

# Kingdoms and Domains

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# Taxonomy is . . .

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*In order to describe and classify a new species, one must compare them to other organisms.*

DISCOVERING

NAMING

DESCRIBING

CLASSIFYING



## **ORGANISMS**

Used to better understand biodiversity

# Why use scientific names?

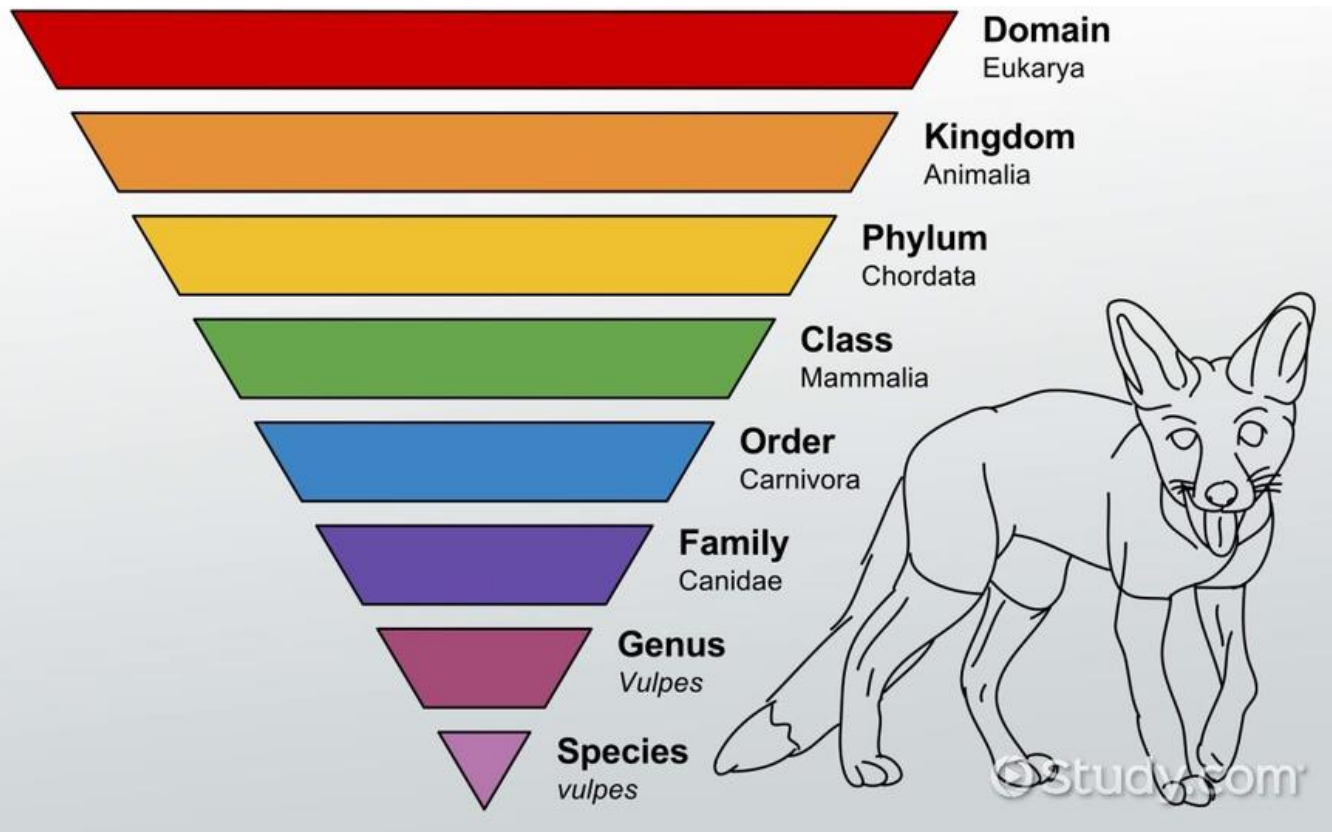
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So that it can be **commonly used from region to region**. Common names tend to vary.

