

An anatomical illustration of a human torso, showing the internal organs and the nervous system. The body is rendered in a light blue, semi-transparent style, revealing the heart, lungs, stomach, and intestines. The nervous system, including the brain, spinal cord, and peripheral nerves, is highlighted in a darker blue and purple. The background is a plain white.

# Classification and Cell Structure

A Review from Elementary School

# Biological Context...

- Life... and by its definition can be used to classify organisms by their attributes
- To make this manageable we will be using the idea of taxonomy
- **taxonomy** (from Ancient Greek τάξις (taxis), meaning 'arrangement', and -νομία (-nomia), meaning 'method') is the science of naming, defining (circumscribing) and classifying groups of biological organisms on the basis of shared characteristics.
- Taxonomists use the power of observation to spot the minute characteristics of species that are similar...
- Take a look at Canada's largest most powerful wild cats...



# Cougar

Males can reach up to two metres in length and weigh over 60 kilograms.





## **Mountain Lion**

Males can reach up to two metres in length and weigh over 60 kilograms.



# Puma

Males can reach up to two metres in length and weigh over 60 kilograms.

# What...?

- You may notice that each of these cats looks very similar and has the same description. This is because they are all the same animal!
- The common name used for this cat is often dependent on the area in which you live. People in Ontario normally call this animal a cougar, while people in British Columbia may refer to this cat as a mountain lion.
- Having multiple names for the same animal can certainly become confusing! This is why a system that gives each organism a unique name would be very useful.
- A consistent naming system would allow people to understand which species are being discussed no matter where they are from. This is what taxonomy is all about.



