other food to eat while living in its nest at Tudor Place.

(Slides 47-50) (Students will review the adaptations that each animal from the story had. Ask students for their answers and then click to reveal adaptations.)

Craft: Adaptation Creation

The presentation will prompt students to identify what adaptations each character in the story had.

- Frog: breathe through skin, they can freeze and thaw and survive which lets them live in more extreme climates
- Red Fox: claws, teeth, sense of smell, fur to stay warm in winter, omnivore/scavenger means lots of food sources
- Viceroy Butterfly: mimicry, can fly from flower to flower to find food with wings, hibernation
- Hawk: sharp talons and beak, strong wings, feathers to stay warm, good eyesight to find prey, hollow wings

Using their knowledge of adaptations, students will create an animal that has a special adaptation. They can take an animal that exists and add a new adaptation to it, or they can create an entirely new animal. The adaptation they create should help the animal survive changes in its environment, like climate change, severe weather or an invasive plant or animal species.

Remind students that an adaptation can be a body covering, body part or behavior.

You can use blank drawing paper or the template provided below. If there is time, have students share what their animal is, what its name is and what its adaptation is.

Option: Use magazines and create a collage of a new animal with a special adaptation

Glossary

Adaptation: a physical feature or behavior that helps a plant or animal survive in its specific habitat/environment (a body part, covering, or behavior)

Amphibian: a type of animal that live both in water and on land. They can breathe in air and in water.

Carnivore: animals that eat only meat

Carrion: dead animals eaten by scavengers

Ecosystem: all of the living and non-living things in an environment, including plants, animals, humans and non-living things like rocks and mountains

Herbivore: Animals that eat only plants

Invasive species: a plant or animal that is not from a place (native) that is brought to an ecosystem. Usually, it harms the native ecosystem

Mimicry: when a plant or animal borrows another species' adaptation for itself by looking/sounding like the other species

Omnivore: An animal that eats both plants and animals.

Scavenger: An animal that eats many things, including dead animals.

My animal's adaptation is ... _____
