

Furs, Feathers, Skins and Scales

Self-Guided Ed-venture

Grades 1-4

Dear Teacher:

Thank you for planning a trip to Capron Park Zoo! This adventure guide is designed to help you make the most of your self-guided visit to the zoo and includes:

- **Pre-visit Warm-Ups:** These activities can be used in the classroom to help your students prepare for their trip to the zoo. It includes activities and vocabulary to familiarize students with the ed-venture theme
- **Ed-venture Amble Activities:** This hands-on learning activity should be done while the students 'amble' through the zoo at their own pace. An answer key with any notes or important information is included for the teacher.
- **Post-visit Wrap-Ups:** Once you have returned to your classroom, use these activities to reinforce the students' ed-venture and wrap up the topic at hand.

All these activities are appropriate to the listed grade levels and have been formulated using the MA State Science Frameworks. We hope you and your students will enjoy your visit to the zoo while learning a bit about our animal friends.

Frameworks, Standards and Skills

Frameworks and Standards

- *Group both living and non-living things according to characteristics they share (Gr. 1 & 2)*
- *Animals are classified according to physical characteristics. (Gr. 3 & 4)*

Skills

- *Observing*
- *Inferring*
- *Predicting*
- *Organizing and interpreting data*
- *Hypothesizing*

'Man masters nature not by force, but by understanding'

Jacob Bronowski

Introduction

The topic of this self-guided ed-venture is the classification of animals. Focusing on vertebrate animals, students will learn to classify animals using the body covering of the animal and other distinguishing characteristics to further define the animal class.

Pre-visit Warm-Ups

Introducing the topic:

Taxonomy is the system of classifying or arranging organisms in order according to their similarities and differences. The word 'taxonomy' comes from the root 'taxis' (to arrange) and 'nomo' (law). Grouping organisms according to certain characteristics they share allows scientists to make generalizations about the group. Separating each organism into the smallest grouping, where all the organisms are of the exact same kind, shows how different these organisms are from all the others. As we work up the hierarchy from the basic unit of species, we are looking at more and more distant common ancestors. Those grouped together in genera have a very close common ancestor while at the level of class the relative is much farther back in evolutionary time.

Animals are broken down into the following groups, from the most general to the most specific:

KINGDOM
PHYLUM
CLASS
ORDER
FAMILY
GENUS
SPECIES

The most general breakdown of all organisms is the *Kingdom*. There are seven kingdoms of life.

Eukarya - single celled organisms like amoeba and paramecium

Eubacteria - traditional bacteria form

Archaea - unusual bacteria forms such as thermophiles and halophiles

Fungi - mushrooms and molds

Plantae - green plants that can produce their own food through photosynthesis

Animalia - multi-celled organisms incapable of producing their own food

Since we are dealing with animals only in this ed-venture, we will ignore the other kingdoms for now.

Once we decide what kingdom the animal belongs to, we must look at the phylum. There are many different phyla in the animal kingdom. The easiest way to decide what phylum something belongs to is to ask the question: Does this animal have a backbone at some time in their life? If the answer is no, then the animal is an invertebrate. If the answer is yes, they are vertebrates and belong to phylum *Chordata* (animals with backbones).

Phyla are then broken down into *Classes*. To figure out what class the animal belongs in look first at what covers it's body and then other physical characteristics. For example, we ask if the animal is **warm-blooded** or **cold-blooded**. If an animal is warm-blooded, it means they are able to maintain a steady, constant body temperature on their own. Mammals and birds are able keep their bodies warm regardless of the temperature of our surroundings, so they are called warm-

blooded. On the other hand, a reptile or amphibian depend on the air temperature and the sun to keep the body warm, so we say they are cold-blooded. Remember the following to decide which class an animal belongs to:

- **Fish** have scales, gills, lay eggs in water and are cold-blooded
- **Amphibians** have wet, smooth skin, lay jelly coated eggs in water, and are cold-blooded. Some breathe with gills, some with lungs, and some have both!
- **Reptiles** have dry, scaly skin, leathery eggs that are laid on land are cold-blooded and breathe with lungs.
- **Birds** have hollow bones, feathers, are warm-blooded and lay hard-shelled eggs.
- **Mammals** have fur or hair, give birth to live young (with two exceptions), are warm-blooded and mothers produce milk to feed their babies