# Father of Taxono

## Carl Linnaeus

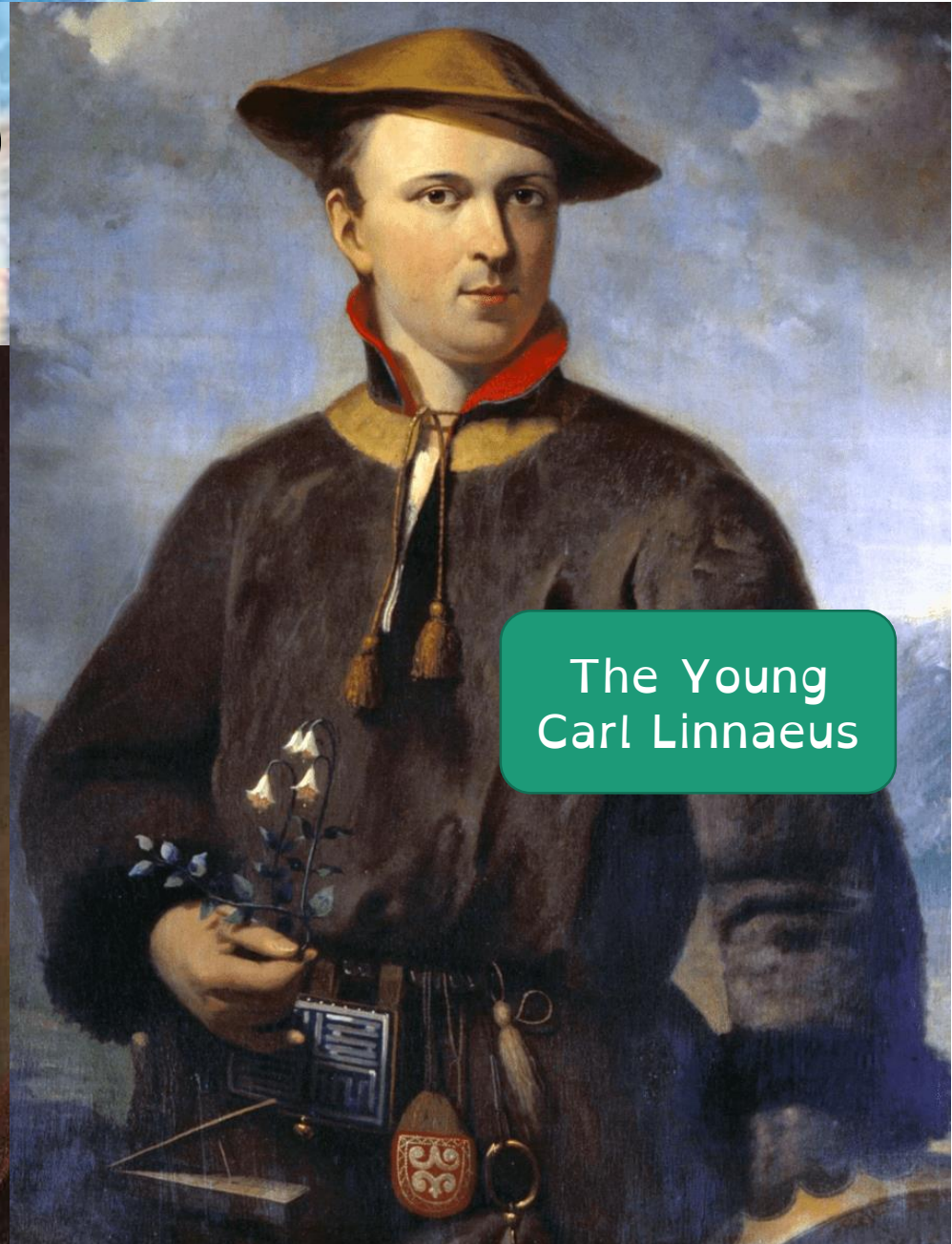
Born: Sweden

Born: May 23, 1707

Died: January 10, 1778

He was a...

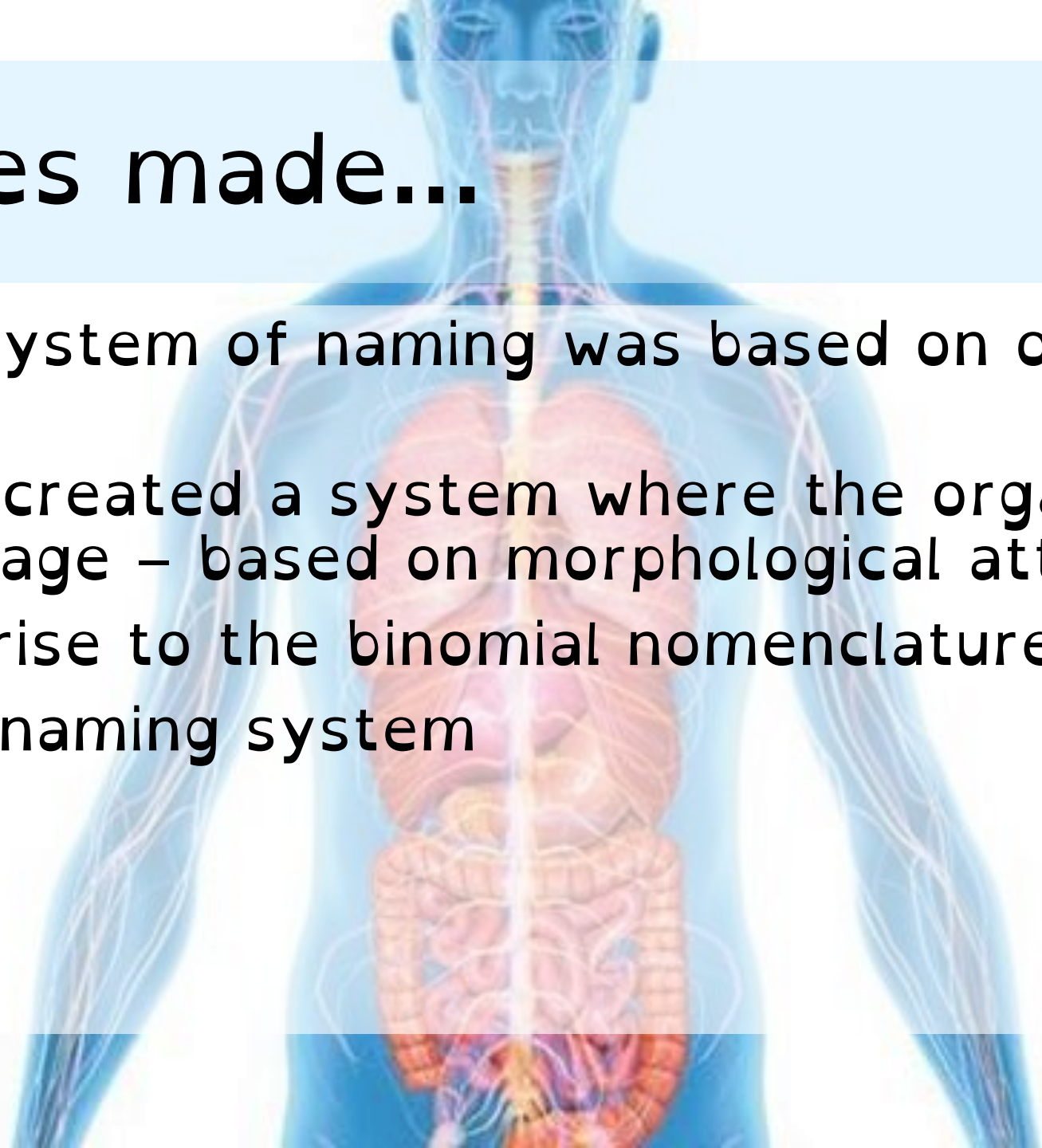
botanist, physician,  
and zoologist!



