

Self-Directed Tour
Grades Three through Five
ANIMAL ADAPTATIONS
Teacher Guide

This self-guided tour will introduce you and your class to animals at the Milwaukee County Zoo, and focus on their adaptations for survival. Animals live in a variety of unique environments. To survive in many of these environments, animals have adapted both behaviorally and physically. At the Zoo, you can observe some of the special physical adaptations that animals have developed over the ages. In this tour, you will be introduced to the world of animal adaptations, including what adaptations are, why some adaptations benefit an animal, and which animals typify certain adaptations.

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Section 1

Objectives

- Children will understand what animal adaptations are.
- Children will be able to explain why animal adaptations are important.
- Children will be able to explain different types of animal adaptations and how they serve different animals.

Animal Adaptations -- Vocabulary

Adaptation

A body part, body covering, or behavior that helps an animal survive in its environment.

Behavior

The actions of an animal.

Camouflage

A color or shape in an animal's body covering that helps it blend into its environment.

Environment

Everything that surrounds and affects a living thing. The environment includes non-living things, such as water and air, as well as other living things.

Habitat

The place where an animal lives. The physical characteristics of an animal's surroundings.

Inborn Behavior (instinct)

A behavior an animal is born with and does not have to learn.

Mimicry

An adaptation in which an otherwise harmless animal looks like a harmful animal in order to protect itself.

Predator

An animal that hunts and eats other animals for food.

Prey

An animal that is taken and eaten by another animal (predator) for food.

Survive/Survival

Using adaptations to continue to live.

Section 2

Adaptations

Adaptations are any behavioral or physical characteristics of an animal that help it to survive in its environment. These characteristics fall into three main categories: body parts, body coverings, and behaviors. Any or all of these types of adaptations play a critical role in the survival of an animal.

Adaptations can be either physical or behavioral. A *physical adaptation* is some type of structural modification made to a part of the body. A *behavioral adaptation* is something an animal does - how it acts - usually in response to some type of external stimulus. When you look at an animal, you usually can see some of its adaptations -- like what it is able to eat, how it moves, or how it may protect itself. Different animals have many different ways of trying to stay alive. Their adaptations are matched to their way of surviving. Each group of animals has its own general adaptations. These groups are: fish, amphibians, reptiles, birds, and mammals. Some of these adaptations make it easy to identify which group an animal belongs to. A good example of an animal adaptation is the way in which an animal moves from one place to another.

Animals have evolved their adaptations. This means a long period of slow change resulted in an animal's adaptation(s). The spots on the snow leopard, for example, did not emerge overnight. Instead, this process took generation upon generation of snow leopards physically adapting to their environment for characteristic spot patterns to evolve. Those snow leopards with spot patterns were able to hide more successfully, therefore surviving longer than those without spots. This allowed the longer surviving snow leopards to reproduce and create more snow leopards with spot patterns like their own. Indeed, this process of change over time is the key to how many organisms develop adaptations. Some adaptations can arise quickly through genetic mutations; these mutations also may be deadly.

In the sections that follow, different types of distinctly visible adaptations and their importance will be discussed. Since behavioral adaptations are far more difficult to observe, these will not be discussed. However, the visible adaptations mentioned are easy to recognize on most animals at the Zoo and should be of special interest to children.

Body Parts

Many animals have developed specific parts of the body adapted to survival in a certain environment. Among them are webbed feet, sharp claws, whiskers, sharp teeth, large beaks, wings, and hooves.

Webbed Feet



In most aquatic animals, swimming is a must. To aid swimming, many animals have adapted and evolved with webbed feet. Webbed feet help animals propel themselves through the water with ease. This can help the animal swim faster to catch prey or escape a predator. Also, if an animal has to swim long distances, webbed feet can help it save energy so it can swim farther. One animal that can be observed at the Zoo with webbed feet is the rockhopper penguin. Other animals with slightly webbed feet: the polar bear and otter.

Sharp Claws

Many land and sea animals alike have developed sharp claws. Sharp claws can be used for many different purposes. For instance, many herbivores use their sharp claws for digging for berries, roots, and herbs or burrowing for shelter. Animals that eat meat may use their claws for killing their prey or tearing meat from their kills. Also, claws can be used to increase traction to run faster, as in the case of the cheetah. Other times, sharp claws have evolved for use in defense. For some animals, showing of claws is enough warning for their predators or competitors to back off. There are many animals at the Milwaukee County Zoo with sharp claws, including many of the bears and felines, as well as aquatic animals like the California sea lion.

Whiskers



Although not usually thought of as an adaptation, whiskers serve an important purpose for many animals. In most cases, whiskers around the face, specifically the mouth area, help the animal feel its way through tight spots. In a way, they serve as "feelers," telling the animal whether or not it can fit into a specific area. One example is that of the North American river otter, which can use its whiskers both on land and in water. On land, they are used to feel their way through narrow channels, with a similar purpose for the whiskers under water. They are also useful to sense prey.

Sharp Teeth



One of the most visible adaptations on many animals, sharp teeth help an animal eat meat. Found primarily on meat-eating animals, or carnivores, sharp teeth are used mainly for the tearing and chewing of an animal's prey. Rather than developing the dull teeth of plant-eaters, or herbivores, carnivores rely on their sharp teeth to allow them to eat and survive. Sharp teeth can serve another purpose: defense. In some animals, bearing a large set of sharp teeth can show power or fear. The Milwaukee County Zoo features many animals with sharp teeth. Unfortunately, it is often difficult to see this distinctive feature. Some animals that we suggest you watch are the snow leopard, cheetah, African lion, mandrill and lowland gorilla.

