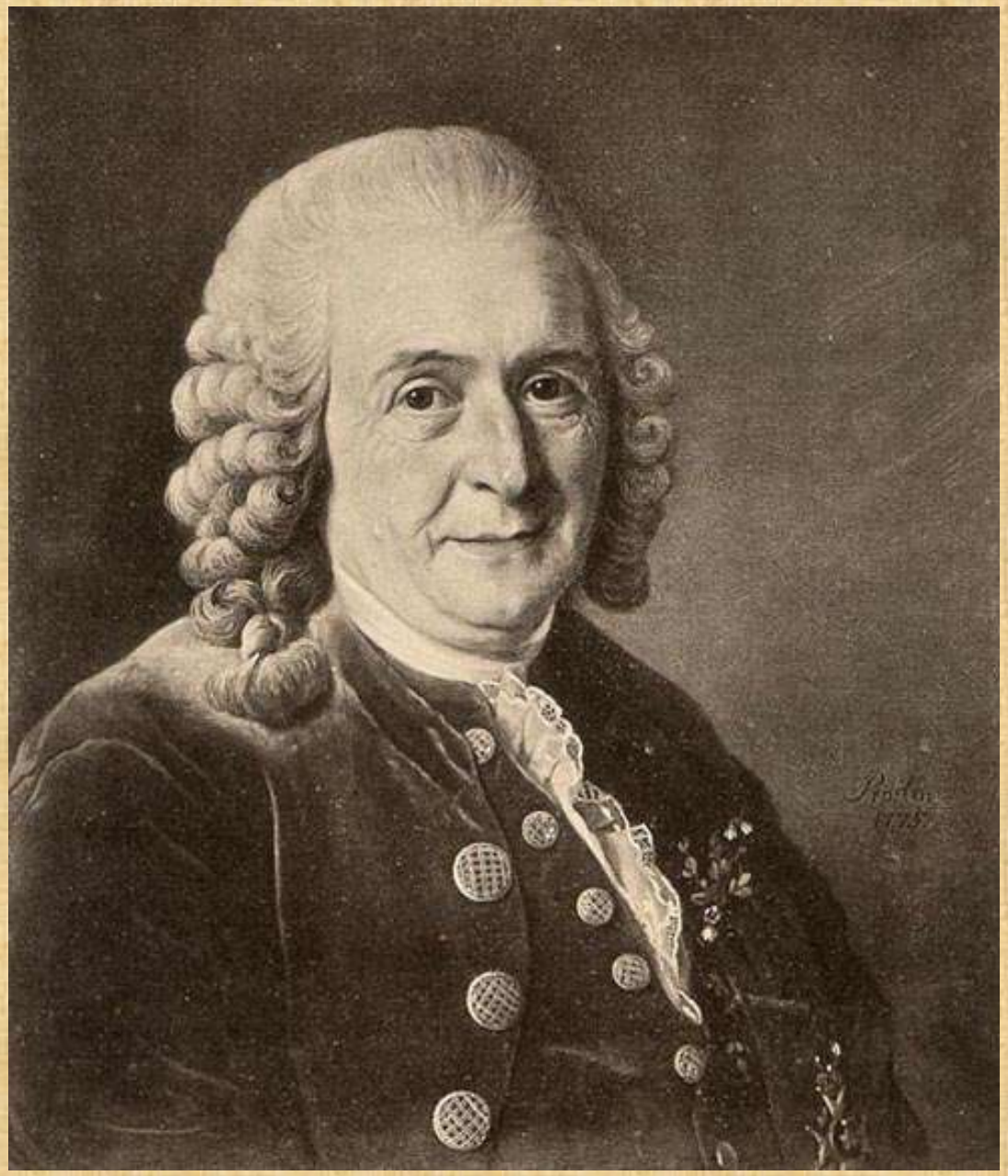
Classification

Biology I

Standards

- **S7L1. Students will investigate the diversity of living organisms and how they can be compared scientifically.**
- a. Demonstrate the process for the development of a dichotomous key.
- b. Classify organisms based on physical characteristics using a dichotomous key of the six kingdom system (archaebacteria, eubacteria, protists, fungi, plants, and animals).



1707-1778

Who was Linnaeus?

The “father of modern taxonomy” was Carolus Linnaeus (Carl von Linné)

What are taxa?

