

Animals Have Class

Curriculum Guide

Grades 9-12



Goal: Students will be able to identify the characteristics of invertebrates and each of the five major groups of vertebrates, as well as identify similarities and differences among the groups.

Association of Zoos and Aquariums Conservation Message:

All life on Earth exists within an ecosystem.

- a. Ecosystems are made of interdependent relationships between groups of living things (biodiversity) and their physical environment

Sunshine State Standards:

- **SC.912.L.15.4** Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
- **SC.912.L.15.6** Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
- **SC.912.L.17.6** Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.

Background Information:

There are millions of species of animals on Earth. Some of these species are very different from one another, while others share many similar characteristics. **Zoologists** (people that study animals) use these shared characteristics to place living things into various categories. Most scientists today first place living things into three general groups called Domains. These domains are then broken into smaller categories which have traditionally been called **Kingdoms**. Organisms that are made up of more than one cell and depend on other organisms for nourishment are a part of the **Animal Kingdom**. This kingdom is then broken down into phyla, each phylum into classes, each class into orders, each order into families, each family into genera, and each genus into **species**. For example, a Ball Python belongs to the species *Regius*, the genus *Python*, the family *Boidae*, the order *Squamata*, the class *Reptilia*, the phylum *Chordata*, and the kingdom *Animalia*. The **scientific name** of an animal consists of the name the genus it belongs to followed by its species name, so the scientific name of a Ball Python

Vocabulary

- Animal** – organism that is made up of more than one cell and depends on other organisms for nourishment
- Kingdom** – the second highest classification into which living organisms are grouped
- Species** – the most specific classification of living things consisting of closely related organisms capable of interbreeding to produce fertile offspring
- Scientific name** – the taxonomic name for an organism consisting of the name of its genus and species
- Ectothermic** – having an internal body temperature that changes in accordance with the temperature of the surroundings
- Endothermic** – having a constant warm internal body temperature
- Fish** – an ectothermic aquatic vertebrate that has gills and fins and is usually covered in scales
- Amphibian** – an ectothermic, smooth-skinned vertebrate that hatches from an egg laid in water
- Reptile** – an ectothermic vertebrate that has a covering of scales and reproduces on land
- Bird** – an endothermic egg-laying vertebrate that has wings and feathers
- Mammal** – an endothermic vertebrate that has hair and produces milk for its young
- Zoologist** – a person who studies animals
- Biodiversity** – the variability of plant and animal life in an environment
- Oviparous** – producing eggs that hatch after laying
- Ovoviviparous** – producing eggs that hatch within the body
- Viviparous** – giving birth to live young that develop within the mother's body

would be *Python regius*. Classifying animals in this way makes it easier for zoologists to study Earth's **biodiversity**.

One of the most basic differences among animal species is that some have a backbone while others do not. Animals that do not have a backbone are called invertebrates, and animals that do have a backbone are called vertebrates. Vertebrates are placed into five major categories: fish, amphibians, reptiles, birds, and mammals.

Invertebrates: Over 95 percent of all the animals on earth are invertebrates. This diverse group of animals is broken up into more than 30 different phyla, and each one may share very few characteristics with other invertebrates. Some of the most common kinds of invertebrates include spiders, crabs, starfish, sponges, jellyfish, snails, clams, worms, and insects. Insects are the most numerous group of invertebrates—there are over a million different species. While insects come in a variety of shapes and sizes, they all have three pairs of walking legs, three body parts, and a pair of antennae.

Fish: Fish make up the largest group of vertebrates. They live in freshwater and saltwater habitats all over the world and come in a wide variety of shapes, sizes, and colors. All fish are **ectothermic** (cold-blooded) and adapted to life underwater. They also have fins and most are covered with scales. Fish need to breathe oxygen, which they filter out of the water through their gills. All fish are vertebrates, but some have skeletons made of cartilage rather than bone. Fish with cartilage skeletons are called cartilaginous fish and include skates, rays, and sharks. Fish that have skeletons made of bone are called bony fish. There is a third major group of fish called jawless fish, which includes only lampreys and hagfish. These fish have slimy scaleless skin and survive as parasites and scavengers.

Amphibians: Amphibians are also ectothermic and most spend part of their lives in water and part on land. Most amphibians emerge from shell-less eggs laid in water and usually go through an aquatic larval stage. Amphibians are divided into three main groups: salamanders and newts, frogs and toads, and caecilians. Some species of amphibians are small enough to fit on a person's fingertip, but the largest amphibian, the Japanese Giant Salamander, can grow to be six feet long. Many amphibians are born with gills and develop lungs as adults. They also absorb oxygen through their skin—some species do not have lungs or gills as adults and must get all their oxygen through their skin. The slimy mucus that covers adult amphibians' skin not only helps to draw in oxygen, but also keeps the animal from drying out.

Reptiles: Reptiles are scaly, ectothermic animals that include crocodilians, snakes, lizards, turtles and tortoises, and tuataras. Many reptiles are **oviparous** (egg-laying), but some, such as Boa Constrictors and Blue-tongued Skinks, are **ovoviviparous** or **viviparous** (give live birth to their young). Young reptiles look like their parents and do not go through a larval stage like amphibians. Another difference between reptiles and amphibians is that reptiles are covered with dry, waterproof scales rather than slimy skin. These scales help keep reptiles' bodies from drying out and provide a hard outer layer of protection. Scales are made up of keratin, which can also be found in fingernails, feathers, and hair. Some species of snakes and lizards are capable of producing venom, which they use to kill their prey or defend themselves.

Birds: Birds are feathered, **endothermic** (warm-blooded), oviparous creatures. They are found on every continent in all kinds of ecosystems. Birds are easy to distinguish from other vertebrates because they are the only kind of animal that has feathers. They can have hundreds to thousands of feathers that keep them warm and dry and provide them with their coloring. All birds also have a bill, two feet, and wings, and most can fly. The largest birds—ostriches, cassowaries, and emus—cannot fly, but they have long powerful legs that they use for running and kicking. The fastest bird in the air is the Peregrine Falcon, which can reach 200 mph as it dives towards the earth. Looking at the shape of a bird's bill, feet, and wings can help to distinguish between different

types of birds. For example, ducks and geese have wide, flat bills and webbed feet, while parrots have sharp, curved beaks and zygodactyl feet (two toes point forward and two point backwards).

Mammals: Endothermic (warm-blooded) animals that have hair and produce milk for their babies are known as mammals. Almost all mammals viviparous (exceptions include the platypus and echidna, which lay eggs). Humans are mammals and belong to the Primate Order along with monkeys, apes, and lemurs. Some of the largest animals on earth are mammals, including the African Elephant, which is the largest land animal, and the Blue Whale, which is the largest animal in the world. Blue Whales can grow to 100 feet in length and weigh over 100 tons. That's more than 45,000,000 times heavier than the world's smallest mammal, the Kittie's Hog-Nosed Bat, which weighs only two grams (less than an ounce). The tallest animal on earth is also a mammal—giraffes can reach heights of over 17 feet.

Procedure (as presented by zoo instructor):

- Introduction (5 minutes)
- Define animal categories using visual aids (5 minutes)
- Give examples of animal groups and discuss similarities and differences using hands-on animal interaction and biofacts (20 minutes)
- Check for comprehension (5 minutes)
- Allow for questions (5 minutes)

Evaluation: The zoo instructor will continually check for comprehension throughout the lesson by asking questions and reinforcing ideas.