Classification Basics

Directions- Facilitators Read!!!

1. **Facilitators:** Choose a different presenter for each slide.
2. **Presenters:** Read the question and attempt to answer the question.
3. **Whole Group**:
    a. Discusses if you agree or disagree– coming to consensus.
    b. Then move on to the answer and discuss as a team.
    c. Write down the main ideas in your notes

Why do scientists classify things? And what is this called?

By classifying things, scientists help organize the world into topics and groups using specific names. This allows them to have a universal language– giving order to our natural world.

The study and process of classifying things is called ***Taxonomy***!!!

The system of naming things is called ***nomenclature***!

What criteria do scientists use to classify organisms?

Organisms are classified by their:
* physical structure (how they look)
* evolutionary relationships
* embryonic similarities (embryos)
* genetic similarities (DNA)
* biochemical similarities

What new knowledge did you find on this slide?

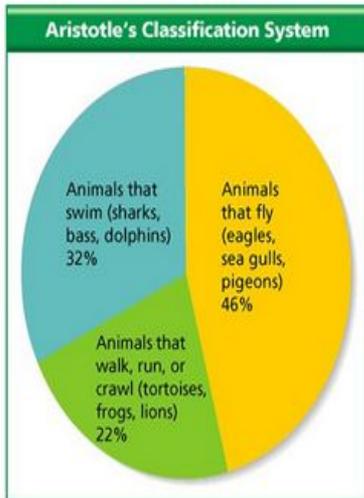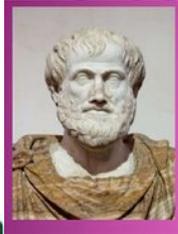# Roughly how many different species are there on Earth?

There are millions of organisms living on Earth today. Currently, scientists have found and named roughly 1.7 million species!!!(This does not account for the millions that have already gone extinct!) However scientists estimate that there could be as many as 11 million, and a new study suggest there could be more than a billion!

What questions arise with this information?

# How did scientists begin to classify organisms?

Aristotle

Aristotle and Classification

Aristotle's Classification System

Pie chart:
- Animals that fly (eagles, sea gulls, pigeons) 46%
- Animals that swim (sharks, bass, dolphins) 32%
- Animals that walk, run, or crawl (tortoises, frogs, lions) 22%

Many hundreds of years before Linnaeus, a Greek scholar named Aristotle developed a classification system for animals. Aristotle first divided animals into those he considered to have blood and those he did not. This graph shows Aristotle's classification system for "animals with blood."

Or you can look at it by where the organism lived.

Linnaeus

Ladder diagram:
- Kingdom
- Class
- Order
- Family
- Genus
- Species
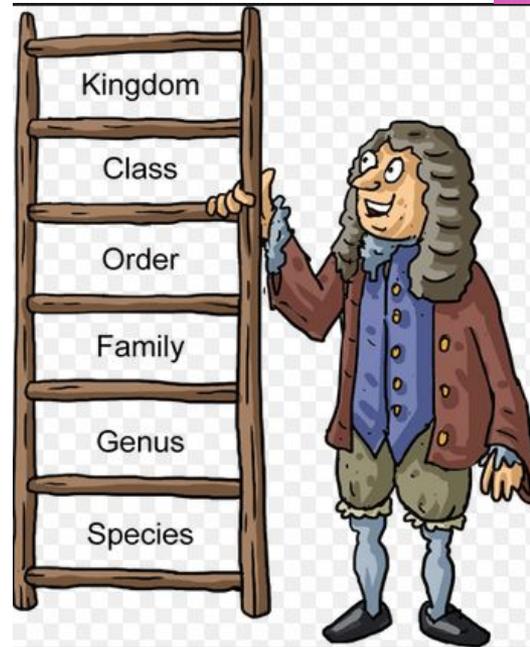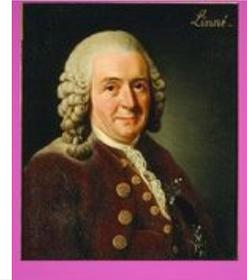
With the invention of the microscope– Linnaeus began classifying organisms by using a new system of names and groups! This was called *Binomial Nomenclature*

What else would you add to this slide?

Linnaeus began giving organisms scientific names.

