Amazing Animal Adaptations

Skeletons: Animals Unveiled

Lesson Curriculum

3rd – 5th Grade

55 Minute Program

3rd Grade:

Florida Next Generation Sunshine State Science Standards

SC.3.N.1.1 - Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

SC.3.N.1.2 - Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.

SC.3.N.1.3 - Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.

SC.3.N.1.4 - Recognize the importance of communication among scientists.

SC.3.N.1.5 - Recognize that scientists question, discuss, and check each other's evidence and explanations.

SC.3.N.1.6 - Infer based on observation.

SC.3.L.15.1 - Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

SC.3.L.17.1 - Describe how animals and plants respond to changing seasons.

4th Grade:

Florida Next Generation Sunshine State Science Standards

SC.4.N.1.1 - Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

SC.4.N.1.2 - Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.

SC.4.N.1.3 - Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.

SC.4.N.1.4 - Attempt reasonable answers to scientific questions and cite evidence in support.

SC.4.N.1.5 - Compare the methods and results of investigations done by other classmates.

SC.4.N.1.7 - Recognize and explain that scientists base their explanations on evidence.

SC.4.L.16.2 - Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.

SC.4.L.16.3 - Recognize that animal behaviors may be shaped by heredity and learning.

5th Grade:

Florida Next Generation Sunshine State Science Standards

SC.5.N.1.1 - Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.5.N.2.2 - Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others.

SC.5.L.14.1 -- Recognize body parts related to movement and the five senses.

SC.5.L.14.2 -- Observe plants and animals and recognize how they are alike in the way they look.

SC.5.L.15.1 - Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.

SC.5.L.17.1 - Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.

Program Overview

Amazing Animal Adaptations will familiarize students with a number of types of adaptations through hands-on observation of various specimens. The participants will work in teams to

evaluate their specimens, determine what types of adaptations they exhibit, and then communicate their finds to the class.

Learning Objectives

1. Participants will successfully define and explain how adaptations help animals survive.
2. Participants will successfully identify a variety of adaptations and explain their function.
3. Participants will successfully work in a team environment and communicate their observations to their team.

Materials and Supplies

Demo: Beaver Skull and Coyote Skull→ teeth adaptation to what they eat
Station cards
1 copy of the answer sheet for teacher
32 Animal Adaptations Worksheets and pencils
Station1: Bird Bone and mammal bone → adaptation for flight Turkey Skull and Raccoon Skull → bird bone v. mammal bone
Beaver Skull and Coyote Skull from Demo
Station2: Pancake Tortoise & Box Turtle → shell (protection) and flat shell for hiding in narrow crevices
Walking stick & leaf insect →mimicry & camouflage
Station3: Eggs: Bald Eagle & Killdeer → Cliff/Tree nesting (eagle) vs. ground nesting (killdeer)
Blue Morpho Butterfly → cryptic coloration (underside camouflages as they fly over) & sometimes sexual dimorphisim (male coloration used to attract females)
Station4: Bird beaks: spoonbill, ibis, eagle → for different food sources
Baleen and killer whale tooth → feeding adaptations
Station5: Rabbit pelts: arctic (winter) and summer →camouflage
Hawk foot and duck foot → for catching food/locomotion

Vocabulary

- Adaptation
- Predator
- Mimicry
- Herbivore
- Prey
- Food Chain
- Omnivore
- Camouflage
- Carnivore
- Defense

Set-Up

Student Tables:

For a group of 25 to 32 students, set up five tables with five or six chairs at each (no chairs if in museum). Place each station with the specimens on the placemats on the table (which specimens go in which station is listed in materials and supplies). Place the demo bones on the front table to share with students while engaging them.

Introduction *(2 min)*

Introduce yourself to the students. Ask them if they have heard of SKELETONS. Tell them a little bit about our museum (we have 500 real animal skeletons etc.). Tell them that this is the collection of one person! His name is Jay Villemarette and he began collecting skulls when he was just 7 years old! If you are in a classroom, make sure to inform them that until instructed they should NOT touch anything on the tables.

Engage *(15 min)*

A lot of the animals we have talked about and the ones you mentioned come from all over the world. Animals do not live in one place; they live in many different places and environments. Today we are going to be talking about amazing animal adaptations! Because animals live in different places, they need different adaptations to survive in their habitats.

Have you heard the word adaptation before? *Let some students try to define it.*
Everyone say "Adaptation". An adaptation is a feature or trait an animal has to help it survive where it lives, in its environment. **Raise your hand if you have ever seen an armadillo before?** Armadillos are common animals that you will see living here in Florida. **What does an armadillo have that helps it survive?** Yes! The armadillo has a type of body armor made up of bony plates in the skin called osteoderms. **Why is helpful for this animal to be covered in bony plates?** This protects them when a predator tries to attack. The 3-banded armadillo has the ability to roll into a ball for additional protection, offering a degree of protection that other species do not possess. The armadillo's adaptation is their armor that protects them; it helps them survive.

