# NYSDEC Environmental Education

## The Five Classes of Vertebrates

**Grade Level:** grades 4 through 8

**Duration:** 45 minutes

**Overview:** A program introduces students to some of the major differences between fish, amphibians, reptiles, birds and mammals. Students will understand the differences between vertebrates and invertebrates, and how humans fit into the environment. Students will better understand the process of classification, and the organization of living things.

**Goal:** Students will learn about animals from different taxonomic classes and discuss how common adaptations enable them to thrive. This program benefits from the inclusion of live animals in the presentation, in addition to animal artifacts. (See "Materials" for suggestions.)

---

**NYS Elementary & Intermediate Level Science Core Curriculum**

**Standard 1:** *Scientific Inquiry*
*Key Idea 1:* The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

**Standard 4:** *The Living Environment*
*Key Idea 1:* Living things are both similar to and different from each other and from nonliving things.
*Key Idea 4:* The continuity of life is sustained through reproduction and development.
*Key Idea 5:* Organisms maintain a dynamic equilibrium that sustains life.

---

## *Key Themes:*

- All animals are to be respected and appreciated, no matter their appearance
- Animals have special traits which make them capable of surviving in their habitat
- Some animals are acceptable as pets, but wild animals should remain wild
- Animals come in all shapes and sizes, for different reasons
- People group animals into sets based on the characteristics that the animals share with one another, and differences between them

**Vocabulary:** adaptation, backbone, characteristics, classification, genus, invertebrate, species, taxonomy, vertebrate

**Materials:** Suggested live animals: Madagascar hissing cockroaches, snake, turtle, toad, rabbit

Suggested animal artifacts: turtle shell, snake skin, feathers, mammal fur, fish taxidermy mounts, insect display mounts

**Background:** To live in such a diverse world, we have to make sense of it. Taxonomy is the science of grouping similar things together. We group animals into different categories to help organize our ecosystems.

Animals are often grouped together by common characteristics. The more characteristics they share, the more closely related they are. For example, a crab, a cow and a buffalo are all animals, but a cow and a buffalo are more closely related. There are many more differences between crabs and cows. The level of differentiation we are going to examine in this program is the broad taxonomic classification "*class.*"

The phylum *chordata* (animals with backbones) is divided into five common classes: fish, amphibians, reptiles, mammals and birds. Show examples of these groups and explain the characteristics that make one different from another.

**Activity:** What is a vertebrate? All vertebrate animals, including humans, have a backbone and an internal skeleton. Our skeleton helps to give us our shape, helps us move, and protects soft body parts. While skeleton shape and structure vary greatly from animal to animal, all vertebrates have a skeleton.

Invertebrates do not have *vertebrae in* them. Some, like lobsters or dragonflies, have an *exoskeleton*, a hard covering that functions similarly to the skeleton of a vertebrate. Some are shelled, like snails and oysters. Others are soft, like jellyfish, octopus and slugs. There are many more invertebrates than vertebrates, both by number of species and number of individuals.

Share several examples of invertebrates.

One of the simplest and easiest ways of determining what class of vertebrate an animal belongs to is by looking at what covers their body. There are exceptions to much of this, but as a generalization, this will help to organize the vertebrate groups.

- Fish = scales
- Amphibians = smooth or bumpy skin
- Reptiles = scales
- Birds = feathers
- Mammals = fur and hair

Some of the other differences between the groups includes homeostasis (warm vs. cold-blooded), numbers of chambers in the heart, reproduction, brain functions, mobility and sensory organs.

Show the students examples or pictures of each of the groups of animals.

Key questions for the students to answer:
- What kind of vertebrate is this? (bird, fish, mammal, amphibian, reptile)
- What covers this animals' body?
- Based on its appearance, what other animals are related to this one?
- What adaptations do you think this animal has to survive in its environment?
- If this animal had babies how would they care for it?
- If this animal was your responsibility, how would you care for it?

Extension:    There are several ways of memorizing the classification of organisms. Carl Linnaeus created a taxonomic system in the 18th Century that is still in use today. Every animal has a Latin name (or scientific name) that is unique, and independent of local common names and local languages. The following are the layers of the Linnaean taxonomic chain.

**Kingdom**, **Phylum**, **Class**, **Order**, **Family**, **Genus**, and **Species**.

A mnemonic is useful in remembering the order, such as **K**ing **P**hillip **C**ame **O**ver **F**rom **G**ermany **S**wiftly, or **K**eep **P**lates **C**lean **O**r **F**amily **G**ets **S**ick**.**

The following is the taxonomic breakdown of a few familiar animals:

| Common Name | Dog | Human | Blue Jay | Great White Shark |
|---|---|---|---|---|
| **Kingdom** | Animalia | Animalia | Animalia | Animalia |
| **Phylum** | Chordata | Chordata | Chordata | Chordata |
| **Class** | Mammalia | Mammalia | Aves | Osteichthyes |
| **Order** | Carnivora | Primata | Passeriformes | Carcharhiniformes |
| **Family** | Canidae | Hominidae | Corvidae | Lamnidae |
| **Genus** | *Canis* | *Homo* | *Cyanocitta* | *Carcharadon* |
| **Species** | *familiaris* | *sapiens* | *cristata* | *carcharias* |
|  |  |  |  |  |
|  |  |  |  |  |