Beyond the level of class, things become a great deal more complicated. To decide what order an animal belongs to, we must ask more specific questions. For example, if an animal has sharp incisors for eating meat, we say it belongs to the order *Carnivora*. If it has front limbs that are modified for true flight (i.e. wings), it belongs to the order *Chiroptera* (bats). At this time, there are approximately 21 orders of mammals. There are more than 25 orders of birds, three orders of reptiles and 3 orders of amphibians.

Orders can be broken down into *Families* of related organisms, like *Bufo*idae (toads), *Pythonidae* (pythons), *Strigidae* (typical owls) and *Felidae* (cats). To decide what family an animal belongs to, we must start looking at characteristics that are more difficult to see, such as bones, skeleton structure and dentition (teeth).

Genera are groups of very closely related organisms, and sometimes scientists must turn to genetics to create these groups. An excellent example of how closely related animals in the same genera are is the *Canids*, or dogs. This genus contains coyotes, foxes, and wolves. All are descended from a relatively recent ancestor, but all have morphological and physiological characteristics that are unique to them.

'*Species*' in Latin means 'kind', and is the basic, most refined unit of classification. In modern day taxonomy, genetics is an important tool for designating a species. Genetic analysis has 'discovered' many 'new' species from animals believed to be the same. Conversely, some animals originally thought to be separate have been found to be the same animal

Each living thing has a unique species name. For instance, the Argentinean Horned Frog has a species name of '*ornata*' meaning ornate, referring to the animals' distinctive color pattern. The genus is '*Ceratophryes*', which means 'horned head'. While there are other horned frogs, none of them has the species designation of '*ornata*'. Put the two name names together, '*Ceratophryes ornata*', and any scientist anywhere in the world will know exactly what type of horned frog being referred to!

Below is a chart of four animals and the taxonomic classification.

KINGDOM	Animalia	Animalia	Animalia	Animalia
PHLYUM	Chordata	Chordata	Chordata	Chordata
CLASS	Amphibia	Reptila	Aves	Mammalia
ORDER	Salientia	Serpentia	Strigiformes	Carnivora
FAMILY	Bufoidae	Pythonidae	Strigidae	Felidae
GENUS	Bufo	Morelia	Megascops	Panthera
SPECIES	americanus	spilotes	asio	leo
	<i>American Toad</i>	<i>Carpet Python</i>	<i>Eastern Screech Owl</i>	<i>African Lion</i>

The following activities are designed to help your students prepare for their trip to the zoo.

Warm-Up Activity: Do You See What I See?

Learner Outcome: Sharpened observation skills that will help students during their trip to the zoo.

Procedure: Begin this activity with a discussion about what it means to observe something. Explain that the students will be observing many things during their visit to the zoo. To prepare your students and sharpen their observation skills, do the following activities.

You've Changed!

Ask students to pair up. Have each pair face each other and look at everything about their partner for 30 seconds. Ask them to turn their backs to each other and change something about their appearance (untie a shoelace, take out an earring, unbutton a button, etc.). When finished, they should turn around and try to guess what is different about their partner.

Now You See It

Lay about 10 ordinary classroom objects (paper clip, chalk, eraser, etc.) on a bandana. Give the class a short time to look at the objects, and then cover them with another bandana. Ask the students to turn their backs, and then quickly pull out one of the objects. Have the students turn around, look at the uncovered bandana, and try to guess what you have taken away.

Warm-Up Activity (Grade 1 & 2): Vertebrate Modes on the Move

Learner Outcome: Students will have a better understanding of the different body coverings of each animal class, and how these classes move.

Part One - Materials: Old boxes, outlines of different animals, pictures of different body coverings

Procedure: Cut out some outlines of different animals from old boxes, but do not color them in (you want them to be silhouettes). For example, you might cut out silhouettes of a bird, snake, mammal, turtle and person. Make pictures of fur, feathers, scales and shells (or you could cut them out of magazines instead!). Have the children decide which 'clothing' goes on which animal and dress the proper cutout. You might want to consider having a classification fashion show and allow the children the opportunity to make fantastic and outrageous 'clothes' for each class of animals.