Scientific Name = Genus and Species names

- For example
  - Common Name: Human
  - Scientific Name: *Homo sapiens*
    - All scientific names are italicized (or underlined) and the first letter of the genus is always CAPITAL while the rest is in lower case letters.
    - Scientific names are in LATIN
    - What does *Homo sapiens* mean?
      - In this case homo means "man" and sapiens means "wise"
        - » Wise Man

What are these names composed of and how are they written?

How are organisms are classified? What is the taxonomic order of classification?

Practice saying the classifications Have each person on your team do it while closing their eyes

Kingdom
Phylum
Class
Order
Family
Genus
Species

A good way to help you remember:

King

Philip

Came

Over

For

Good

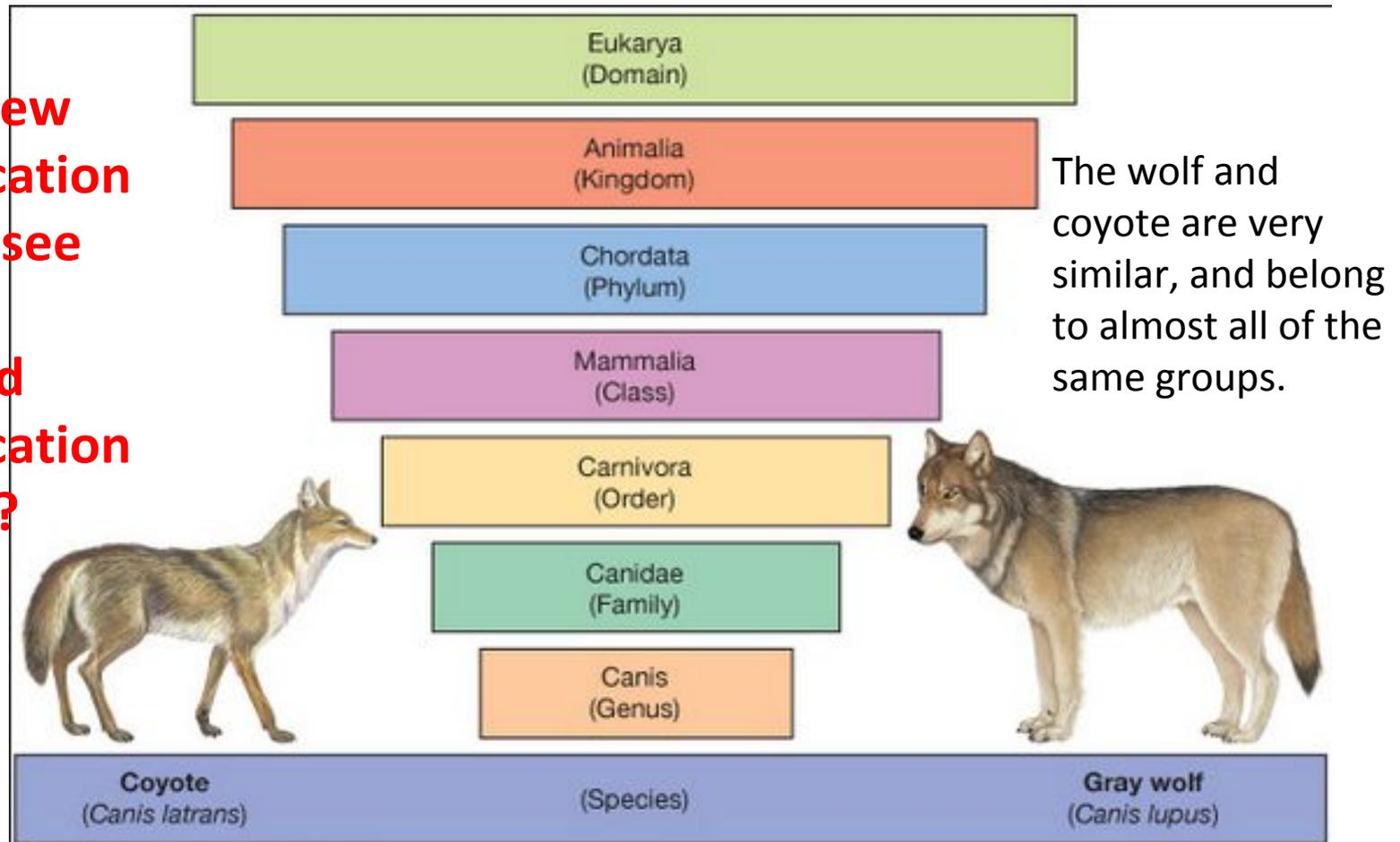Spaghetti

Can you think of a new mnemonic device… or "new way of remembering" this? Get creative!

