

Cloverbud Investigators: Taking the Adventure Outside

Classification Systems - Where do I Belong?

January

Background: Did you know that humans are mammals? We belong to the **class** “Mammalia”. Scientists like to organize all lifeforms into categories. This helps them understand how species are alike and different. To do this scientist came up with a “**Scientific Classification System**.” This is a way to organize all the lifeforms that exist on Earth into smaller groups that can be manage.

Objective: In this lesson, Investigators will understand the Scientific Classification System and learn to use a simple key to categorize different species into **classes**.

Supplies:

- Seven different size boxes or containers that will stack inside each other.

Activity 1. Biological Stacking

Select boxes of the same shape but different sizes and allow the children to stack the boxes biggest to smallest. Label the boxes according to the Biological Classification system with the largest box being the Kingdom and the smallest box the Species. This will visually help them understand that we are going from largest group to smallest group.

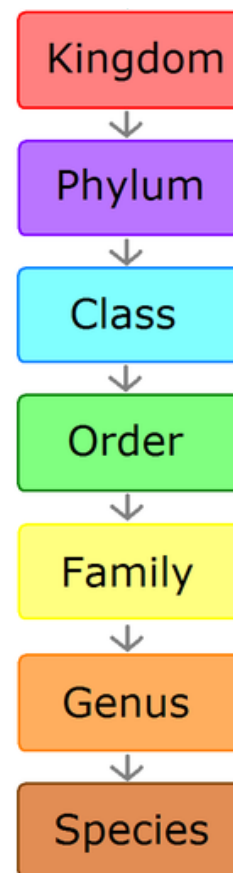
Supplies:

- Mixed sizes, colors, and shapes of craft beads (you can substitute another object, like beans, blocks, marble etc.)

Activity 2. Biological Sorting

Using craft beads of all sizes, shapes, and colors (or the item you have selected), have the Investigators conduct their own Scientific Classification System. Working in pairs or small groups give them each a bag of objects to classify.

- Ask them to organize the items into 3 or 4 groups.
- Once they have organized their groups, go around and discuss how they decided to put their groups together. Was it by size? Shape? Color?
- Next, ask them if they can break their groups down into smaller groups. For example, can they separate all the green beads now into a large green bead group and a small green bead group?
- Again, go around and discuss how they decided to divide their groups into smaller groups.



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- Finally, ask them if they can think of one more way to divide their groups into even smaller groups.

Explain to them this is how scientist classify life forms on earth. They just keep putting things that are alike into smaller and smaller groups.



Month's Mystery: Using the Scientific Classification System, can we figure out where our “new species” belongs? What about where humans belong?

Activity 3. Where do I belong?

In this activity, the investigators will select a brand of Cheerios that will represent a “new” species that they need to classify using the Scientific Classification System. As a group they will walk through the process of deciding where their Cheerios fit into a big box store. We will be comparing Scientific Classification of species, to organizing a big box store like Walmart to help children understand how lifeforms are classified.

Supplies and Do ahead:

- Print out Scientific Classification sheets, use these to hold up as you are talking to help the children visualize the layout of the store.
- Print out cereal page, cut out cereal.

Using the Scientific Classification System handout included in this lesson, to help the investigators follow along and decide how to classify their item.

Sample Script – Now that you are all experts at sorting species, let’s use the example of a big box store like Walmart, to help us understand how scientists decided how to classify a “new species.”

- Allow each investigator to select their species of Cheerios. (See Cheerios handout included).
- Show the picture of the store* - The store represents planet Earth; it contains thousands of items, just like Earth contains millions of lifeforms. In order for us to find things easily in the store, the store managers organize the items into departments that make sense. This is like how the scientist organize lifeforms into “**KINGDOMS**”.
- Show the picture of the Store Map* - For example, the store might have different departments, like a food, clothing, garden, home, pets, toys, hardware/automotive, electronics and health/beauty. *Point these out on the picture.* Just like the store managers, scientist have created six Kingdoms called: Bacteria, Fungi, Protozoa, Plant, Animal and a newer one called Archaeobacteria (aar.kei.bak.tee.ree.uh). **As Humans, we are**



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classified in the **Animal Kingdom** with all the other animals on Earth. Which makes sense because we are NOT a plant, fungus, protozoa, bacteria or archaeobacteria right?