Part Two - Materials: pictures of animals from the five different vertebrate classes, enough for one for each child

Procedure: You will need to be outside in a large open space for this activity. Break the children into two teams. Have each child on both teams select a picture. Have the children do a relay race using the method of movement that the pictured animal uses rather than plain old running. (Be sure to have a camera handy - this activity will have everyone laughing!)

Warm-Up Activity (Grade 3 & 4): *Vertebrate Grab Game*

Learner Outcome: Students will better understand the characteristics of the 5 major vertebrate groups

Materials: Cut out vertebrate figures and vertebrate characteristics

Procedure: Using boxes or poster board, cut out a variety of vertebrate silhouettes, then have a discussion the characteristics of 5 vertebrate (see above).

After the students understand the differences between the groups, divide them into 2 teams and have the teams line up facing each other on opposite sides of a field or room. Next, have the children on each team count off and tell them to remember their numbers. Show the students the 5 cutouts and explain that each one represents the appropriate group. Line up the cutouts in the center of the playing area between the teams.

Explain that you will read a statement (use the group characteristics) that describes one or more vertebrate groups. The children must listen carefully and try to figure out which group or groups you are describing. Explain that when you call out a number the child on each team with that number should run to the center of the playing area and grab the appropriate cut-out, then run back before being tagged by the child on the other team.

This activity is from "Amazing Mammals I"; Nature Scope, National Wildlife Federation.

Warm-Up Activity: Vocabulary

Amphibian – *Animal that has cold blood, smooth skin, and lays eggs in water.*

Reptile – *Animal that is cold blooded, has dry, scaly skin and lays eggs on land.*

Cold-blooded – *Having a body temperature that changes with the surrounding air, land or water temperature*

Warm-blooded – *Able to maintain a steady warm body temperature without regard for the surrounding temperature*

Mammal – *Animal that is warm-blooded, has fur or hair, gives birth to live young and feeds its baby milk*

Avian – *Animal that is warm-blooded, has feathers and hollow bones, and lays hard-shelled eggs*

Ed-venture Amble Activity (Grade 1 & 2): *Head of the Class*

Learner outcome: Students will make observations to discover to which family each animal on the list belongs.

Procedure: Distribute the table with the animal list to each student. As they walk around the zoo, students should put an 'X' in the appropriate column for each animal and then decide to which class the animal belongs.

ANIMAL	Fur	Feather	Skin	Scales	Warm Blood	Cold Blood	Lays Eggs	Live Young	CLASS <i>(Amphibian, Reptile, Bird or Mammal)</i>
Silvery-cheeked Hornbill									
Ocelot									
Llama									
Sloth Bear									
Japanese Macaque									
Visayan Warty Pig									
Red-crowned Crane									
Ruffed Lemur									
Agouti									
Fennec Fox									
Corn Snake									
Douroucouli									
Pygmy Slow Loris									
Tawny Frogmouth									
Green Tree Python									
Violet Turaco									
Two-toed Sloth									
African Spur-thigh Tortoise									
Dart Frogs									
Emu									
Kangaroo									

Ed-Venture Amble Activity (Grade 3 & 4): *What's in a Name?*

Learner Outcome: To understand how the genus and species word are used to describe and define an animal

Materials: Scientific Name Chart, pen or pencil

Procedure: Give each student a copy of the name table. Discuss how sometimes it is easy to figure out what scientific words might mean by observing the animal's physical characteristics or where finding out where it comes from. For example, the genus and species name of a Green Tree Python is *Morelia viridis*. "Morelia" means tree snake/python and "viridis" means green.