- The science of classifying organisms is called taxonomy
- Organisms are grouped into “taxa” based on their similarities to each other

The Old System

The old classification system is:

5 Kingdom Classification System:

Monera: all prokaryotes

Protista: single-celled eukaryotes (protists)

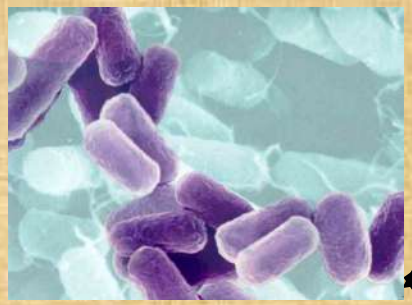
Fungi: multi-cellular heterotrophic sessile eukaryotes

Plantae: multi-cellular autotrophic sessile eukaryotes

Animalia: multi-cellular heterotrophic motile eukaryotes

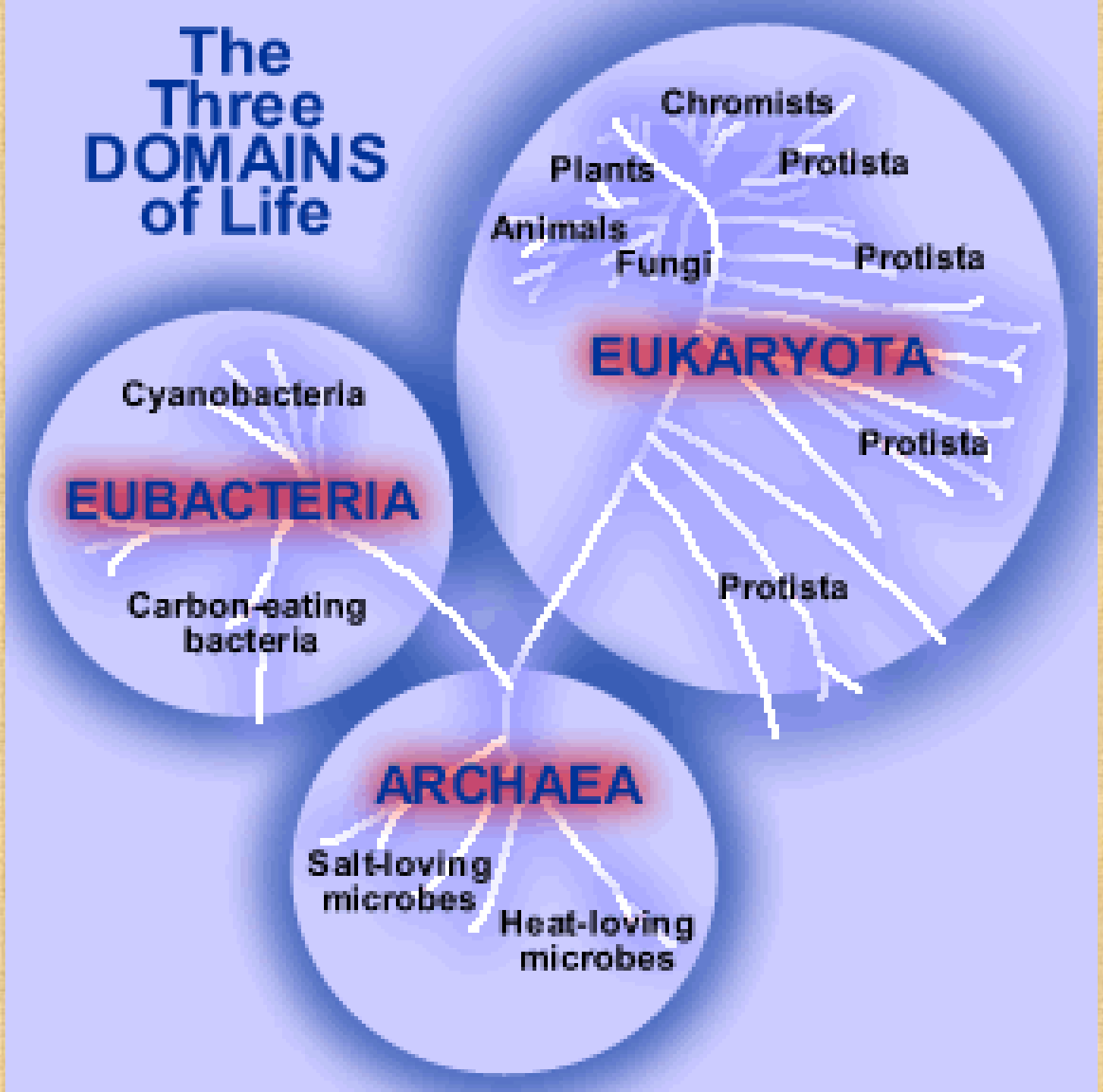
6 Kingdom Proposal

Archebacteria



EUbacteria

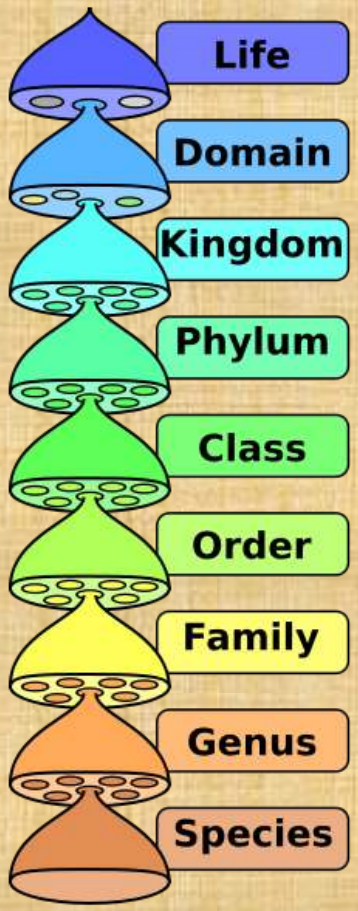
- 6 Kingdom Classification System
  - Kingdom Eubacteria: true bacteria
  - (formerly in kingdom monera)
  - Kingdom A rchebacteria: extremophiles (formerly in kingdom monera)
  - Kingdom Protista (same)
  - Kingdom Fungi
  - Kingdom Plantae
  - Kingdom Animalia


The Three DOMAINS of Life
Chromists
Plants
Protista
Animals
Fungi
Protista
EUKARYOTA
Protista
Protista
Cyanobacteria
EUBACTERIA
Carbon-eating bacteria
ARCHAEA
Salt-loving microbes
Heat-loving microbes

What are the 3 Domains?

- 3 Domain System:
  - Archaea: prokaryotes; extremophiles
  - Eubacteria: prokaryotes; true bacteria
  - Eukarya: eukaryotes
    - Protista
    - Fungi
    - Plantae
    - Animalia

What are the 8 levels of classification?



Domain

KINGDOM

PHYLUM

CLASS

ORDER

FAMILY

GENUS

SPECIES

What mnemonic do we use to remember the 8 levels of classification?

