



Cabrillo Marine Aquarium Lesson Plan

**Cabrillo
Marine
Aquarium**

Grade Level: Second through Fifth Grades

Title: Sorting it Out: A Lesson on Classification

Objective: Students will understand that animals are classified as vertebrates or invertebrates and that there are subgroups of each of these classes of animals. Students will also be able to describe the unique characteristics of specific animal groups and learn to identify and sort animals based on similar and different traits and features.

California Science Standards: **2nd:** 2c, 2d, 4c, 4g **3rd:** 3a, 3b, 5b, 5d, 5e
4th: 2b, 3a, 3b, 6a, 6f **5th:** 2a, 2b, 6a, 6g, 6h, 6i

Time to Complete: 50 minutes

Materials Provided by CMA: *Worksheet: Vertebrates with Class, Worksheet: Spine or Spineless! Worksheet: Animal Kingdom Report* (the following items only provided with CMA's Ocean Discovery Kit: Invertebrate Specimens, Posters, Books, and Habitat & Ocean DVD's)

Materials Provided by Teacher: Pictures & books of vertebrate & invertebrate animals

Vocabulary: Invertebrate, vertebrate, vertebrae, classification, taxonomy, taxonomist, species, class, trait, amphibian, bird, fish, mammal, reptile, sponge, Porifera, annelid, echinoderm, cnidarian, arthropod, mollusk, warm-blooded, cold-blooded

Lesson Background:

People have a natural tendency to sort items into groups. Sorting objects into groups allows items to be organized and makes things easier to understand & describe. Sorting animals into groups is like any other form of grouping objects with similar features. When sorting is done with animals it is called **classification**. Animals belonging to the same group will have more features in common than those belonging to a different group. All animals are divided into two main groups called **invertebrates** and **vertebrates**.

Vertebrates are animals that have a backbone. Fish (including sharks and bony fishes), reptiles, birds, amphibians, and mammals are all vertebrates because they have a spine. Do you think you have a backbone? Just feel the ridges going down the center of your back. This is called your spine or backbone. It is made out of a stack of small bones and each one is called a **vertebra**. There are over 1.7 million of different kinds of animals that have been named on our big blue planet and millions more to be discovered and described. Yet, only about three percent are classified as vertebrates. Most of the animals

on our planet are spineless! **Invertebrates** are animals that do not have a backbone. Think of some animals you know that droop like a wet noodle. An earthworm is an invertebrate. Other such creatures include; sea jellies, snails, spiders, crabs and insects. There are millions of different kinds of invertebrates & many more yet to be discovered!

The science of sorting animals is called **taxonomy** and a scientist who sorts animals into groups is called a **taxonomist**. There are many different types of animals in the world. Many animals look alike while others look quite different. Animals are classified based on their similarities. Every kind of animal belongs to its own group, or **species**. Similar species are organized into families and other specific groups. The vertebrate group can be broken down into five smaller groups, or **classes**: **mammals**, **birds**, **reptiles**, **amphibians**, and **fish**. Let's check out some of their common features or **traits**. Be aware, though, that every group has exceptions.

General Animal Class Characteristics and Traits of Vertebrates:

Fish (including sharks and bony fishes)

- **Cold-blooded**, the body temperature of the animal is dependent on the temperature of its surroundings
- Use gills to take in oxygen from the water
- Usually have scales for protection & fins for swimming
- Usually lay eggs (however, most sharks have live birth)

Amphibians

- Cold-blooded
- Live part of their life in water & part on land
- Have gills when they are young to take in oxygen from the water and develop lungs as they grow to take oxygen from the air
- Usually have moist, smooth skin
- Usually lay jelly-like eggs

Reptiles

- Cold-blooded
- Have dry, thick scaly skin
- Breathe with lungs
- Usually lay soft, leathery eggs

Birds

- **Warm-blooded**
- Have feathers, wings & beaks
- Breathe with lungs
- Hatch from eggs

Mammals

- Warm-blooded, remain at almost a constant internal temperature
- Have hair or fur
- Have lungs to breathe oxygen from the air
- Feed their young milk

- Give live birth to young, sometimes will lay eggs

First, have the students work on the Worksheet: Vertebrates with Class. When the sheet is completed, discuss the animal groupings and their common traits.