Large Beaks



Just as in the case of sharp teeth, large beaks are often an adaptation used to help an animal eat. However, large (and often sharp) beaks can be a feature of both carnivores and herbivores. For instance, the large beak of the macaw has been adapted to help it crack open large nuts to reach the sweet fruit and pulp inside. On other birds however, the large beak is used to tear meat, as in the case of the rhinoceros hornbill. The rhinoceros hornbill uses its large beak to tear meat off of an animal it scavenges -- usually the result of another animal's kill.

Wings/Flying



Wings are another highly visible adaptation on many animals. Although most think of birds when it comes to wings, other animals like the vampire bat also have wing-like structures that help it fly. Of course, the primary function of wings is flight in most animals with wings. Animals like the golden eagle and peregrine falcon can reach speeds up to and above 60 miles per hour in flight. This flight is used to attack its prey. Other animals, like the Micronesian kingfisher, do not reach the speeds of other raptors, but still use their wings to travel from place to place. Finally, the Humboldt penguin does not use its wings to fly at all. Instead, it uses its wings as flippers to move through the water.

One point of interest with the vampire bat is that its wings are not really wings. Bats evolved separately from birds and thus their "wings" are structured much differently than the wings of birds. In fact, a vampire bat's wing structure is more similar to the hand of a human than the wing of a bird.

Hooves

Hooves are another body part that are an important adaptation for many large animals. In most cases, animals with hooves use their specially adapted feet to maneuver in a rocky environment. Hooves protect the feet of these animals and allow for greater mobility than unprotected feet. Animals at the Milwaukee County Zoo with hooves include the greater kudu, zebras, and the Dall sheep.

Body Coverings

An animal's body covering is one clearly visible adaptation. Body coverings help to protect animals in diverse environments -- from the land to water, from the arctic to the desert. Mammals have hair, or fur, that helps insulate their bodies. It keeps them warm in winter and can protect specific areas of the body, like eyelashes protecting the eyes. Some mammals have different coverings: the armadillo has plates, the porcupine has quills, and naked skin covers the dolphin. All of these help these mammals to survive in the different conditions in which they live. Birds also have a very protective covering: feathers. The feathers keep the bird warm in winter, help it fly or swim, and help fan the bird in hot weather.

Amphibians and reptiles have body coverings that protect them as well. Amphibians have moist, slick skin that is well suited for the water. Reptiles have tough, dry skin covered by scales. Insects, such as the cockroach, have coverings that enable them to squeeze into very small places. This allows them to find food and shelter. Many insects build nests (a behavioral adaptation) or cocoons (behavioral and structural adaptation) for the winter because their body coverings alone do not permit them to adjust to the cold. Many insects also have other adaptations included in their body coverings: cells that sense light and pigments that allow some insects to change colors in order to hide themselves from predators.

Striped Fur



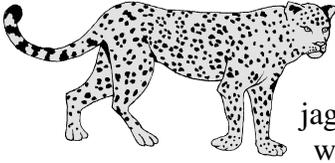
Striped fur is one variation of a special adaptation called camouflage. Striped fur, in most cases, helps animals blend into their environment. This helps the animal in one of several ways, including hiding from predators and sneaking up on prey. Striped fur, as in the case of a tiger's vertical stripes, serves the animal by helping it match the surrounding vegetation, thus making it nearly invisible to other animals. In other animals, like the skunk, the stripes serve as a warning to predators. In this way, the stripes serve as a defense mechanism.

Brightly Colored Feathers



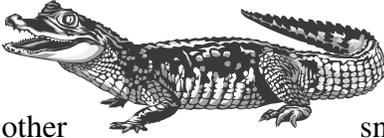
Found mostly in tropical rain forests, birds with brightly colored feathers are another example of an animal with an adaptive body covering. Brightly colored feathers can serve several purposes, including camouflage, defense, and mating. In some parts of the rain forest, the macaw and its brightly colored feathers can hide amid similarly brightly colored plants and flowers. The male peacock uses its bright feathers for another purpose: attracting a mate. In contrast to the male, the female peafowl has very dull colored feathers. This feature, common among female birds of most species, helps females hide while guarding their nest and protecting their young.

Spotted Fur



Another adaptive type of body coloring is spotted fur. Spotted fur is similar to striped fur in the fact that it serves as camouflage. Many animals with spotted fur live in heavily wooded forest areas. One example is the jaguar, which lives in the rain forest. The jaguar's spotted fur helps it blend in with the small patches of sun that reach the rain-forest floor. These patches, mixed in with the shade, produce an effect that highly resembles a jaguar's coat. Another animal with spotted fur is the snow leopard. The snow leopard, with a white coat and black spots, lives in wooded areas as well, using its coat to hide amid the trees and snow.

Scales



One final type of body covering is scales. Scales serve a purpose different than that of fur and feathers. Scales are mainly a protectant from the environment for most animals. For instance, anacondas and other snakes at the Milwaukee County Zoo have scales to protect their bodies from the variety of terrain they encounter. In the case of the anaconda, its habitat is largely made up of water. In the case of other snakes, the climate may be dry and the land sandy and rocky; so they cannot afford to lose water from their body. Scales help protect the body of the animal in an instance where skin, fur, or feathers would become damaged or destroyed.

Section 3

Animal Adaptations - Zoo Animal Information

Many animals at the Milwaukee County Zoo exhibit good examples of the animal adaptations discussed in this packet. Included in this packet is more in-depth information about several specific animals that display one or more of these adaptations. These "focus animals" will help guide your trip to the Zoo. We encourage you to use this only as a baseline for further exploration of the fascinating animals at the Milwaukee County Zoo.