Domain= **D**o

Kingdom = **K**ings

Phylum = **P**lay

Class = **C**ards

Order = **O**n

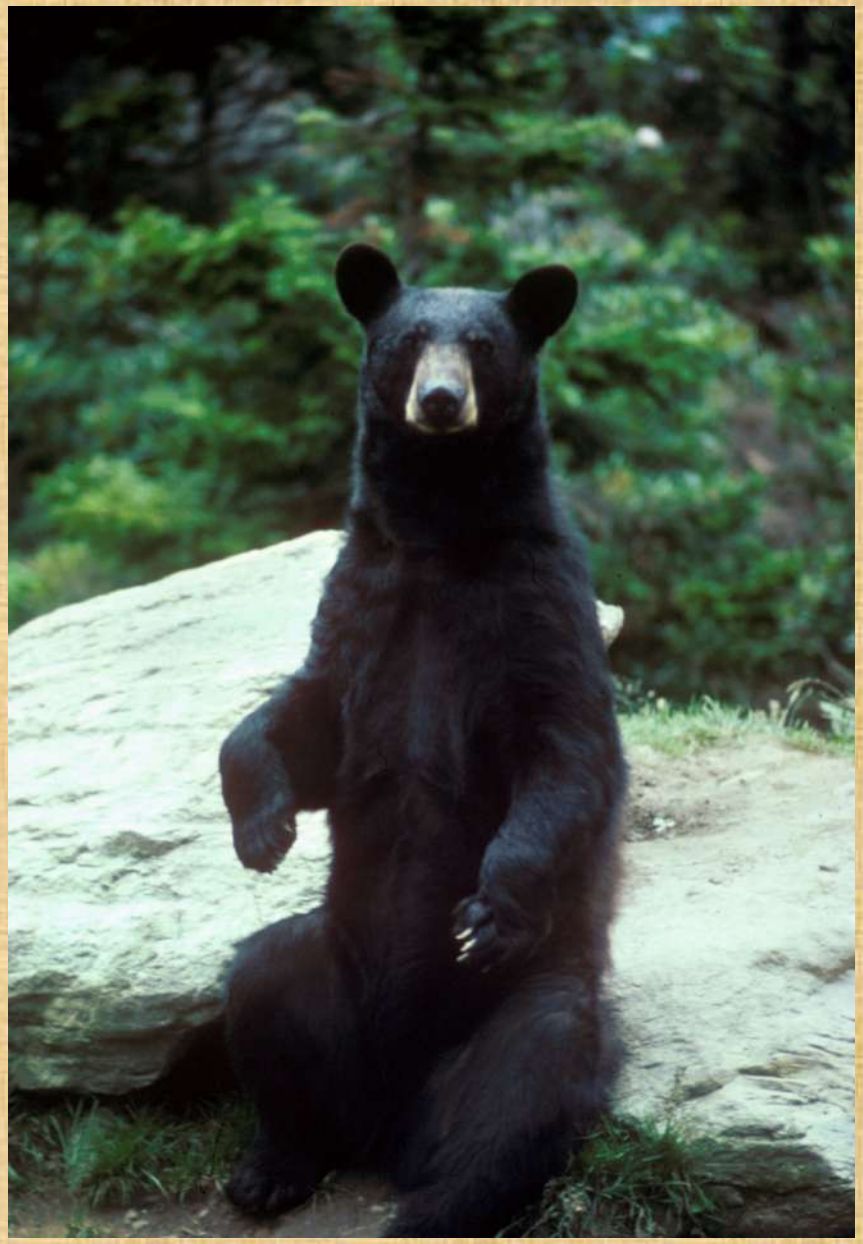
Family = **F**at

Genus = **G**reen

Species = **S**tools

What is the most specific classification level?

- Organisms are grouped into smaller and smaller groups all the way down to their species