As they walk around the zoo, have them find the animals whose scientific names are listed below and write the common name in the appropriate column. Then have them try and figure out what each word means









SCIENTIFIC NAME	COMMON NAME	WHAT THE SCIENTIFIC WORDS MIGHT MEAN
<i>Grus japonensis</i>		GRUS:
		JAPONENSIS:
<i>Muntiacus reevesi</i>		MUNTIACUS:
		REEVESI:
<i>Panthera leo</i>		PANTHERA:
		LEO:
<i>Nycticebus pygmaeus</i>		NYCTICEBUS:
		PYGMAEUS:
<i>Musophaga violecea</i>		MUSOPHAGA:
		VIOLECEA:
<i>Choloepus didactylus</i>		CHOLOEPUS:
		DIDACTYLUS:
<i>Leptailurus serval</i>		LEPTAILURUS:
		SERVAL:
<i>Lontra canadensis</i>		LONTRA:
		CANADENSIS:
<i>Hystrix indica</i>		HYSTRIX:
		INDICA:
<i>Goura victoria</i>		GOURA:
		VICTORIA:

Wrap-Up (Grade 1 & 2): Match-It

Learner Outcome: To ensure that students understand how to classify and identify animals

Materials: Match-it Cards, pen or pencil

Procedure: Break the class into 4-5 small groups and give each group a match-it card. Then read the clue riddles and classification information out loud and see if the groups can properly match the clue with the description of the animal

 SNOW LEOPARD	 DIADEM SNAKE	 INDIAN CRESTED PORCUPINE	 DART FROG
 RED-CROWNED CRANE	 MEERKAT	 EMU	 FOREST FODY

CLUE RIDDLES:

1. Our coats are spotted black and white; our tails are long for poise. Together we are an awesome sight, and we like to play with toys - *Kingdom: Animal, Phylum: Chordata, Class: Mammalia*
2. When we stand up like poles, we're on the lookout for danger. If we feel scared we hide in our holes, from the unknown stranger - *Kingdom: Animal, Phylum: Chordata, Class: Mammalia*
3. When it's light | sleep in a nice cool place, at night | feast on fruit and leaves. People say my face is sweet, but my quills say no hugs please! - *Kingdom: Animal, Phylum: Chordata, Class: Mammalia*
4. My eyes are very big and wide, but cannot see from side to side. I need to move my head around to see what's moving on the ground - *Kingdom: Animal, Phylum: Chordata, Class: Avea*
5. We're red, black and white, with big, long beaks used for what we're wishing. Our dinner we must catch and eat, so we spend our days a-fishing - *Kingdom: Animal, Phylum: Chordata, Class: Avea*
6. Our habitat is rocky and dry, we have no legs or feet. The hot desert air will keep us warm, but careful we don't over-heat - *Kingdom: Animal, Phylum: Chordata, Class: Reptila*

7. We're large birds with tiny wings, grass and bugs we like to munch. We cannot fly and have to run to keep from being lunch - *Kingdom: Animal, Phylum: Chordata, Class: Aves*

Wrap-Up (Grade 3 & 4): *The Scientific Name Game*

Learning Outcome: Students will use Latin root words to determine the meaning of the scientific names of some animals.

Procedure: Explain to the class that scientific names can be divided into categories according to their meaning: appearance, personal name of a real or mythical person (like the discoverer), native name, geographical origin, habitat, behavior, food, and voice.

Assign the students (or allow have them choose) different animals and have them research the scientific names. Have the students conduct further research to determine the origins and meanings of the scientific names.

Here's an example

The scientific name of the Silvery-checked Hornbill is *Bycanistes brevis*. The word *Bycanistes* means “trumpeter”, and the word “*brevis*” means short. This name fits the hornbill as the casque on the top of its short beak enables its trumpet-like calls to carry further through the rainforest.