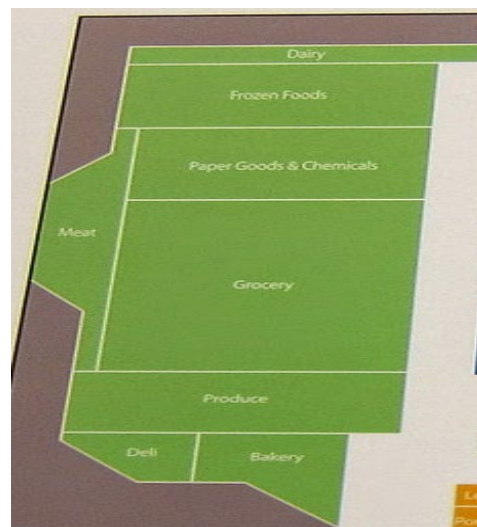
4. *Show the picture of the Store Department* - The problem with **Kingdoms** is that they are huge, and full of many lifeforms. Once the scientists decide on what **Kingdom** the species should be in, then they look for what **Phylum** in which it belongs. In our store example, this would be like the sections within a department of the store. For example, in the

Kingdom-Food, there are the sections/**Phyla** called:

Dairy, Frozen Food, Paper Goods, Chemicals, Grocery, Produce, Meat, Deli, and Bakery.

Ask - What department/Phylum do you think your species might be found in?

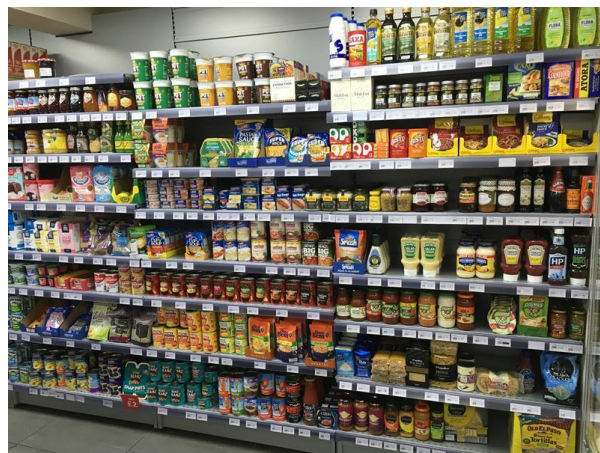
Humans we are classified in the **Phylum Chordata** with other animals like birds and fish, but do we look like a bird or a fish? We better keep sorting into smaller groups.



5. *Show the picture of the rows*— Say, we need to break the Phyla into smaller groups called “**CLASSES**”. In our store example, this would be like the different rows within the department of our **Phylum Grocery**. In the Grocery section we would find rows or “**classes**” of breads, candy, can goods, pasta/rice, baking goods, coffee/tea/juice, drinks, breakfast food, sauce/ salad dressing aisles. *Ask, What Class or row do you think your species would be found in?* As Humans are in the **class, Mammalia**, along with whales, wolves, bats, and even horses, but we still don’t look like any of those animals, do we? We need to keep sorting into smaller groups.



6. *Show the picture of the shelves* - To keep all mammals straight, scientists organized them into “**ORDERS**”. *Orders* would be like the **shelves** in the rows at the grocery store. In our **breakfast foods row**, we might find pop tarts, cereal, oats, breakfast bars and maybe even cream of wheat or maple syrup. *Ask: What Order or shelf do you think your species would be found on? As humans, we are in the Order Primates. The Primate Order contains over 300 species. Some primates weigh only a few ounces and can fit in your hand, while other weigh hundreds of pounds and can be as big as a gorilla! Those are still some big differences so let's keep sorting!*