- A **species** is the most specific grouping and includes only organisms that can interbreed with each other and produce fertile offspring



Ursus americanus

American Black Bear

How are organisms scientifically named?

Binomial Nomenclature: "a two-name system"

First part of name: **genus** first letter always capitalized

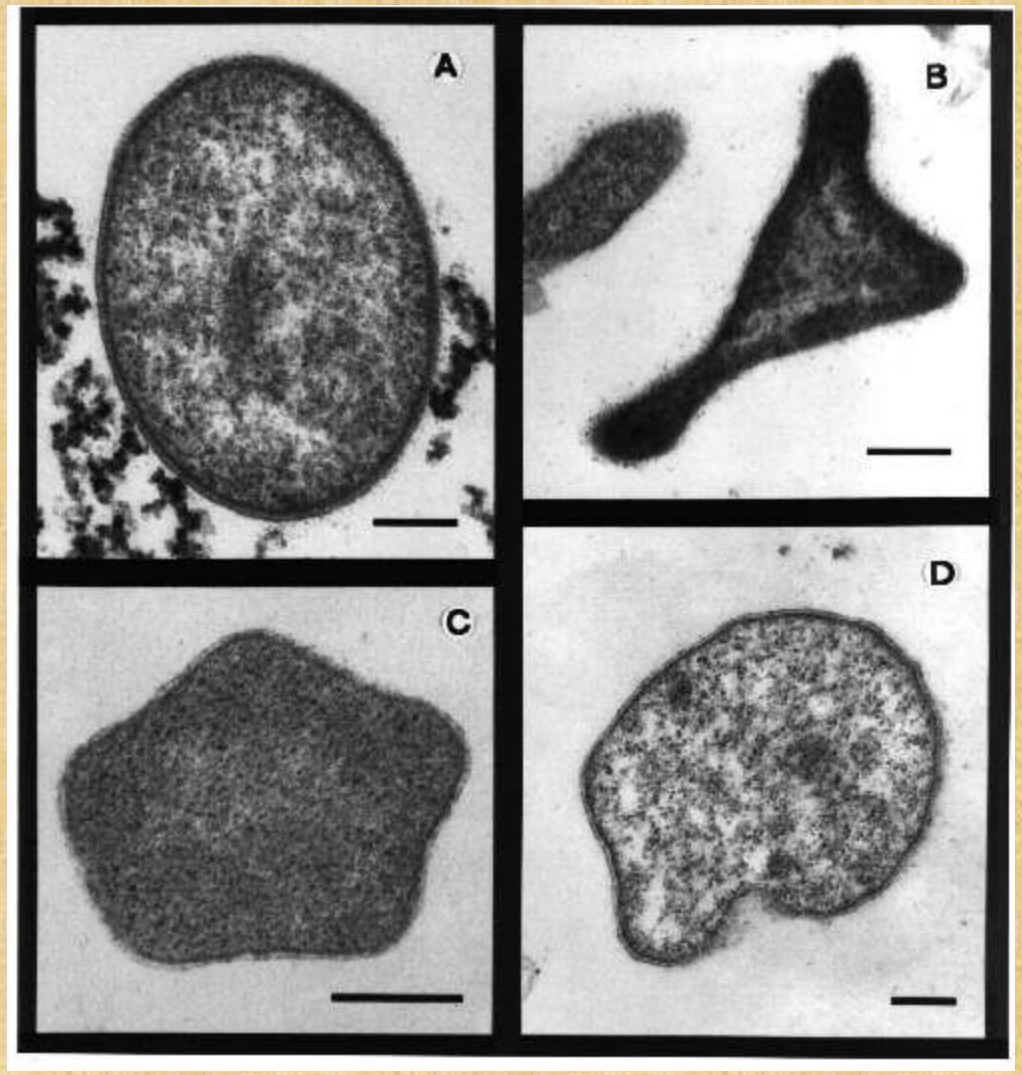
Second part of name: **species** first letter always lowercase