At Aviary -- King Penguin (*Aptenodytes patagonicus*)

Geographic Location: The largest breeding colonies exist on the South Georgia, Kergulen, Macquarie, and Marion islands.

Habitat: Lives in the ice-free sub-Antarctic waters and breeds on islands there.

Natural History:

It stands about 3 feet tall, and weighs 24-33 pounds. It has well-oiled feathers that are 2 inches long and form a thick mat over the entire body. This coat keeps out the cold and wet but retains heat on land and in the water. The wings are powerful, stubby, and flipper-like. They propel the bird rapidly under water. The feet are used to steer the penguin through the water when it pursues prey. They also contain many blood vessels, which are used to incubate the egg and warm the chick. The beak is long, curved and sharp for seizing prey. Inside its mouth and over its tongue are protrusions that enable it to grip slippery prey.

Diet:

The king penguin is an excellent hunter. The bird dives into the sea and snatches fish and squid with its beak. It also eats krill.

Interesting Facts:

The king penguin is the second largest of all the penguins. The king penguin can dive to a depth of 200 feet when it is hunting. They can swim at speeds of 6 mph, using their wings as flippers to fly through the water, and then hop out onto the rocky shore. At the start of the mating season the male brays like a donkey while trying to attract a female. King penguins do not build nests, but tuck their single egg under their "brood patch" (a special flap of skin under the belly) while resting it on their feet! The mother and father penguin take turns keeping the egg warm. Although it is nearsighted on land, it sees much better under water.

At Primates of the World -- Black-Handed Spider Monkey (*Ateles geoffroyi*)

Geographic location: Mexico, Central and South America

Habitat: Mature rain forest and montane forest.

Natural History: The head and body length is between 15 and 25 inches, with the tail adding another 20 to 35 inches. They weigh usually between 12 and 16 pounds. The hair is coarse and stringy and lacks underfur. Hair colors may include golden, red, buff, brown or black, with hands and feet generally black. The face is often marked with a pale mask of unpigmented skin around the eyes and muzzle. Hands are like hooks with long, narrow palms, long curved fingers, and no thumb. Limbs and tail are exceptionally long in relation to body. Tail is prehensile. Head is small while the muzzle is prominent.

Diet: Fruits, young leaves, and flowers. May eat some nuts, seeds, insects, arachnids, and eggs.

Interesting Facts:

Spider monkeys have a prehensile tail that they use like a fifth limb. The tail can grab onto branches for extra stability while moving through trees, or it can allow them to hang from branches while foraging. Spider monkeys do not have thumbs; this aids them in swinging from tree to tree.

At Aquatic & Reptile Center -- Anaconda (*Eunectes murinus*)

Geographic Location: Tropical South America

Habitat: Streams, rivers, swamps, and pools of the tropical rain forests of Amazonia.

Natural History:

The green anaconda can grow up to 36 feet long and can weigh up to 550 pounds. The nostrils are like that of a crocodile. They are located on the top of the snout so the snake can breathe easily while it is swimming. The black patches on its back combine with dull background color to blend in with the thick, wet vegetation of its habitat. Unlike most snakes, anacondas give birth to live young.

Diet:

The anaconda preys on caiman, deer, wild pigs, and large rodents such as the agouti, paca, and capybara. It also attacks aquatic animals like the caiman, a small relative of the alligator. It lies in a murky pool to ambush prey coming to the water to drink. It seizes its prey quickly with its sharp teeth and drags it into the water. The snake squeezes tighter each time the animal breathes out so it cannot breathe again. The prey dies quickly from suffocation and is swallowed whole. The snake can stretch its mouth around prey twice the width of its head because its jawbones are loosely attached to its skull and to each other. After a large meal, the anaconda sleeps for several days as it digests and may not feed again for weeks.

Interesting Facts:

This heavy snake is more at home in the water than on land, and it swims with grace and agility. It can stay submerged for 10 minutes at a time and often lies beneath the surface waiting for prey. When kept out of the water, an anaconda's body becomes infested with ticks. The heaviest of snakes, a 20-foot anaconda weighs more than a 33-foot python.

At Small Mammal Building -- North American River Otter (*Lutra canadensis*)

Geographic Location: All of the U.S. and Canada except the tundra and parts of the arid southwestern United States.

Habitat: Streams, rivers, lakes, estuaries, and salt- and freshwater marshes.

Natural History: Long, slender, sleek body, weighing approximately 20 pounds and about 2 ½ feet from head to tail. The head is small and round, with small eyes and ears, but with prominent whiskers. Legs are short, but powerful; all four feet are webbed. The tail is long and slightly tapered toward the tip with musk-producing glands underneath. The short, dense fur is dark brown and waterproof. Chin and stomach are reddish-yellow and tinged with gray. Females are a third smaller than males.

Diet: Fish, crayfish, frogs, turtles, aquatic invertebrates, plus an occasional bird, rodent or rabbit.

Interesting Facts:

The river otter is almost impervious to cold because of an outer coat of coarse guard hairs, plus a dense, thick undercoat that helps to "water-proof" the animal. They have no blubber - the fur keeps them warm. Scent glands under the tail are used for identification, defense, marking territory, and trail marking. Small ears and nostrils can be closed tightly when in water; they are excellent swimmers and divers. During a dive, their pulse slows to a tenth of the normal rate of 170 beats a minute, thereby conserving oxygen.

Vampire Bat (*Desmodus rotundus*)

Geographic Location: Central and South America from Mexico to northern Chile and Argentina.