Using a single standard Latin name for each species **avoids any confusion**

# Remember . . .

Organism are classified based on **taxons**.



# Classifying Species

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When classifying species , scientists look for **similarities and differences between organisms.**

## Structural Diversity:

When scientists look at similarities they look at the following:

- **cell type**
- **cell number**
- **cell wall material**
- **DNA sequence.**

# Classifying Species







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Scientists often reclassify organisms as new information is discovered.

**Why is it important for scientists to continue to classify and reclassify organisms?**

Originally all species were categorized into two kingdoms 'Plants' and 'Animals'. Advances in technologies and new discoveries allowed further categorization.

# Kingdoms

Original	1860s	1930s	1960s	1990s
Animals 	Animals	Animals	Animals	Animals
				Plants
Plants 	Plants	Plants	Plants	Fungi
			Fungi 	Protists
	Protists 	Protists	Protists	Bacteria
		Bacteria 	Bacteria	Archaea 

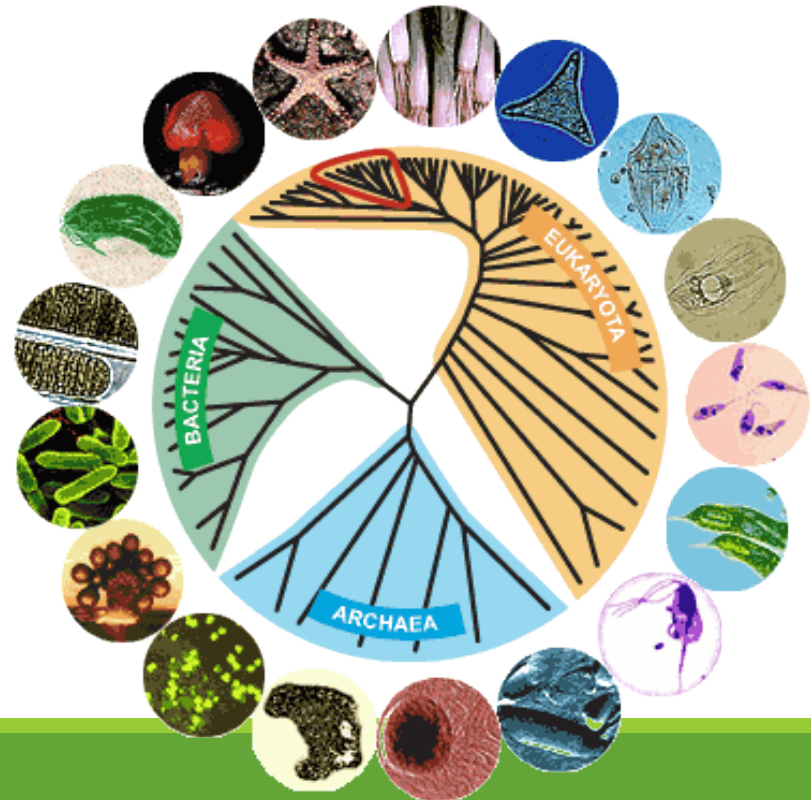
# Domains

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With further discoveries and development of new technologies, scientists have added another taxa known as 'Domain'.

There are three domains (the broadest taxon)