Entire name is underlined and *italicized*

Names must be submitted for acceptance by original discoverer, and are generally Latin or Latinized

The Six Kingdoms

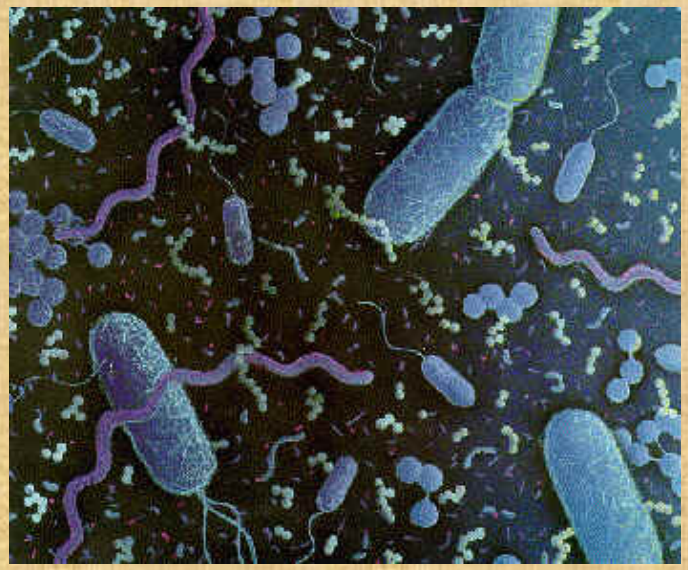
Domain Archaea

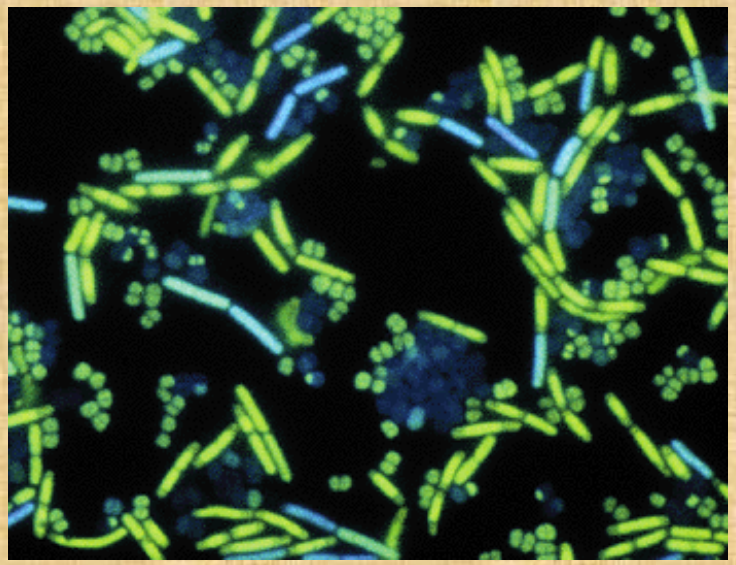


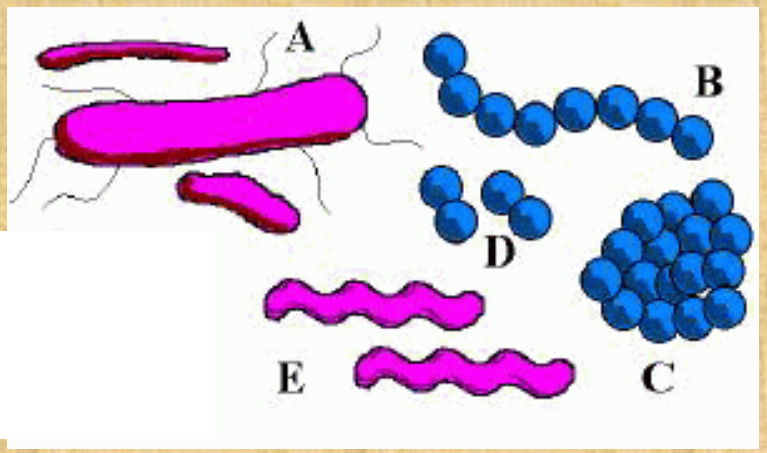
Domain Archaea

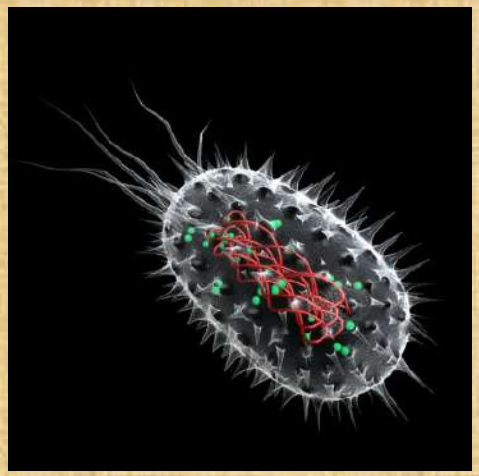
Formerly part of the kingdom monera
Microbiologists who study bacteria determined that the DNA of these are much different from other, true bacteria
Most Archaea live in extreme conditions (very hot, acidic/basic, sulfurous, etc)

Domain Eubacteria