Habitat: In tropical and subtropical regions.

Natural History:

The length of the body is about 2 inches, and the wingspan is about 8 inches. It weighs about 1 ounce.

Diet:

The vampire bat feeds on the blood of animals. Cows, pigs, and horses are its favorite hosts. The bat usually will choose to feed on the most docile or isolated animal in the resting herd. Using its chisel-like incisor teeth, the bat makes a small cut in the animal's skin. It usually chooses a fleshy area, like the shoulder or neck, where the blood vessels are closer to the skin's surface. The bat then drinks the blood that flows from the wound. Chemicals in the bat's saliva keep the blood flowing for the 2-3 minutes that the bat feeds. Often 2 or 3 bats feed from the same wound. In most instances, the host animal suffers no ill effects from the loss of blood, although if too many bats feed on the same animal, it may be weakened severely.

Interesting Facts:

In a year, a colony of 100 bats may consume a quantity of blood equivalent to the amount in 25 cows. A vampire bat finds its prey with echolocation, smell, and sound. They also use special heat sensors in their noses to find veins that are close to the skin. Usually when a bat approaches its prey, it does not land directly on the animal, but rather, lands nearby and "walks" or hops up to the unsuspecting victim. It then climbs up the animal and finds a suitable meal site. The common vampire bat usually climbs backward, or slightly sideways, and is always highly alert while climbing. It is light on its feet and moves delicately to avoid detection. Vampire bats are active only during the darkest periods of the night. It is the time when they are most likely to avoid being caught by nocturnal predators such as owls. During the day, vampire bats roost in colonies, hanging upside down in caves and hollow trees.

At outdoor exhibit adjacent to American Black Bears -- American Badger (*Taxidea taxus*)

Geographic Location: Across western and central North America, from southwest Canada south to Mexico.

Habitat: It is found in plains, grassland, and woodlands.

Natural History:

The length of the head and body is about 2 feet with the female being smaller. The tail is about 4 inches long. The body is flat, wedge-shaped, and muscular. It is covered in gray or reddish brown fur with coarse guard hairs. It has a distinctive white head stripe and white patches on the face, throat, and chin. The animal has strong claws on its forepaws to dig very rapidly.

Diet:

The American badger is a carnivore. It uses its strong jaws and teeth to crush prey. The badger catches rabbits as well as other small mammals and even digs ground squirrels out of their burrows. This badger also feeds on invertebrates, bird's eggs and nestlings, carrion, and garbage scraps. It stores surplus food in its burrow.

Interesting Facts:

The badger is solitary except during the breeding season, when it pairs to mate. It marks its territory with a strong-smelling secretion from its anal glands. It spends most of the day resting in its burrow and emerges toward dusk to hunt. In the colder regions the badger remains in its burrow for much of the winter, living off a layer of body fat. Although its body processes slow down, it is not a true hibernator, and it may feed above ground in mild weather. When frightened by an intruder, it snarls and growls. However, it rarely provokes an attack, preferring to retreat. Badgers locate their prey primarily by scent.

At the Florence Mila Borchert Big Cat Country -- Cheetah (*Acinonyx jubatus*)

Geographic Location: Sub-Saharan Africa

Habitat:

Open semi-arid grasslands, scrubland, savanna woodland and occasionally forest margins.

Natural History:

Length of their body from head to beginning of tail is 3 ½ - 4 ½ feet. Their tails extend from their bodies 2 - 3 feet. They weigh anywhere from 86 to 143 pounds. Males are slightly larger than females. Their coats are tawny with small round black spots. The face is marked conspicuously by "tear stripes," which run from the corner of the eyes down the sides of the nose.

Diet:

Gazelles, impala, and wildebeest calves are the preferred prey. (Basically any hoofed animal up to 90 pounds is ideal). The cheetah first stalks the herd. At the right moment it shows itself and panics the animals into running. The cheetah follows at high speed, usually catching up to its prey within a minute. If forced to run longer than this, the cheetah gives up.

Interesting Facts:

The cheetah is the fastest land animal, reaching speeds of up to 60 - 70 miles per hour during short sprints (it can keep up this speed only for a quarter-mile). It is designed for speed: lean body, small head, light bones, very long legs, flexible spinal cord, and a sliding shoulder joint. It is the only cat that cannot retract its claws. These claws provide additional traction during rapid acceleration and direction change while chasing prey. Its tail works as a rudder, moving from side to side as the cheetah twists and turns. Long teardrop-shaped lines on each side of the nose from the corner of its eyes to its mouth are thought to help deflect light away from the eyes while the cheetah hunts during the day. Another adaptation is the presence of spots on the coat. These spots camouflage the cheetah. The cheetah's coloration and spots help to break up the outline of the cheetah's body form, making it easier for a cheetah to approach prey animals without being detected.

Jaguar (*Panthera onca*)

Geographic Location: Mexico, Central and South America

Habitat: Tropical rain forests, swamps and grasslands near rivers, streams or other wetlands.

Natural History:

It has a total body length of 44 - 73 inches, of which the tail is 18 - 30 inches. Males weigh 125 -250 pounds, and females only 100 - 200 pounds. Its coat is basically yellowish-brown, but can vary from almost white to black, with a pale chest and irregular placed black spots on the belly. Its back is marked with dark rosettes, and the lower part of the tail is ringed with black.

Diet:

Jaguars hunt mainly on the ground; however they will climb trees to lie in wait for prey. The jaguar can cover short distances rapidly, but it tires quickly. It hunts mainly at night and often surprises its unsuspecting prey. Its food consists mostly of forest animals varying in size from mice to deer. The jaguar is a proficient swimmer and also eats frogs, fish, turtles, and small alligators. It is especially skilled at catching fish, which it does by flipping the fish out onto the riverbank with its paw. Jaguars also will kill domestic animals, particularly where the forest has been cleared for farmland.