Adaptations are related to an animal's environment. **Can anyone raise their hand and tell me where you might find a horse living?** *Take all answers.* They might live on a ranch or out in the wild. **Could a horse live in the ocean?** *No*! **Why not?** Horses do not have any adaptations to help them survive in the ocean. **What do fish have that helps them survive in an aquatic environment?** Fish have gills to help them breathe underwater; gills are their adaptation to living in the ocean. Horses do not have gills, they have four legs that help them to walk and run on land. **Could a fish live in the desert?** *No!* Horses cannot survive in water, whereas fish cannot survive without water.

Sometimes animals have more unique adaptations. Think about bats. They are a very unique mammal and actually make up about ¼ of all mammal species. **Can anyone name some adaptations of bats?** One of their adaptations is echolocation. **Does anyone know what that is?** *Take all answers.* Bats emit a sound in their environment and listen for how the sound returns to them by bouncing off different objects. How these sounds return to them help them locate and identify objects. Echolocation helps them fly at night and hunt for insects. Echolocation is a bats adaptation to navigate their environment and catch their food.

I brought some skulls to share with you today. *Hold up the beaver skull and ask students to guess what animal they think it is! Most of the time they get it right away.* Yes, it is a beaver. **What gives it away as a beaver?** Yes, its teeth! **What do they use their teeth for?** *Pause for answers.*

Beavers use their teeth for cutting wood to make their homes and to eat. **By looking at these sharp teeth in the front, do you think these would be helpful for chewing your food? Think about how you use your teeth to eat, what do you do with your front teeth?** *Bite!* **What do you do with your back teeth?** *Chew our food!* Beavers are the same way, they use their front teeth to bite, *open the mouth of the beaver skull*, and have teeth in the back to chew their food so that they can digest it.

I have another skull (coyote), what type of animal do you think this is? It may be a little harder to guess. *Let students try to guess, if struggling help them out. For example, if they say it's an alligator, say "its not an alligator and it is not in the reptile family!" or if they say it's a dog say, "it is in the dog family and it is a wild dog!"* Yes, it is a coyote. **Do the coyote's teeth look like the beaver teeth?** *No!* **Why not?** *Take all answers.* Because coyotes do not eat the same foods as beavers do. **What do coyotes eat?** *Meat! Open the coyote skull so they can see the sharp teeth.* Coyotes are actually omnivores but they primarily eat meat**. Because they eat meat and they need these sharp teeth to slice through meat, beavers are herbivores which means they eat what?** *Plants!* So animals need different teeth because they eat different things. That is an adaptation too.

Plants have adaptations too! *(Think of a cactus, adapted to survive in the desert with limited water, or a branch covered in thorns).* No animal is perfectly adapted to their environment – animals do not always catch their food and plants do not always survive droughts. However, an adaptation can help them survive and pass on that adaptation to their offspring.

Activity *(25 min)*

Today we are going to learn all about these amazing animal adaptations by studying different specimens up close. You will be split up into teams of scientists. It will be your job to determine which adaptation you are looking at for the items in your station and how it helps the animal survive in its environment. You will be filling out a worksheet to keep track of the different adaptations you see.

Most of the items here today are real! So please treat them respect. You may touch them and pick them up but there are two rules: rule # 1: do not walk away with the items; they must stay over the table at all times, rule #2: if you pick up the items, please use two hands. *Divide the students into groups, or allow the teacher to split up groups, (for how many stations you have) of approximately 3-6 students. Hand out worksheets to all students. Rotate students to each station as time allows (for 5 groups, 5 min per station).*

Conclusion *(13 min)*

Animals have a variety of adaptations that help them survive in a particular environment. **What adaptations did you see? How did it help the animals survive in their environment?** *Let the students tell you about some adaptations. Go through each station to describe what the adaptations are as the students tell you about them. You do not need to go over ALL of this information, just the adaptations, some of the information is to help you with questions the*

students might have. Give a the copy of the answer sheet to the teacher, allow them to collect the worksheets from the students.

Station 1:
Bird bone and mammal bone. Birds have air pockets in their bones to make them lightweight; the lightweight hollow bones help them to fly. If you hold the mammal bone in one hand and the bird bone in the other, you can feel the weight difference. That is because birds are adapted to fly and mammals are not. Similarly with the skulls, they also have a weight difference. They also have different teeth or beak because they are different animals and eat different things.

Coyote and beaver skull.
Briefly review the demo specimens.

Station 2:
Pancake tortoise and box turtle.
Their adaptation is that they have shell to help protect them from predators, just like the armadillo we talked about. Their shells can also help camouflage them into their environment. The pancake tortoise inhabits Africa, North America, Asia, Europe, and South America. Its top shell is brown frequently with a pattern of radiating dark lines on each scute (shell plate), helping camouflage the tortoise in its natural dry habitat. When threatened, the tortoise wedges itself deep in within a rock crevice or below a boulder; the flat and lightweight shell allow it to do this.