Domain Eubacteria

- Formerly a part of the kingdom monera
- Name means “true bacteria”
- These are the kind of bacteria likely to make us sick, live in our gut to help us digest food, or be used in the making of cheese

A. Bacilli

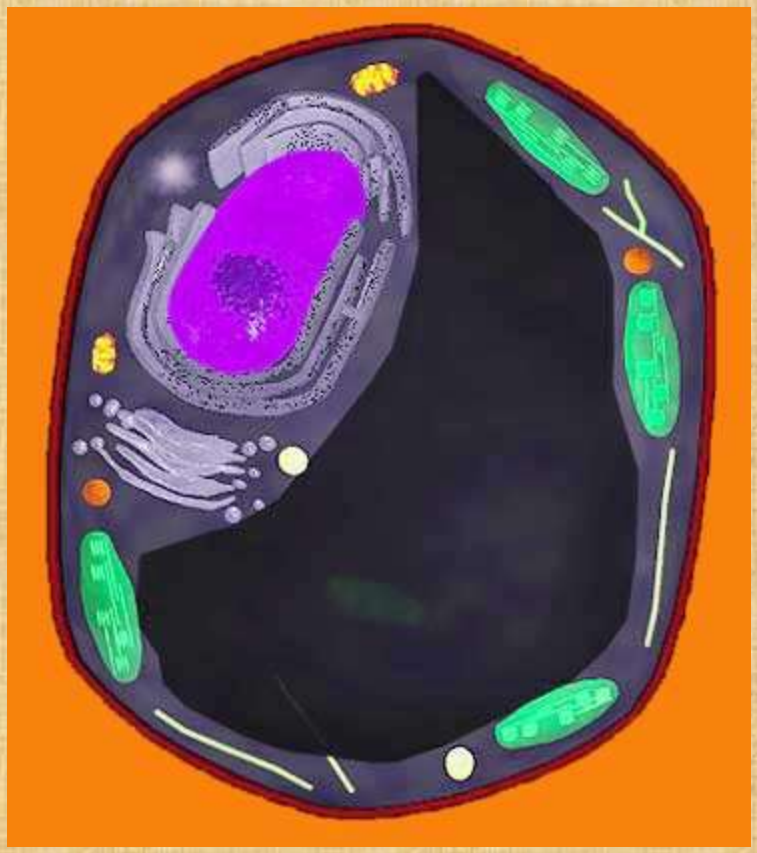
B. Streptococcus

C. Staphylococcus

D. Dicoccus

E. Spirilla

Domain Eukarya



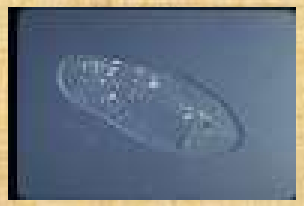
Domain Eukarya

- Contains all of the eukaryotes (organisms with a nucleus in their cells)
  - Protista
  - Fungi
  - Plantae
  - Animalia

Kingdom Protista

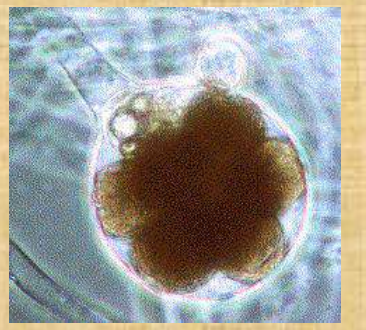
Animal-Like (Protozoans)