Interesting Facts:

The jaguar and the leopard are very similar in their body outlines. However, the jaguar has a more heavily built body, with stocky legs and a short neck. Its jaw is larger and even more powerful looking than the leopard's. They are excellent climbers and swimmers. Jaguars hunt alone at night. They can kill their prey with one blow and they regularly kill prey by piercing the base of the skull with their canines. The jaguar is the only big cat that does not roar. Melanistic (all-black) jaguars are not

uncommon. In an area where food is plentiful, a jaguar can survive in a circular area of about 3 miles in diameter. Where food is scarce, it may need to roam over an area of 200 square miles.

Snow Leopard (*Uncia uncia*)

Geographic Location:

Mountains of India, Pakistan, Afghanistan, Nepal, Bhutan, Tibet, Mongolia, and China

Habitat: Arid alpine regions between tree line and permanent snow

Natural History:

The body length is between 4 and 5 feet, and the tail is about 3 feet long. The snow leopard can weigh 55 - 165 pounds. The winter coat has spots that are arranged in distinct rows. They are round and charcoal gray, set against a light gray to yellow background, which grows paler in the winter. The background of the snow leopard's coat turns darker in the summer. The placement of the eyes is high. This allows the animal to stay low behind cover when stalking prey. The paws have thick cushions of hair to protect them from heat and cold. Large paws also allow them to walk on snow and not sink into it. Extremely strong back legs allow leaps of up to 50 feet -- useful for surprising prey. Snow leopards have several adaptations that enable them to survive in the mountains. They have long fur with a wooly undercoat to keep warm in the high mountains. The tail is long and thick with fur, and is wrapped around the body and neck at night to keep the animal warm. The tail is also long and flexible, and is used for balance.

Diet:

The snow leopard hunts alone because the rocky terrain and amount of food available in any one area cannot support large groups. It preys on blue sheep, ibexes, wild goats, hares, and even birds and mice. In milder, lower-altitude weather, the snow leopard hunts deer, gazelle, and wild boar. It stalks its prey, then springs and fastens onto it. It leaps to high rocky crags where it rests or watches for prey.

Interesting Facts:

The snow leopard is slightly smaller than the leopard, but its dense fur makes it look larger. It has the longest tail (relative to body length) of any cat.

Section 4

MANY COLORED CATS

Objectives:

- Children will be able to define camouflage.
- Children will be able to describe how camouflage helps some cats survive.
- Children will be able to identify characteristics of different types of cats.

Materials:

Copies of cat accordion sheet included	Copies of cat poem included	Scissors
Crayons or markers	Reference books	
Chalkboard or easel paper	Pictures of different wild cats	

Activities:

1. Begin by explaining that many mammals are camouflaged. This means that the colors and markings on their coats help them blend into their environment and make them less visible to their predators or prey. Show pictures of different types of cats and how their coats are different. Discuss what characteristics are different with each and write them on the chalkboard/easel.
2. Write the following cat names on the chalkboard/easel: leopard, lion, black panther, tiger, cheetah, jaguar, cougar, and snow leopard. Then, pass out the poem included at the end. Have the children read the poem. Then, explain that each verse of the poem matches one of the cats listed. Have the children search reference books and try to determine which picture matches which verse.
3. Pass out copies of the cat accordion sheet included and follow the Cat Cut-Out instructions:
 - a) Cut along the straight, solid lines in the middle and top of the page.
 - b) Fold the cat cutout like an accordion along the dotted lines. You will be cutting along the lines of the "top" cat. So make sure that it faces outward.
 - c) Cut the outline of the top cat along solid lines only. Be sure to hold the layers together firmly so that they do not slip. (To make it easier for children, have them cut around each cat separately and then fold it like an accordion.)
 - d) Unfold the paper and then color each cat to match one of the cats described in the poem (lion, jaguar, snow leopard, black panther, and tiger). The order of the cats does not matter, but make sure the children use the reference books to make their markings accurate.
 - e) Write the name of each cat on the back of its picture and then copy its verse onto the back as well.
4. When finished, discuss with the children the various ways that each cat's coat helps it blend into its environment. For example, discuss how the orange and black pattern on the tiger helps it blend into its background to help it sneak up on its prey. The dark black stripes of the tiger run at right angles to the outline of the tiger's body. This helps to break up the tiger's outline and makes it look as if it were part of the habitat where it lives. Another example is that of the leopard, which is spotted. This cat lives in a wooded area where sunlight comes through the woods in a "mottled" pattern. The dark spots on the cat's light coat help the cat mimic the natural light and dark pattern found on the forest floor. It also helps break up the outline of the body.

(Answers to poem verses: 1. Lion, 2. Tiger, 3. Black Panther, 4. Snow Leopard, 5. Jaguar)

(Source: Ranger Rick Naturescapes: Amazing Mammals II, P. 18-20)

Cat Verses

1

I've got a strong body
And very large paws,
Teeth made for killing
And powerful jaws.
When it's time for a hunt
The females take charge,
And the prey they go after
Are usually large.

2

On padded tiptoes
I move without sound.
I can jump twenty feet
In only one bound.
I often go swimming
Or lie under a tree.
And the stripes on my back
Make me harder to see.

3

In dark Asian forests
I ambush my prey.
And my dark-colored coat
Doesn't give me away.
Like all other leopards
I have spots on my back
Though you can't always tell
'Cause my coat is so black.