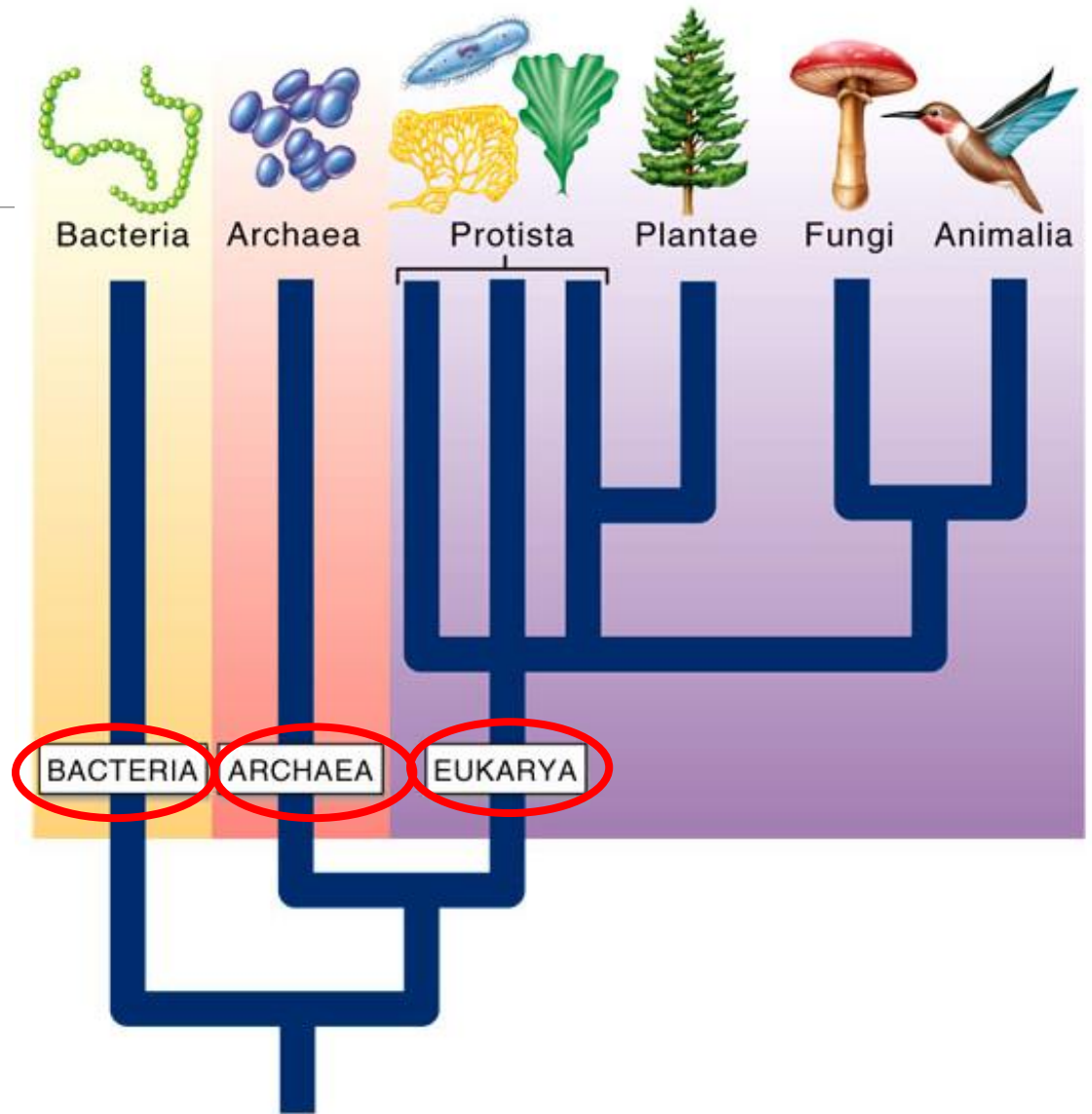
1. Bacteria
2. Archaea
3. Eukarya





# Domains

*Today, there are 3 broad domains that are mostly based on the cell type and environment of the organism. These domains are further subdivided into 6 main kingdoms.*