7. *Show the picture of all the cereal brands* – Because not all Primates look exactly alike, scientist break them down into groups called “**FAMILIES**.” In our store example, this is like organizing all the boxes of cereal. The cereal boxes look a lot alike, but there are still small differences if we look at each box. In the store, the managers organize the cereal by brand names (companies that make cereal), so we can go to that section and grab our favorite cereal. Cereal belongs to a brand name like Kellogg's, Quaker, General Mills, Post, Great Value. *Ask: what Family or company does your species belong too? As Humans we are classified into the Hominidae family with chimpanzees, gorillas, orangutans and even gibbons, but we still don't look exactly like those species, right? So, let's keep going.*



8. *Show the picture of all the Cheerios flavors* - From **Family** groups, scientist created the “**GENUS**”, which puts things that are very similar together. So, in our store example, our **Genus** would be **Cheerios** but what kind? There are lots of flavors to pick from: Chocolate, Frosted, Honey Nut, Very Berry and Apple Cinnamon.



9. As scientists, we need to be very specific when talking about our species. So, let's give our species a name, this is called Binomial Naming. It is specific to one individual "species". Every species with that name will be the same.



In our store example, this would be our selected item:

Show the five different choices and let the Investigators find their species.

Point out that in Binomial Naming, the first word is capitalized and is the genus, the second is not capitalized and is the species. So, our product would be called "Cheerios chocolate."

The classification of Humans is **Homo sapiens: Kingdom** Animalia, **Phylum** Chordata, **Class** Mammalia, **Order** Primata, **Family** Hominidae, **Genus** Homo and **Species** sapiens

*In our store example our species was **Kingdom:** Food, **Phylum:** Grocery, **Class:** Breakfast Foods, **Order:** Cereal, **Family:** General Mills, **Genus:** Cheerios and **Species:** Flavor of Cheerios.*

*A great way to help kids remember the order for the Biological Classification system is to teach them this sentence: **Keeping Precious Creatures Organized For Grumpy Scientists!**
K- Kingdom P- Phylum C- Class O-Order F-Family G- Genus S-Species*

| | |
|---------|-----------|
| KINGDOM | Animalia |
| PHYLUM | Chordata |
| CLASS | Mammalia |
| ORDER | Primata |
| FAMILY | Hominidae |
| GENUS | Homo |
| SPECIES | sapiens |

Activity 4. The “Dichotomous key” to Classification

Scientists use tools called dichotomous keys which ask opposite questions to help them organize plants and animals into groups. In this activity, Investigators will use a simple dichotomous key to identify sample animals.

Procedures:

1. Pass out one animal card per Investigator.
2. Pass out a dichotomous key, one per Investigator.
3. Allow each investigator to answer questions to figure out which animal they have.

Supplies and Do ahead:

- Printed the dichotomous key, one per investigator.
- Print out animal page, one animal per investigator.
- Cut out animal cards

Science Behind: Taxonomy is from the Greek and means *arrangement method*. It is the science of classifying biological organisms based on their shared characteristics. A Swedish botanist named Carl Linnaeus is credited with the modern system of taxonomy. He developed the system which is now called Linnaean taxonomy. Linnaeus developed the system to categorize plant species and the system of binomial nomenclature for naming them.

Making scientific connections to nature: Why is it important to identify and classify organisms? In nature, it is extremely important because it allows scientists to organize large amounts of information about organisms and make predictions based on knowledge of similar organisms. Biological classification is important to environmental scientists, climatologists, ecologists, botanists, biologists and more. These scientists work with large populations of species making predictions in relation to changing environmental effects.

Taking the Adventure Outside: Using a real dichotomous key for trees, insects, birds etc., take a trip to a local park or nature area. Using the key, try to identify species you find.

Career Connections: Wildlife Biologist, Ecologist, Biologist

Go Over Findings:

What is the classification system called that scientists use when they find a new species?
Scientific Classification System

What is the sentence that will help us remember the order of the Scientific Classification System?

Keeping Precious Creatures Organized For Grumpy Scientists!