4

I'm active at night
But may sleep through the day,
And my fur has dark spots
On a background of gray.
I eat all kinds of prey
Including goats called markhor,
But unlike other big cats
I'm unable to roar.

5

It's Latin America
Where I always roam.
The tropical forests
Are the place I call home.
My light-colored coat
Is all covered with spots.
And within my rosettes
There are even more dots.

CAMOUFLAGE IN THE CLASSROOM

Objective:

Students will demonstrate their understanding of camouflage by designing a butterfly that blends into a classroom "habitat."

Materials:

One box of assorted toothpicks

- An outdoor grassy area or large piece of fabric or Astroturf
- Paper butterfly patterns for each student
- Butterfly pattern
- Markers, crayons, or colored pencils
- Colored toothpicks or paper clips

Instructions:

1. Begin the lesson by presenting the students with a box of toothpicks or paper clips in assorted colors.
2. Count how many toothpicks or paper clips there are of each color. Write the total of each on the blackboard. (Be sure to have green toothpicks in your box.)
3. Spread the colored items randomly over a large area of green grass. (If you don't have a grassy area at your school, use a patch of bare earth with some tan toothpicks. OR, use a large piece of fabric that matches the color of the toothpicks.)
4. Give the students 10 seconds to collect as many colored items as they can find.
5. Count the number of each colored item that the students retrieved. Compare this to your original count. Which color items were the easiest to spot and collect? Which were less obvious? Why?
6. Introduce the concept of camouflage as an animal adaptation.

Explain that many animals have colors or markings on their fur, feathers, scales, or skin that enable them to blend into their habitat (the place where the animal lives).

Ask the students, "How might camouflage help an animal to survive?" Can they think of any examples? (A motionless green frog at the edge of a pond is almost impossible for predators and prey to spot. The drab feathers of most female birds help them go unnoticed as they sit on their eggs. The snowshoe hare changes color with the season, becoming white in winter and brown in summer.)

Student Activity:

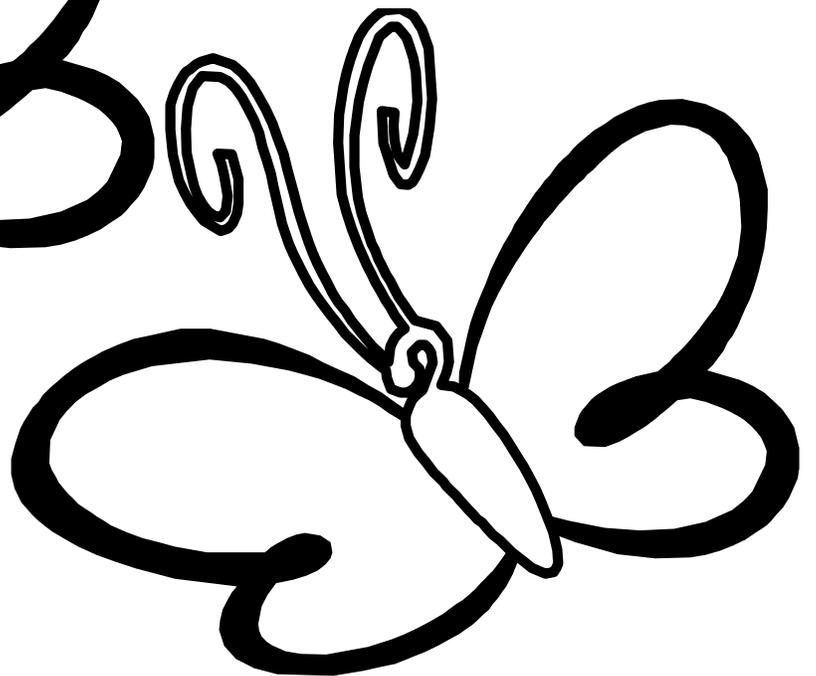
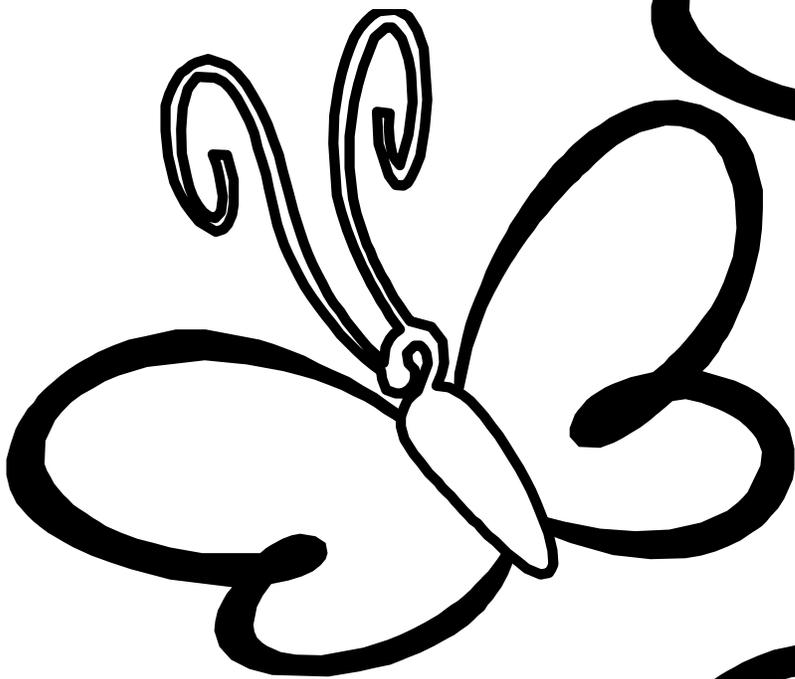
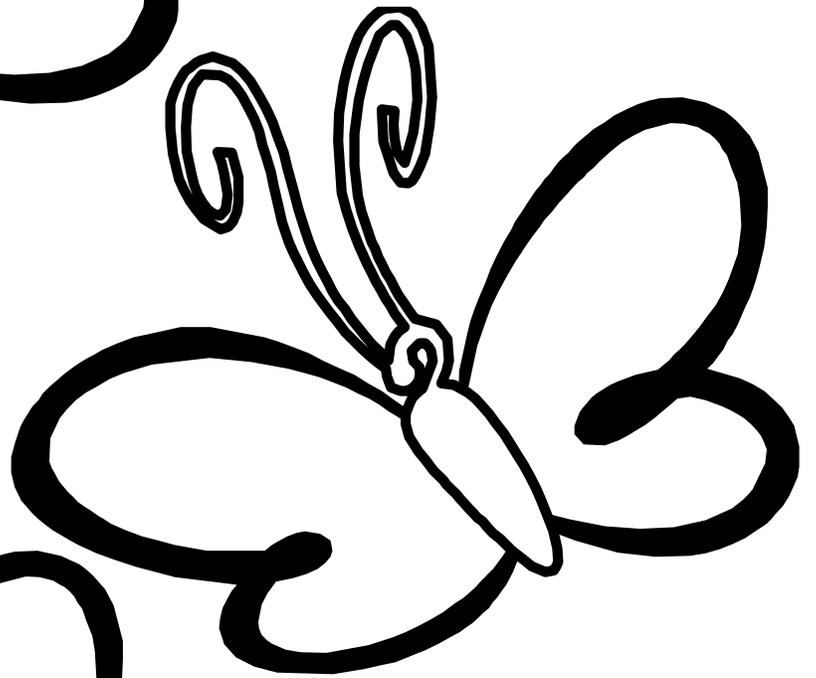
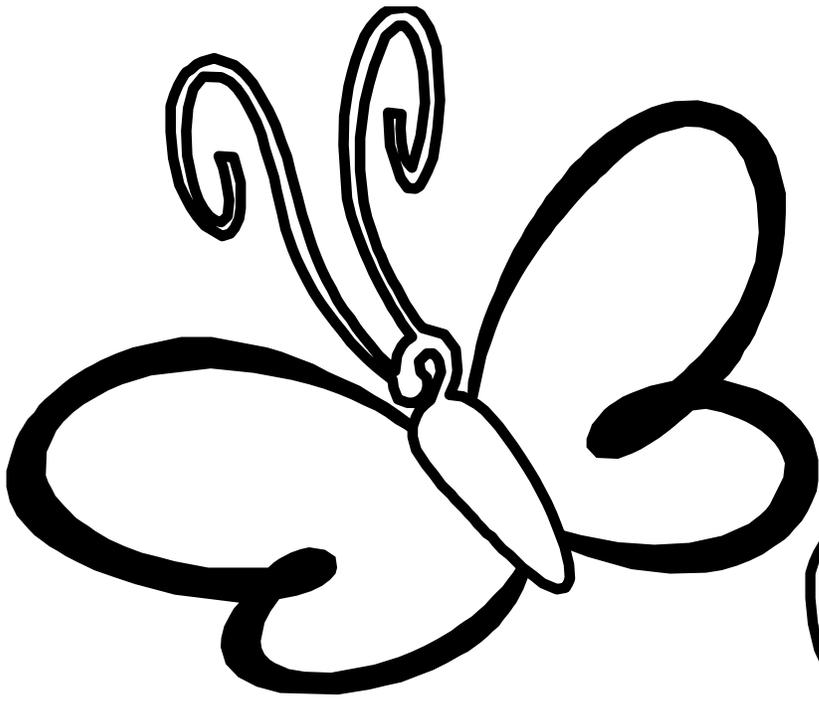
1. Give each student a copy of the butterfly pattern.
2. Ask the students to pretend your classroom is a butterfly habitat. Have each student look around the room and select a specific home or habitat for his or her individual butterfly.
3. Have each student color his/her butterfly pattern with markers, crayons, or colored pencils so that it will be camouflaged in this habitat.
4. Ask your students to place the butterflies in their habitat without burying them. The butterflies must be out in the open, but well-camouflaged.
5. Invite students from another class to see how many of your butterflies they can find.

Extensions:

Sometimes an animal's coloration does the opposite of camouflage. Instead, its markings or color patterns may call attention to the animal. Coloration may issue a warning to other species (for example, the bright colors of the South American poison arrow frog warns possible predators that these amphibians are not good to eat), or help advertise for a mate (male peacocks use their impressive tail display to attract females.)

Repeat the Classroom Camouflage activity by having students design butterflies whose coloration does not blend into their surroundings. Since they cannot hide from view, what methods might each of these butterflies use to protect itself from predators? What are some of the advantages and disadvantages of camouflage compared to advertising or warning coloration?

(Source: Los Angeles Zoo Web site: <http://www.lazoo.org/camo.htm>)



Section 5

CREATURE FEATURE SCAVENGER HUNT

Name: _____

Find the answers to these questions about animal adaptations in the Milwaukee County Zoo. Write the names of the animals that have these special adaptations in the blanks below. For some blanks there may be more than one right answer.

Webbed Feet: _____

Striped Fur: _____

Sharp Claws: _____

Whiskers: _____

Bright-Colored Feathers: _____

Sharp Teeth: _____

Large Beak: _____

Spotted Fur: _____

Wings: _____

Scales: _____

Hooves: _____

Can you list any other creature features you saw that help animals survive?