# Creating Kingdom Categories

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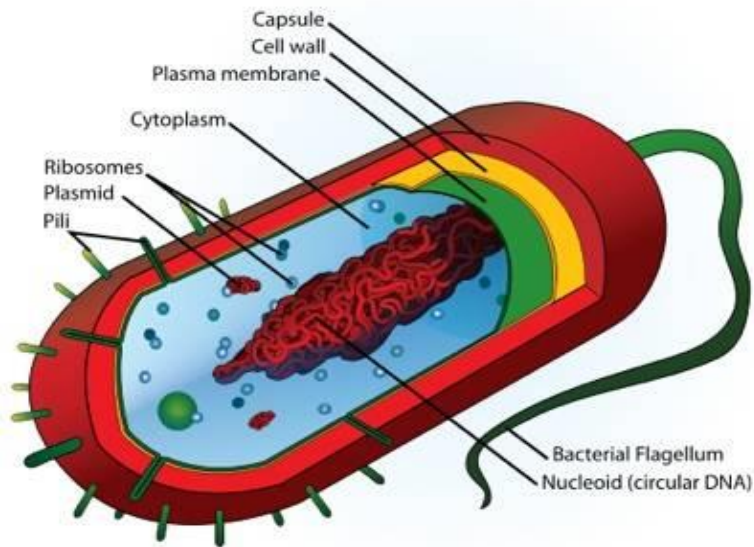
Information used to categorize different kingdoms:

1. Cell Type
2. Number of Cells
3. Cell Wall Material
4. Nutrition
5. Type of Reproduction

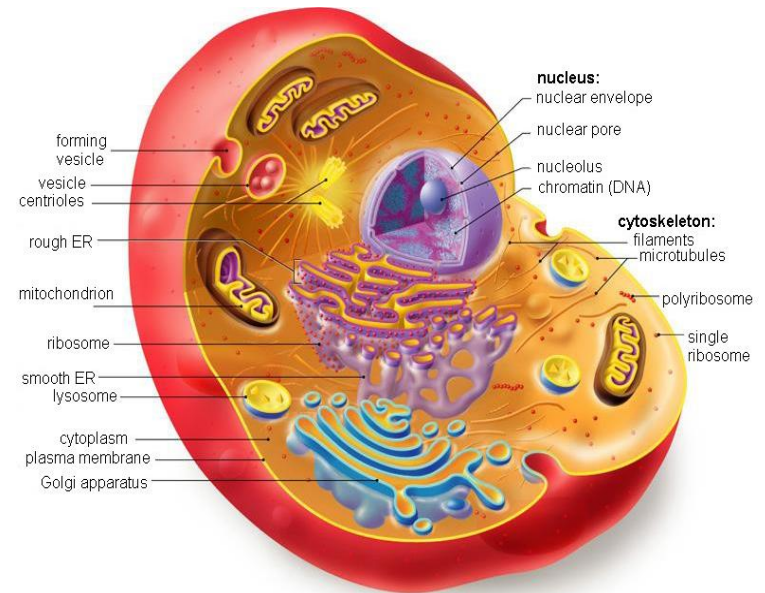
**\*\* Note: *cell type* and *number of cells* are primary distinction factor.**

# 1. Cell Types

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**Prokaryotes** (*before nucleus*) :  
small, simple cell without a  
membrane bound nucleus