Look over the following and practice saying the words!!!
You DO NOT need to memorize scientific names, but you need to be able to identify them when they are written.
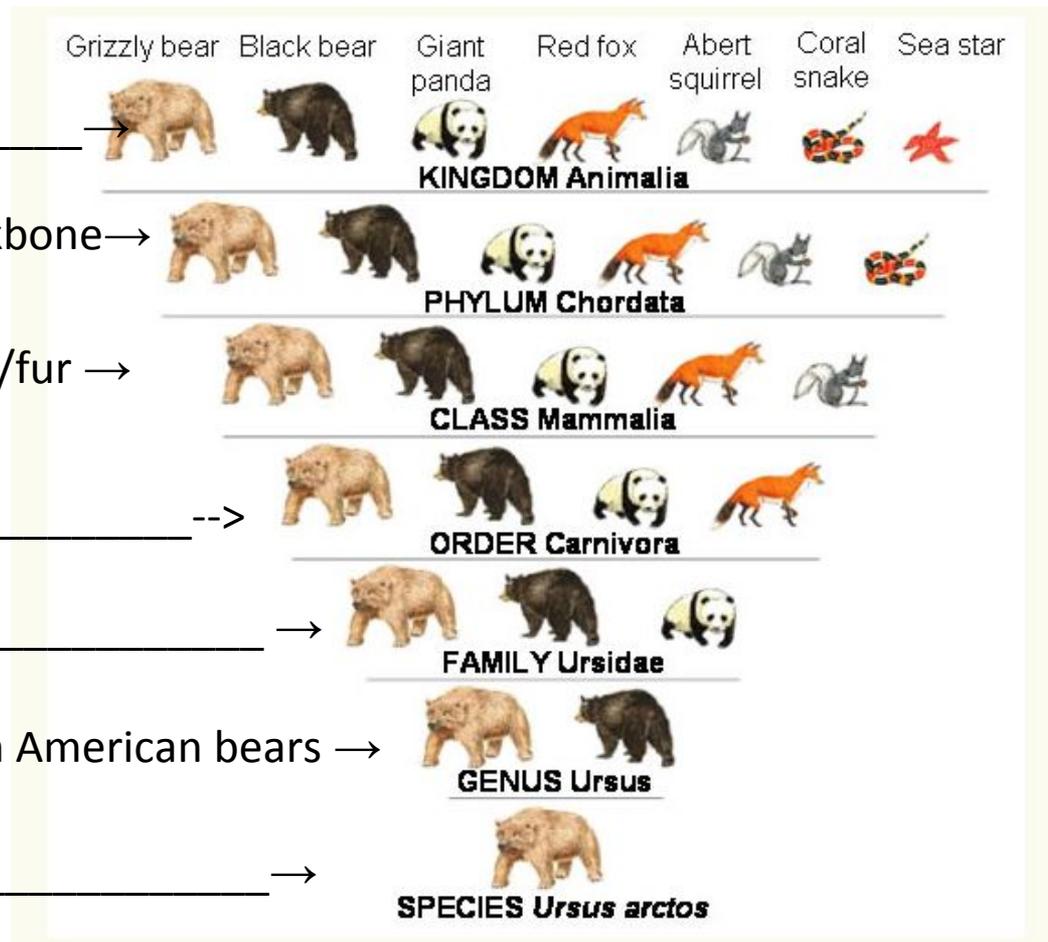
What new classification do you see on this updated classification system?

The wolf and coyote are very similar, and belong to almost all of the same groups.

Eukarya (Domain)
Animalia (Kingdom)
Chordata (Phylum)
Mammalia (Class)
Carnivora (Order)
Canidae (Family)
Canis (Genus)
Coyote (*Canis latrans*) — (Species) — Gray wolf (*Canis lupus*)

At what taxonomic level (class, order family, etc.) do wolves and coyotes become disctinct or separate?

Additionally… you have seen this example, but now discuss it more scientifically. What do the organisms in each taxonomic level have in common? Where do they differ? Then fill in the blanks.