CREATURE FEATURE SCAVENGER HUNT

(Answer sheet)

Find the answers to these questions about animal adaptations in the Milwaukee County Zoo. Write the names of the animals that have these special adaptations in the blanks below. For some blanks there may be more than one right answer.

(NOTE: Below are just a few of the animals in the zoo that may fit these categories. Encourage children to find additional answers.)

Webbed Feet: Humboldt Penguin, Canadian Geese, North American River Otter

Striped Fur: Siberian Tiger, Zebra, Greater Kudu

Sharp Claws: Cheetah, Brown Bear, American Badger, Wolverine

Whiskers: Snow Leopard, Siberian Tiger, Cougar, North American River Otter, Caracal

Bright-Colored Feathers: Macaw, Livingston's Turaco, Congo Peacock

Sharp Teeth: Polar Bear, African Lion, Jaguar

Large Beak: Macaw, Rhinoceros Hornbill

Spotted Fur/Coat: Jaguar, Spotted Hyena, Cheetah, Snow Leopard

Wings: Barn Owl, Guam Micronesian Kingfisher

Scales: Anaconda, Blood Python, Cuban Boa

Hooves: Greater Kudu, Eland, Dall Sheep

Can you list any other creature features you saw that help animals survive?

ANIMAL ADAPTATIONS AT THE ZOO

1. Find one bird that has *feet* adapted for swimming. _____
What makes its feet useful for swimming? _____

 2. What is the one adaptation all birds have that no other animal has? _____
 3. Why do adult **orangutans** live by themselves? _____

 4. The **Japanese macaque** has thick, almost wooly fur. Why would this kind of fur be an adaptation for this monkey? _____

 5. **Gorillas** are knuckle-walkers. Name one physical adaptation they have that makes this possible.

 6. The **fennec fox** lives in the desert. Name a physical adaptation it has to help stay cool. ____

 7. What does the **fat-tailed dwarf lemur** use its tail for? _____

 8. The **Siberian tiger** is a hunter. Name two adaptations it has to help it hunt. _____
-

Section 6

FACT AND FICTION I

Objectives:

- Children will be able to define adaptation.
- Children also will be able to compare mammal adaptations for finding food and escaping from predators.
- Children will write and illustrate a story describing how a certain mammal adaptation arose.

Materials:

Copy of Just So Stories by Rudyard Kipling

Copy of "Why the Possum's Tail is Bare" by James Connolly (Ranger Rick, April 1985)

Chalkboard or easel paper

Paper and pencils

Reference books

Crayons or markers

Activities:

1. Begin by discussing with the children some of the ways mammals and other animals are adapted to survive. Explain that adaptations are characteristics or behaviors that help an animal survive in its environment. For example, have kids think of ways that a fish is adapted to live in water. (Gills, fins, and a streamlined body could be examples.) Then, ask them to think of other animal adaptations. Write these answers on the chalkboard/easel.
2. Then, ask the children if they are familiar with Rudyard Kipling's Just So Stories. If not, explain that Kipling was a famous author who wrote short stories, poems, and novels. He lived in India during the late 1800s and early 1900s. In his book, Kipling made up descriptive tales using imagination to explain how some animals came to look or act the way they do. Read one or two of these stories to the children. You also may want to read a myth by another author (in this example, "Why the Possum's Tail is Bare" by James Connolly).
3. Then, allow the children time to brainstorm a mammal that they think has some interesting adaptation. Then, let the kids write and illustrate their own "just so" story about one of their favorite mammals. (Some suggestions include: "How the Platypus Got Its Duck Bill," "How the Zebra Got Its Stripes," and "How the Vampire Bat Got Its Wings.")

These stories should combine some fact and some fiction. For example, Kipling's "The Beginning of the Armadillos" explains that the hedgehog and the tortoise changed into armadillos by borrowing characteristics from one another. Of course, this is not true, but the story does explain that the armadillo has protective armor and can roll up into a ball to defend itself from predators -- which are all facts.

4. When the children have finished, have them share their stories and illustrations with others.

(Source: *Amazing Mammals II*, p. 70)

FACT AND FICTION II

Objectives:

- Children will be able to define adaptations.
- Children will be able to create an imaginary animal with real adaptations using their background knowledge of animal adaptations.

Materials:

- Stories and illustrations created in Fact and Fiction I
- Paper
- Colored crayons, markers, or pencils
- Pencil or pen
- Chalkboard or easel paper

Activities:

Begin by having students share their animal adaptation stories from Fact and Fiction I. If the Fact and Fiction I was not used, begin with the step below (#2).

After sharing the stories, have children list the different types of animal adaptations they know about. Write these adaptations on the chalkboard or easel paper. Have the children discuss the ways that these adaptations are used and how they help the animals.

After discussing animal adaptations, explain that today the children get to create their very own animal with special adaptations. Using their knowledge of animal adaptations and their imaginations, the children should create a brand new animal with a special adaptation and be prepared to write about how that adaptation helps the animal survive. The simplest way to carry this out is to use a real animal, adding the special adaptation to it. For example, one animal could be a lion with webbed feet to help it swim. Whatever the example, children should be able to explain why they chose the animal and how its new adaptation helps the animal. Also, children can and should use their imaginations to create an animal with a new adaptation.

When the children have decided upon an animal, they should color and "design" the animal, giving it a name. When the children have finished designing their animal, they should then write a paragraph about why this new adaptation will help the animal. This will help develop critical thinking about the why and how of animal adaptations.