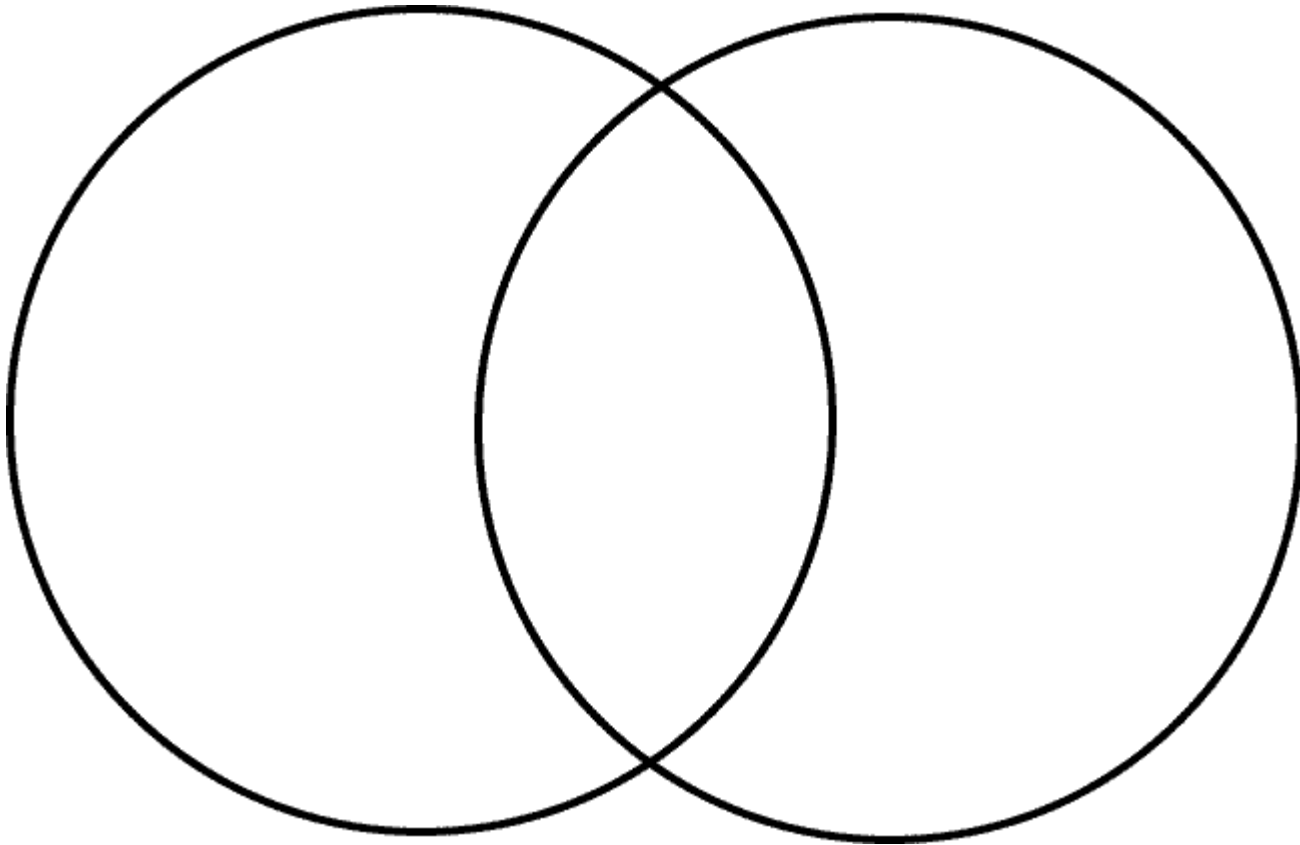


**Eukaryotes** (*true nucleus*) :  
~1000X larger, complex cell  
with a membrane bound  
nucleus

# 1. Cell Types

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*What are other differences between eukaryotic and prokaryotic cells?*

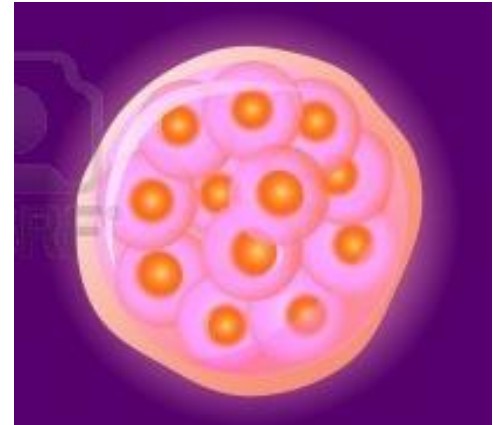


## 2. Number of Cells

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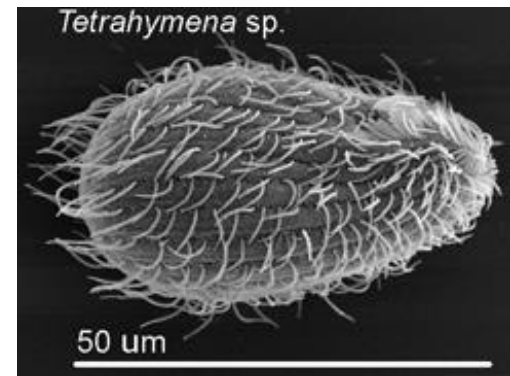
### Multicellular :