The Young  
Carl Linnaeus

# Changes made...

- Original system of naming was based on organisms habitat!
- Linnaeus created a system where the organism took centre stage – based on morphological attributes
- He gave rise to the binomial nomenclature....
- 2 name –naming system





# Binomial Nomenclature

- Each level of the hierarchy is called a taxon
- (Taxon – is a grouping... plural is taxa)
- Today we use 8 taxa to describe all living things
- As you move from domain to species it becomes more specific

# Binomial Nomenclature



- Linnaeus' genus and species are the two most specific levels in the classification system.
- **genus** - biological classification ranking between family and species, consisting of structurally or phylogenetically related species plural **genera**
- **species** - a **species** is often defined as the largest group of organisms in which any two individuals of the appropriate sexes or mating types can produce fertile offspring, typically by sexual reproduction.

# Ancestry

An anatomical illustration of a human torso, showing the internal organs and the skeletal structure. The illustration is semi-transparent, allowing the underlying anatomy to be seen. The background is a light blue gradient.

- Binomial nomenclature not only provides unique and specific names for all organisms, it will also provide information on how organisms are related.
- Taxonomic levels or ranks are based upon shared characteristics. This means that the more levels that two organisms share, the more closely related they are.

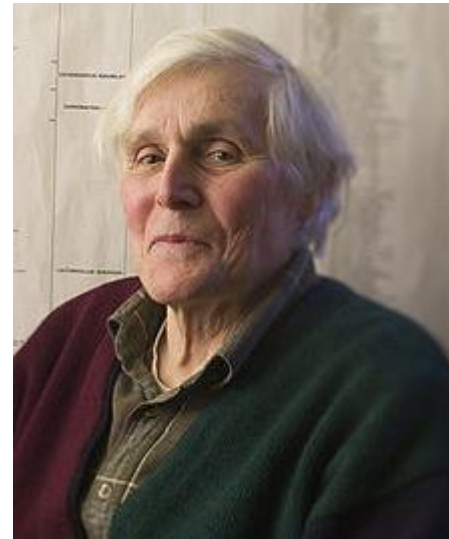


An anatomical illustration of a human torso from the neck to the waist. The body is rendered in a semi-transparent blue color, revealing internal organs. The lungs are shown in a reddish-pink hue, the heart is a darker red, and the stomach and intestines are in shades of orange and red. A complex network of white and purple lines represents the nervous system, with a central spinal cord and branching nerves throughout the body. The background is a light, solid blue.

# Modern Taxonomy

# Before the Kingdom Classification

- The widest least specific classification in taxonomy is the domains.
- In biological taxonomy, a domain, also known as superkingdom, is the highest taxonomic rank of organisms in the three-domain system of taxonomy devised by Carl Woese et al. in 1990.
- Carl Richard Woese (July 15, 1928 – December 2012) was an American microbiologist and biophysicist. Woese is famous for defining the Archaea (a new domain of life) in 1977.