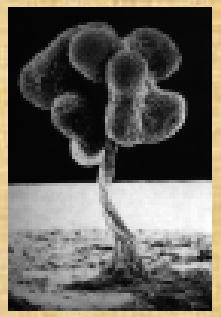

Amoeba


Paramecium

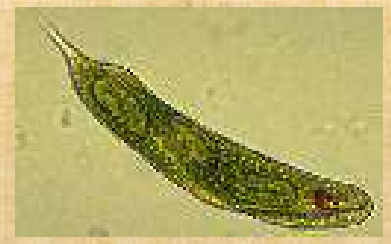

Giardia

Fungus-Like


Water Mold


Slime Mold

Plant-Like


Euglena


Dinoflagellates


Green Algae


Brown Algae


Diatom

Kingdom Protista

Includes All Protists:
- Eukaryotic
- Unicellular

Animal-Like Protists (protozoans)
- Pseudopods, Ciliates, Flagellates
- Examples: Amoeba, Paramecia, Giardia

Plant-Like Protists (autotrophic)
- Euglenoids, Dinoflagellates, Diatoms, Green/Red/Brown Algae

Fungus-Like Protists
- Examples: Water molds, slime molds

Kingdom Fungi

Kingdom Fungi

- All eukaryotic, multicellular, heterotrophic, sessile organisms
- Includes: molds, mushrooms, rusts, lichens
- Mycorrhizal associations allow plants to absorb more water and nutrients from the soil

Kingdom Plantae

Bryophyte
(Moss)

Pteridophyte
(Fern)

Pteridophyte
(Fern)

← **Primitive Plants**

Complex Plants ↙

Coniferophytes
(Pine Trees)

Angiosperm;
Dicot

Angiosperm;
Monocot

Kingdom Plantae

All eukaryotic, multicellular, autotrophic, sessile organisms

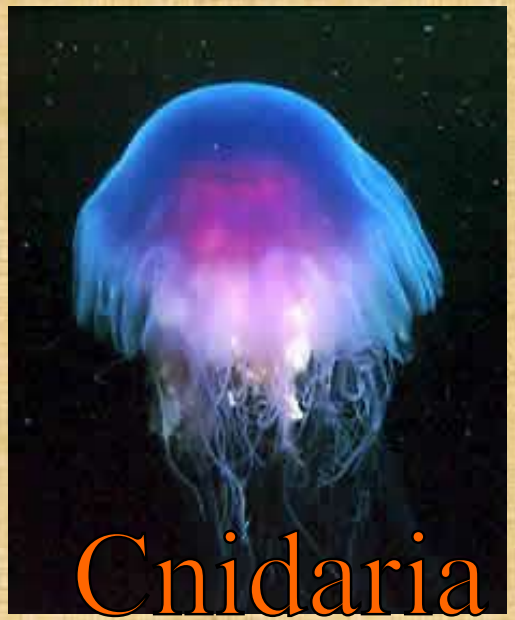
Produce their own food from sunlight and carbon dioxide

Common Phyla:

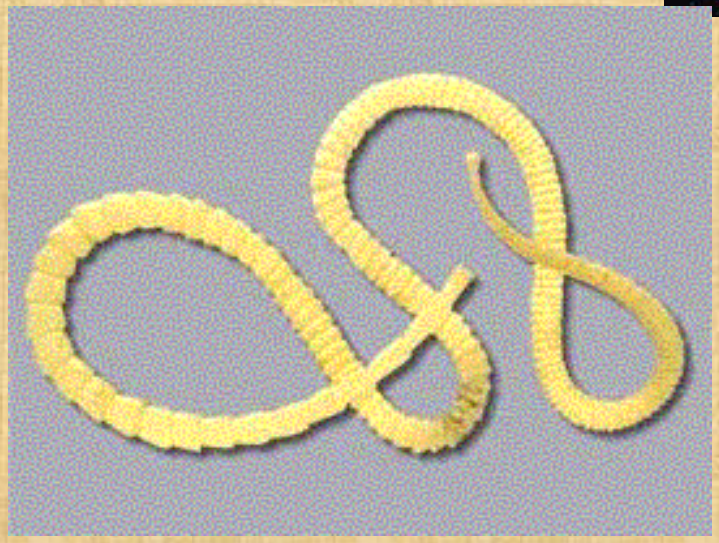
- Bryophyta (mosses)
- Pteridophyta (ferns)
- Coniferophyta (conifers, like pine trees)
- Angiospermophyta (angiosperms, like flowering plants