- E.g. Cats, plants, humans



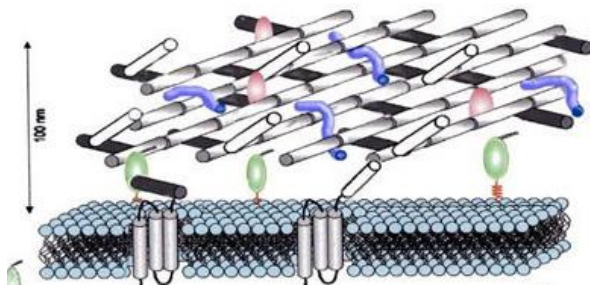
### Unicellular:

- E.g. Bacteria, halophiles (salt lovers)

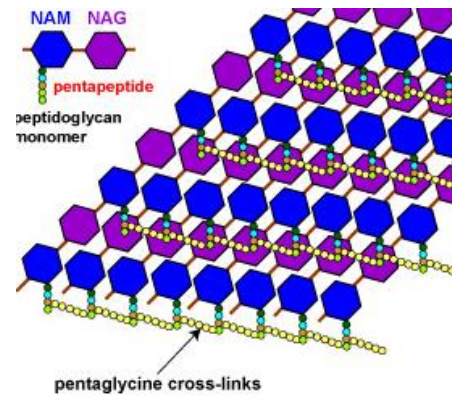


# 3. Cell Wall Materials

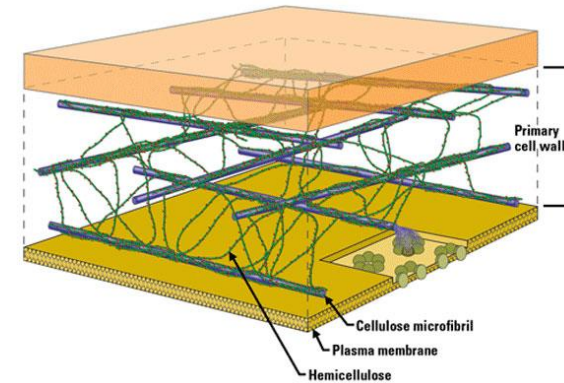
The cell wall material varies between organisms. Depending on type of material, organisms are classified in different domains and kingdoms



*Chitin (fungi)*



*Peptidoglycan (bacteria)*



*Cellulose (plants)*

# 4. Nutrition

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Autotrophs:

Heterotrophs:



*Autotroph*



*Heterotroph*

# 5. Reproduction

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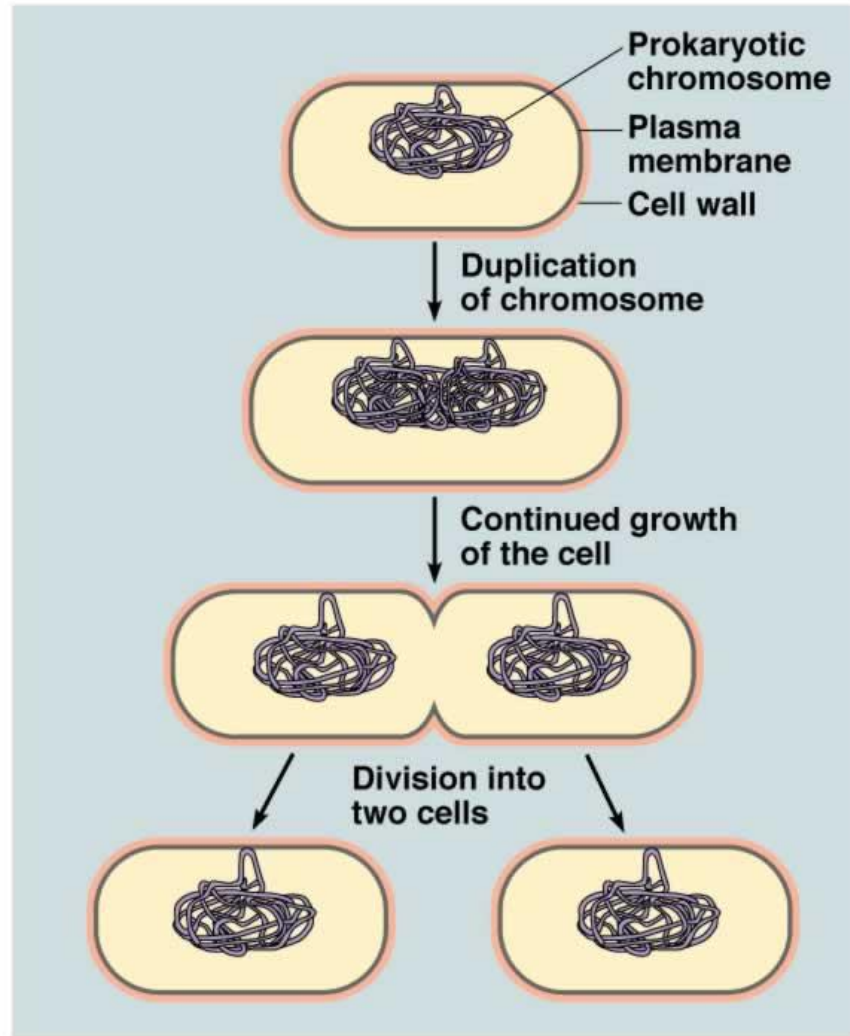
Asexual: offspring arise from a **single parent**, and inherit the genes of that parent only

Sexual: **genetic material** of two parents are **combined** to create an offspring



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## *Asexual Reproduction*



# Main Characteristics of Kingdoms

Classification of Living Things						
DOMAIN	Bacteria	Archaea	Eukarya			
KINGDOM	Eubacteria	Archaeobacteria	Protista	Fungi	Plantae	Animalia
CELL TYPE	Prokaryote	Prokaryote	Eukaryote	Eukaryote	Eukaryote	Eukaryote
CELL STRUCTURES	Cell walls with peptidoglycan	Cell walls without peptidoglycan	Cell walls of cellulose in some; some have chloroplasts	Cell walls of chitin	Cell walls of cellulose; chloroplasts	No cell walls or chloroplasts
NUMBER OF CELLS	Unicellular	Unicellular	Most unicellular; some colonial; some multicellular	Most multicellular; some unicellular	Multicellular	Multicellular
MODE OF NUTRITION	Autotroph or heterotroph	Autotroph or heterotroph	Autotroph or heterotroph	Heterotroph	Autotroph	Heterotroph
EXAMPLES	<i>Streptococcus</i> , <i>Escherichia coli</i>	Methanogens, halophiles	<i>Amoeba</i> , <i>Paramecium</i> , slime molds, giant kelp	Mushrooms, yeasts	Mosses, ferns, flowering plants	Sponges, worms, insects, fishes, mammals

# Dichotomous Keys

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A ***dichotomous key*** is an identification tool that consists of a series of two-part choices that lead the user to the correct identification of an organism

Used by scientist with a specimen that is unknown



vs.



# Dichotomous Keys (pg. 27 of textbook)

1a. Skin dry and warty... <b>American toad</b>	1b. Skin not dry and warty...go to 2
2a. Toes with “sticky pads”...go to 3	2b. Toes without sticky pads...go to 4
3a. Brown, <2 cm, a darker X-shaped mark on the back... <b>spring peeper</b>	3b. Grey or green, yellow under the legs... <b>eastern grey treefrog</b>
4a. Back without a pair of ridges...go to 5	4b. Back with a pair of ridges...go to 6
5a. Mottled pattern, with mammal-like odour... <b>mink frog</b>	5b. Unmottled green pattern; to 15 cm... <b>bullfrog</b>
6a. Back with large round or squarish spots...go to 7	6b. Back unspotted (or with a few small spots)...go to 8
7a. Spot round... <b>leopard frog</b>	7b. Spots squarish... <b>pickerel frog</b>
8a. Predominantly green colour... <b>green frog</b>	8b. Brown, with a dark mask through the eye... <b>wood frog</b>

# Dichotomous Keys

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To design a key to make identifications at the species level appropriate characteristics must be chosen.