Teacher Notes: Answer Key

Ed-Venture Amble Activity: Head of the Class

ANIMAL	Fur	Feather	Skin	Scales	Warm Blood	Cold Blood	Lays Eggs	Live Young	CLASS <i>(Amphibian, Reptile, Bird or Mammal)</i>
Silvery-cheeked Hornbill		x			x		x		BIRD
Ocelot	x				x			x	MAMMAL
Llama	x				x			x	MAMMAL
Sloth Bear	x				x			x	MAMMAL
Japanese Macaque	x				x			x	MAMMAL
Warty Pig	x				x			x	MAMMAL
Red-crowned Crane		x			x		x		BIRD
Ruffed Lemur	x				x			x	MAMMAL
Agouti	x				x			x	MAMMAL
Fennec Fox	x				x			x	MAMMAL
Corn Snake				x		x	x		REPTILE
Douroucouli	x				x			x	MAMMAL
Pygmy Slow Loris	x				x			x	MAMMAL
Tawny Frogmouth		x			x		x		BIRD
Green Tree Python				x		x	x		REPTILE
Violet Turaco		x			x		x		BIRD
Two-toed Sloth	x				x			x	MAMMAL
African Spur Thigh Tortoise				x		x	x		REPTILE
Dart Frog			x			x	x		AMPHIBIAN
Emu		x			x		x		BIRD
Kangaroo	x				x			x	MAMMAL

Teacher Notes: *Answer Key*

Ed-venture Amble Activity: *What's in a Name?*

SCIENTIFIC NAME	COMMON NAME	WHAT THE SCIENTIFIC WORDS MIGHT MEAN
<i>Grus japonensis</i>	Red-crowned or Japanese Crane	GRUS: Crane
		JAPONENSIS: Japanese
<i>Muntiacus reevesi</i>	Reeve's Muntjac	MUNTIACUS: Muntjac
		REEVESI: Reeve's
<i>Panthera leo</i>	African Lion	PANTHERA: Large Cat
		LEO: Lion
<i>Nycticebus pygmaeus</i>	Pygmy Slow Loris	NYCTICEBUS: Slow Loris
		PYGMAEUS: Pygmy
<i>Musophaga violecea</i>	Violet Turaco	MUSOPHAGA: Turaco
		VIOLECEA: Violet
<i>Choloepus didactylus</i>	Two-toed Sloth	CHOLOEPUS: Sloth
		DIDACTYLUS: Two-toed
<i>Leptailurus serval</i>	Serval	LEPTAILURUS: Medium Cat
		SERVAL: Serval
<i>Lontra canadensis</i>	North American River Otter	LONTRA: New World Otter
		CANADENSIS: Canada/ N. America
<i>Hystrix indica</i>	Indian Crested Porcupine	HYSTRIX: Old World Porcupine
		INDICA: Indian
<i>Goura victoria</i>	Victoria Crowned Pigeon	GOURA: Crowned Pigeon
		VICTORIA: Victoria

Teacher Notes: *Answer Key*

Wrap-Up: *Match It*

CLUE RIDDLES:

1. Our coats are spotted black and white; our tails are long for poise. Together we are an awesome sight, and we like to play with toys - *Kingdom: Animal, Phylum: Chordata, Class: Mammalia*

SNOW LEOPARD

2. When we stand up like poles, we're on the lookout for danger. If we feel scared we hide in our holes, from the unknown stranger - *Kingdom: Animal, Phylum: Chordata, Class: Mammalia*

MEERKATS

3. When it's light I sleep in a nice cool place, at night I feast on fruit and leaves. People say my face is sweet, but my quills say no hugs please! - *Kingdom: Animal, Phylum: Chordata, Class: Mammalia*

INDIAN CRESTED PORCUPINE

4. My eyes are very big and wide, but cannot see from side to side. I need to move my head around to see what's moving on the ground - *Kingdom: Animal, Phylum: Chordata, Class: Avea*

EASTERN SCREECH OWL

5. We're red, black and white, with big, long beaks used for what we're wishing. Our dinner we must catch and eat, so we spend our days a-fishing - *Kingdom: Animal, Phylum: Chordata, Class: Avea*

RED-CROWNED CRANES

6. Our habitat is rocky and dry, we have no legs or feet. The hot desert air will keep us warm, but careful we don't over-heat - *Kingdom: Animal, Phylum: Chordata, Class: Reptila*

DIADEM SNAKES

7. We're large birds with tiny wings, grass and bugs we like to munch. We cannot fly and have to run to keep from being lunch - *Kingdom: Animal, Phylum: Chordata, Class: Avea*

EMUS