Here are some questions to help in sorting animals according to their similar traits:

- Where does the animal live: on land, or is it an aquatic animal?
- Does it have arms, legs, wings, or webbed-feet?
- Does it have fur, feathers, or scales?
- Does it breathe with gills or lungs?
- Are the babies born alive or are they hatched from eggs?
- Is it warm- or cold-blooded?

An **invertebrate** is an animal without a backbone or skeleton inside its body. They represent 97 percent of the planet's animal species. Some invertebrates have a soft body, while others have a hard outer covering. Scientists classify invertebrates from simple to complex, according to their physical characteristics. In this section we will discuss six main groups of invertebrates. The simplest of the groups is **Porifera**, commonly known as the **sponges**. Sponges live in the ocean and, although it may not look or behave like a typical animal, it is an actual living organism. The next group is the hollow-bodied animals. This group is called the **cnidarians** and includes sea jellies, coral & sea anemones. These animals are aquatic and have a hollow center and one body opening. The third group is the **annelids**. This is a fancy, scientific term for worms. They are soft-bodied animals that live both on land and in the water. Earthworms and leeches are examples of this group. The fourth group is called the **mollusks**. Mollusks have a soft body, but many also have a hard outer shell. Some live on land and others are aquatic. Examples of this group are snails, clams, oysters, sea slugs, squid & octopus. The next group is the **arthropods**. These animals have an outer skeleton, jointed legs and segmented bodies. This is the largest group in the **animal kingdom**. This group includes insects, crabs, spiders and millipedes. The last group is the spiny-skinned **echinoderms**. This group of unique animals has sharp spines on the outside of their bodies, which form a hard skeleton for protection. Spiny-skinned animals live in many ocean habitats. Some examples of this group are sea stars, sand dollars & sea urchins.

To identify an animal as an invertebrate, it should have these characteristics:

- Invertebrates have no backbone. This means they are spineless!
- Invertebrates are **cold-blooded**. They cannot regulate their own body temperature.

That's it! There are so many different types of invertebrates that making a list of common traits or characteristics is almost next to impossible.

Next, have the students work on the *Worksheet: Spine or Spineless!* When the sheet is completed, discuss if the animal is an invertebrate or a vertebrate and what were some clues that helped with sorting it out!

Worksheet: Spine or Spineless! Answer Key

Classify these animals below as a (V) for vertebrate or an (I) for invertebrate.

I Octopus	I Clam	I Crab
I Oyster	V Shark	I Mussel
I Snail	V Sea Lion	I Lobster
V Eagle	I Sponge	I Shrimp
V Sea Turtle	V Fish	V Whale
V Gull	V Pelican	I Coral
I Squid	V Sea Snake	I Sea Anemone
V Eel	I Worm	I Abalone
V Seal	I Seastar	I Sea Urchin
V Orca	V Dolphin	I Sea Jelly (Jellyfish)

Lesson Wrap-up:

There are many different animal **classes** and every animal in the world belongs to one of them. The five most well known classes of **vertebrates** (animals with backbones) are **mammals, birds, fish, reptiles, and amphibians**. There are also a lot of animals without backbones. These are called **invertebrates** and they can be placed into six major categories: **Porifera, annelids, mollusks, cnidarians, echinoderms and arthropods**.

Scientists called **taxonomists** have grouped these animals together based upon similar physical **traits** & characteristics and ask many questions to help sort and classify the animals known and the many yet to be discovered.

Lesson Extensions:

Science Journal Activity

Let the students decide what activity they want to do based on the type of learning that is best for them. Let them decide if they want to:

1. Draw a picture of their favorite vertebrate or invertebrate.
2. Write a creative story about their favorite invertebrate or vertebrate
3. Write-up a report on their favorite invertebrate or vertebrate and include ten interesting facts they learned about their favorite animal.

Further Student Exploration:

Worksheet: Animal Kingdom Report

Assign students a specific animal group to research (mammal, amphibian, bird, fish, mollusks, echinoderms, etc). Have each student create a collage of their animal group using pictures from magazines, the internet, old calendars, etc.

References:

- National Wildlife Federation
<http://www.nwf.org/Wildlife.aspx>
- Sheppard's Software, Kids Corner
http://www.sheppardsoftware.com/web_games_trivia_animal.htm