What tool can you use to identify species? (Dichotomous Key)



Investigate, Create, & Take:

Make a Classification table or hanger





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Birds

Reptiles

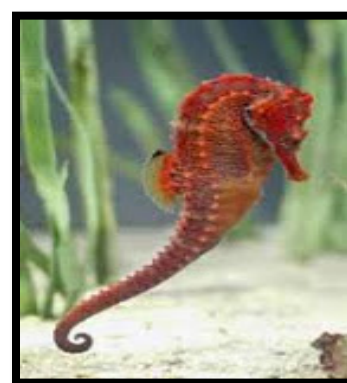
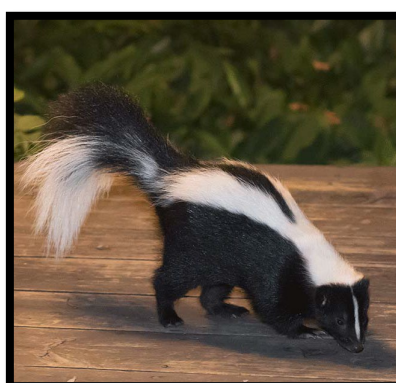
Mammals

Fish

Insects



Amphibians



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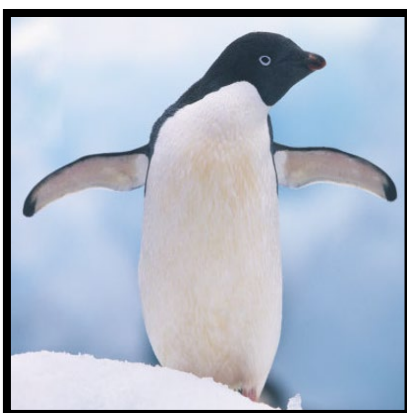
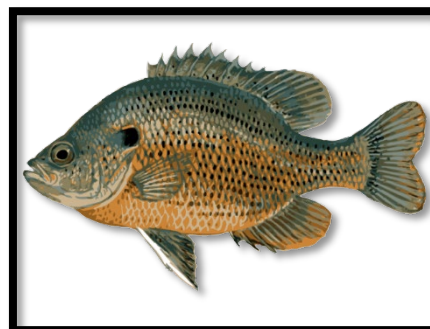
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Dichotomous Key

**START
Here**

1

- a. This animal has four legs (Go to question 2)
- b. This animal does not have four legs (Go to question 3)

10

Are you a
(mammal) wolf?
A. Yes
B. No – Start over

2

- a. This animal has fur (Go to question 10)
- b. This animal does not have fur (Go to question 3)

11

Are you a (reptile) turtle?
A. Yes
B. No - Start over

3

- a. This animal has a shell (Go to question 11)
- b. This animal does not have a shell (Go to question 4)

12

Are you a bird?
A. Yes
B. No - Start

4

- a. This animal has feathers (Go to question 12)
- b. This animal does not have feathers (go to question 5)

13

Are you a (reptile) snake?
A. Yes
B. No - Start over

5

- a. This animal has scales (Go to question 6)
- b. This animal does not have scales (Go to question 7)

14

Are you an insect?
A. Yes
B. No - Start over

6

- a. This animal has a long tongue (go to question 13)
- b. This animal does not have a long tongue (go to question 7)

15

Are you a fish?
A. Yes
B. No - Start over

7

- a. This animal has wings (Go to question 14)
- b. This animal does not have wings (Go to question 8)

8

- a. This animal can breathe water. (Go to question 15)
- b. This animal cannot breathe water. (Go to question 9)

16

Are you a (mammal)
dolphin?
A. Yes
B. B No - Start over

9

- a. This animal lives in water but breathes air (Go to question 16)
- b. This animal does not live in water (Go to question 1)



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Dichotomous Key Animal Cards



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Sources:

<https://www.bing.com/images/search?q=clip+art&qpv=clip+art&FORM=IGRE>

Ohio State University Extension Chick Quest

Ducksters Educational site https://www.ducksters.com/science/scientific_classification.php

Pictures from Shutterstock.com, and www.ActiveWild.com

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