Example: to identify a species of wildflowers

- # of leaves
- Arrangement of leaves
- Flower colour
- Plant size

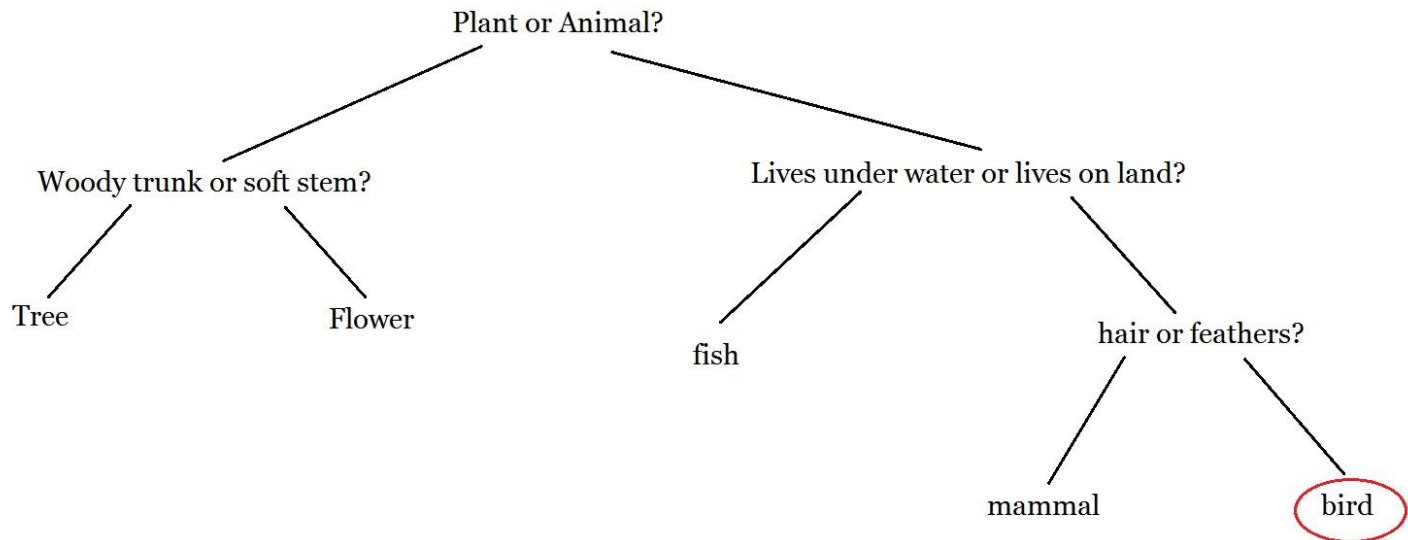


# Dichotomous Keys

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*Often, the key is turned into a visual*



# Checking for Understanding

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What domain includes Protista?

- A) Archaea
- B) Plantae
- C) Prokarya
- D) Eukarya
- E) Bacteria

## Checking for Understanding

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Organisms in which kingdom have cell walls that contain peptidoglycan?

- A) Bacteria
- B) Archaea
- C) Plantae
- D) Protista
- E) Fungi



## Checking for Understanding

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Which term best describes organisms that must consume other organisms to obtain energy-yielding food?

- A) Omnivore
- B) Eukaryotic
- C) Prokaryotic
- D) Autotrophic
- E) Heterotrophic

# Homework

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Textbook: pg. 30 #1-2, 4-9