Porifera

Ctenophora

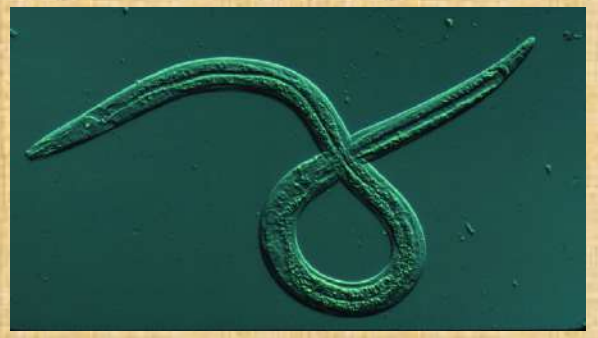


Cnidaria

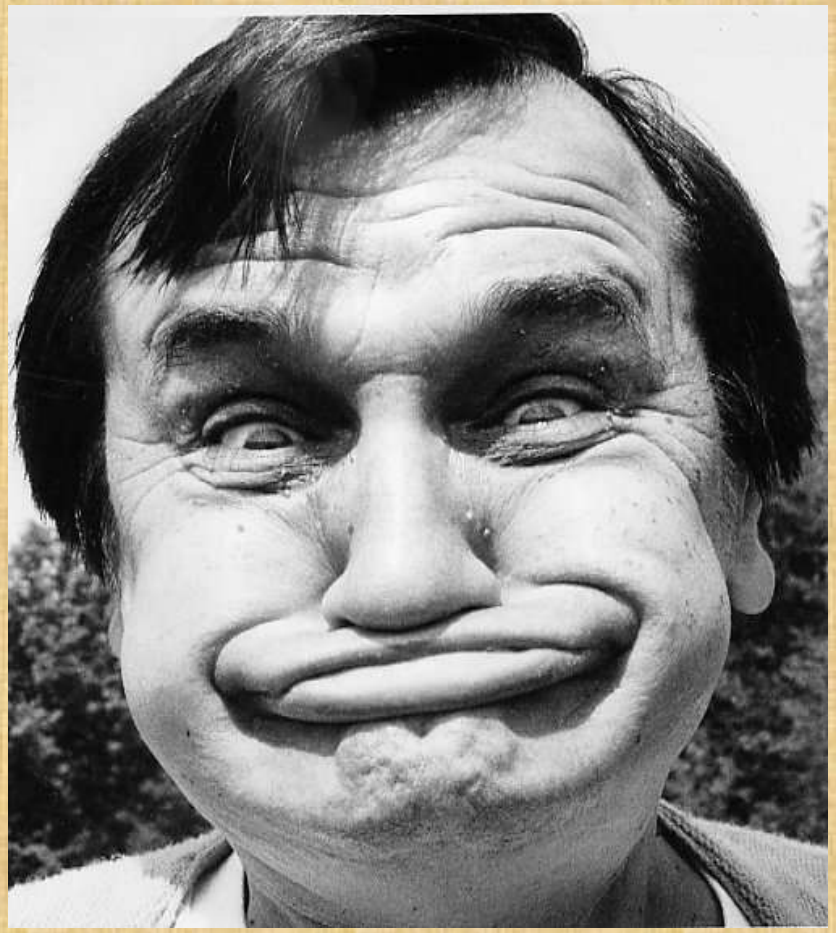


Platyhelminthes

Nematoda



Human Classification



Kingdom Animalia

- All eukaryotic, multicellular, heterotrophic, motile (most) organisms
- Common Phyla:
  - Porifera (sponges, corral)
  - Cnidaria & Ctenophora (jellyfish and similar animals)
  - Platyhelmenthes (flat worms, tapeworms)
  - Nematoda (small unsegmented worms)

Chordata

Arthropoda

Annelida

Echinodermata

Molluska

Human Classification

- Domain: Eukarya
- Kingdom: Animalia
- Phylum: Chordata
  - Class: Mammalia
  - Order: Primates
    - Family: Hominidae
      - Genus: Homo
      - Species: Sapien

Note Guide

- Who was Linnaeus?

- What are taxa?

- The old classification system is:_____ Kingdoms

- The new classification system there are:_____ Kingdoms
- What is the difference between the 3 domains?
  - 1.
  - 2.
  - 3.

- What are the 8 levels of classification?
- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)

Note Guide (pg. 2)

- What mnemonic device do we use to remember the 8 levels of classification?
- What is the most specific classification level?
- How are organisms scientifically named?
- What are the six kingdoms of life?
- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- How would you fully classify a human?