These are all _____ →

These all have a backbone→

These all have hair/fur →

_____ -->

_____ →

These are all North American bears →

_____ →

What makes a species a species???

The defining characteristic that makes a species its own group, is that the individuals of one species can MATE *and reproduce offspring (babies) that are* **viable** (are fertile, which means they can reproduce offspring).
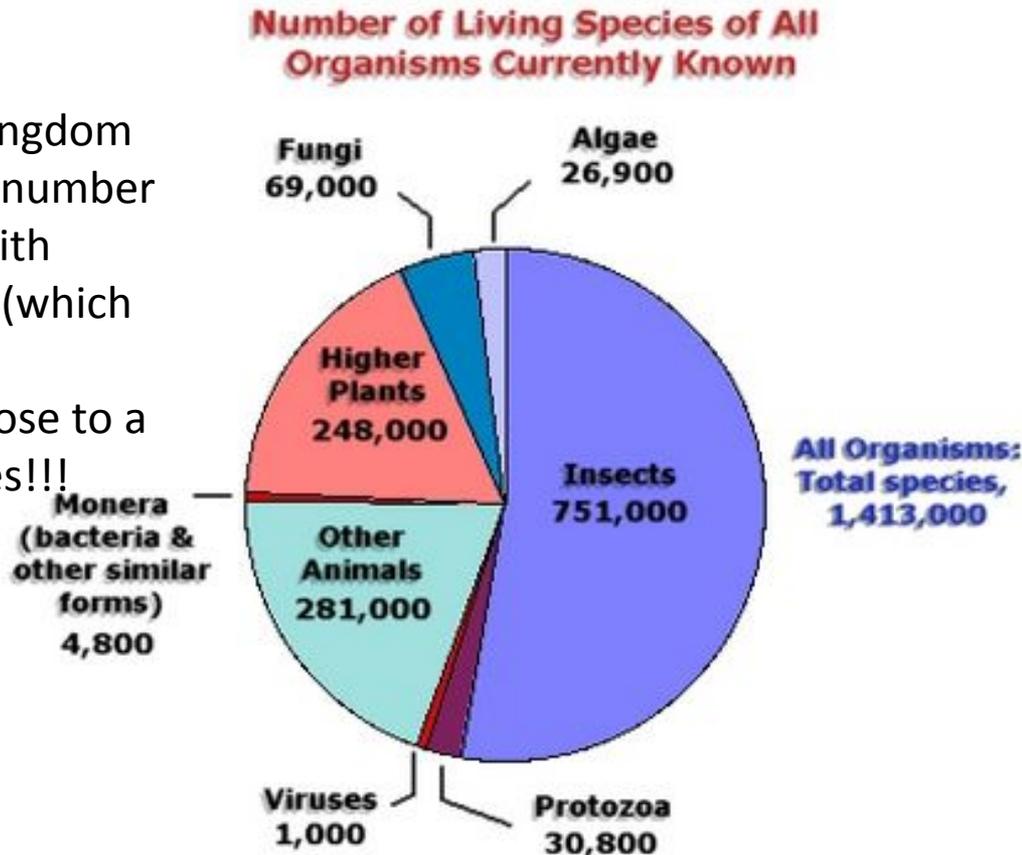
If two organisms CANNOT mate **and** produce fertile (or viable) offspring, then they are DIFFERENT species.

Example: Horses and donkeys can mate, but their offspring, a mule is not viable. What does this mean?

What questions arise from this new knowledge?

According to this pie chart, which Kingdom has the most diversity (greatest number of species)?

The animal kingdom has the most number of species– with insects alone (which are animals) numbering close to a million species!!!

What questions arise from this formation?

Number of Living Species of All Organisms Currently Known

Fungi 69,000
Algae 26,900
Higher Plants 248,000
Insects 751,000
All Organisms: Total species, 1,413,000
Monera (bacteria & other similar forms) 4,800
Other Animals 281,000
Viruses 1,000
Protozoa 30,800

Based on what you learned and summarized in the last slide, what question does the information on this pie chart raise?

Why do classifications keep changing?

Science is a process of continuous **change and discovery** based on the collection of new evidence and expanding technologies that allow us to learn more.

As new discoveries are made, science evolves too. Science looks to find the best possible answers given the information available – while also knowing that new evidence can (and probably will) be found to support new ideas.

As a group, summarize this important concept and write it down in your notes.