The box turtle inhabits North America and Mexico. They have a moveable hinge on the lower shell (no it isn't broken) that allows them to retract inside the shell and then completely close up, leaving no flesh exposed. Their coloring also helps them to camouflage to pond water.

If needed: Difference between turtle and tortoise: **turtles** spend most of its life in the water. Turtles tend to have webbed feet for swimming. Sea turtles are especially adapted for an aquatic life, with long feet that form flippers and a streamlined body shape. **Tortoises** are land-dwellers that eat low-growing shrubs, grasses, and even cactus. Tortoises do not have webbed feet; their feet are round and stumpy for walking on land. Tortoises that live in hot, dry habitats use their strong forelimbs to dig burrows. Then, when it's too hot in the sun, they slip underground.

Walking stick and leaf insect:
Both insects use camouflage as their adaptation. The walking stick can blend in to tree branches and sticks and the leaf insect blends into the surrounding leaves. The walking stick is found predominantly in the tropics and subtropics—although several species live in temperate regions—stick insects thrive in forests and grasslands, where they feed on leaves. Mainly nocturnal creatures, they spend much of their day motionless, hidden under plants. Many stick insects feign death to thwart predators, and some will shed the occasional limb to escape an enemy's grasp. Leaf insects feed on plants and typically inhabit densely vegetated areas. Their natural range extends from islands in the Indian Ocean, across parts of mainland South Asia and Southeast Asia, to Papua New Guinea and Australia in the western Pacific. There area also different colors and shapes of leaf insects!

Station 3:
Eagle egg and killdeer egg. **How do you know which egg goes to which bird?** Large birds lay large eggs, so you know that the larger bird has the large white egg. Small birds lay small eggs. **Why are they different colors? Where do eagles lay their eggs?** *In a nest up in the trees!* **Where do killdeer birds lay their eggs?** *On the ground!* **Even looking at the picture, if you place the egg in that environment what do you notice?** It blends in. **Why do you think this bird might want their eggs to camouflage?** So that predators do not find and eat their eggs. Having eggs that blend in with the ground is a very advantageous adaptation because it helps your offspring survive. **Because you know which animals love to eat eggs?** Snakes and raccoons!

Blue Morpho Butterfly: These butterfies live in the tropical rainforests of Central and South America. Their wings span anywhere from five to eight inches, and are a bright, iridescent blue due to microscopic scales that reflect light. The underside of their wings, however, is dull brown with many eyespots, providing camouflage against predators when they are closed; this is called cryptic coloration. When the Blue Morpho is seen flying, the contrasting bright blue and dull brown colors flash, creating a beautiful effect that looks as if it's appearing and disappearing. The female Morpho butterfly is less vivid than the male. The males' bright coloring is designed to attract females and to intimidate any rivals that might fly into his territory. The males' wings reflect the bright, iridescent color over an extremely wide angle, to maximize its visibility in the rainforest.

Station 4:
Bird beaks: **All of these animals are in the bird family, but why do they have different beaks?** These birds to not eat the same things so their beak is going to be adapted to what they eat! Eagles eat mice, ground squirrels, rabbits, reptiles, and other prey. **Do you think that the Scarlet Ibis would be able to eat the same thing as eagles?** *No!* The eagle has a perfectly shaped beak for ripping meat off of bones. **Could the Scarlet Ibis beak rip pieces of meat off of bones?** *No!* The Scarlet Ibis has a long thin bill for probing in water, cracks in dry ground, or mud for grasshoppers, beetles, worms, and crustaceans. Spoonbills have large, flat, spatulate bills and feed by wading through shallow water, sweeping the partly opened bill from side to side. The moment any small aquatic creature touches the inside of the bill—an insect, crustacean, or tiny fish—it is snapped shut.

Baleen and Killer Whale: Some aquatic animals have very different adaptations! Baleen is a filter-feeder system inside the mouths of baleen whales. The baleen system works when a whale opens its mouth underwater and the whale takes in water. The whale then pushes the water out, and animals such as krill are filtered by the baleen and remain as food source for the whale. Killer whales, are the largest of the dolphins and one of the world's most powerful predators. They feast on marine mammals such as seals, sea lions, and even whales, employing teeth that can be four inches (ten centimeters) long. They are known to grab seals right off the ice. They also eat fish, squid, and seabirds.

Station 5:

Rabbit Pelts: Most fur colors are shades of brown and gray depending on where the rabbits live. While arctic rabbits, like the white pelt in this class, have a whitish fur color to camouflage the white background of winter, but in autumn the same color changes to brown or reddish to mingle with the surroundings, like the brownish pelt in this class. Rabbits use their fur color to camouflage into their environment.

Hawk foot and duck foot: Both feet are used for locomotion, though also have their own adaptations because they are different feet! Ducks use their feet for swimming because they live on the water. Hawks need grasping feet to catch their prey, so they also use them for predation! Both birds do not eat the same foods and use their feet in different ways.