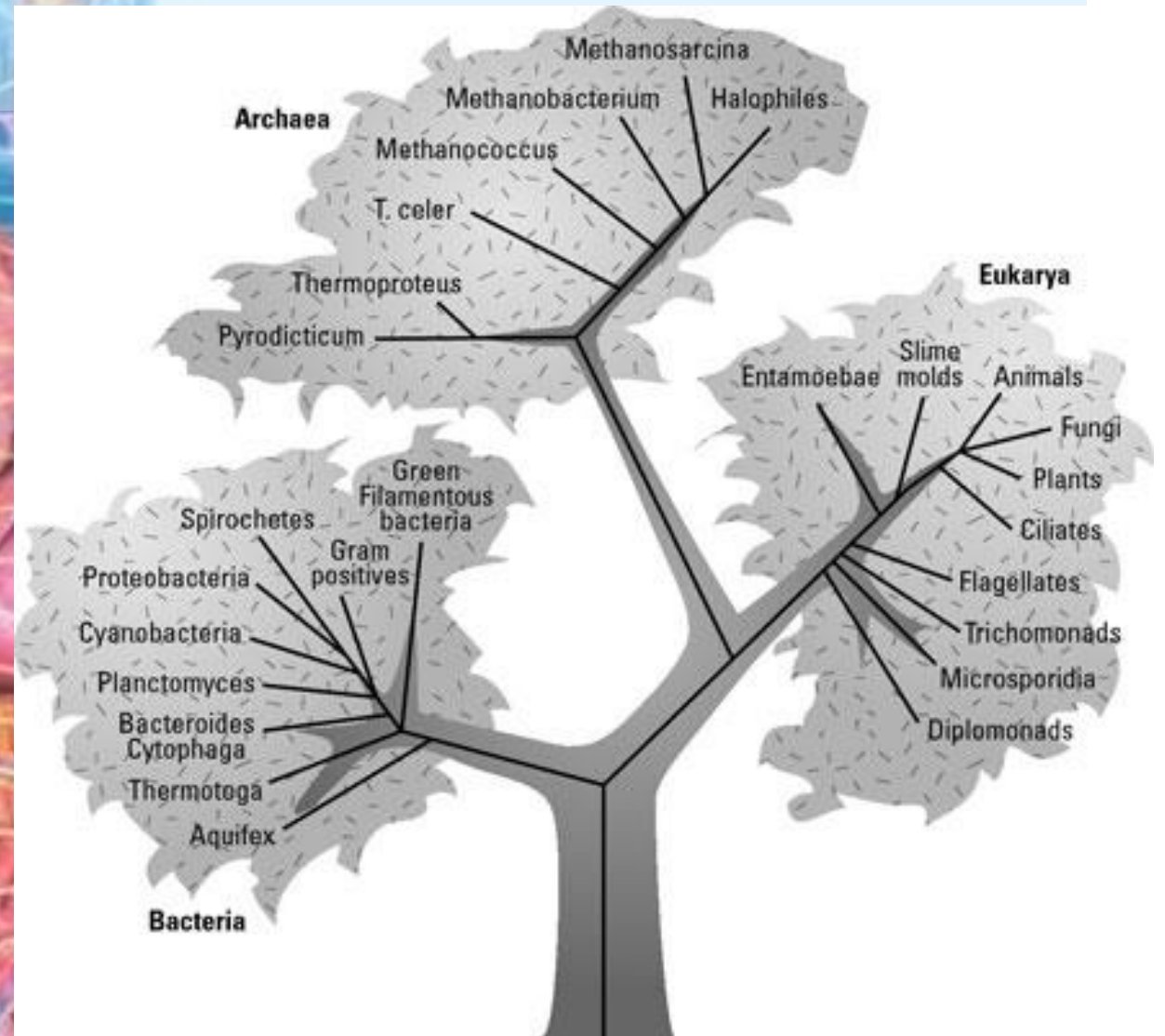
# Before the Kingdom Classification

- According to this system, the tree of life consists of three domains: Archaea, Bacteria, and Eukarya.
- The first two are all prokaryotic microorganisms, or mostly single-celled organisms whose cells have no nucleus.
- All life that has a cell nucleus and eukaryotic membrane-bound organelles is included in Eukarya.
- Non-cellular life is not included in this system.



# Tree of Life

- Another way to show relationships using taxonomy is through phylogenetic trees.

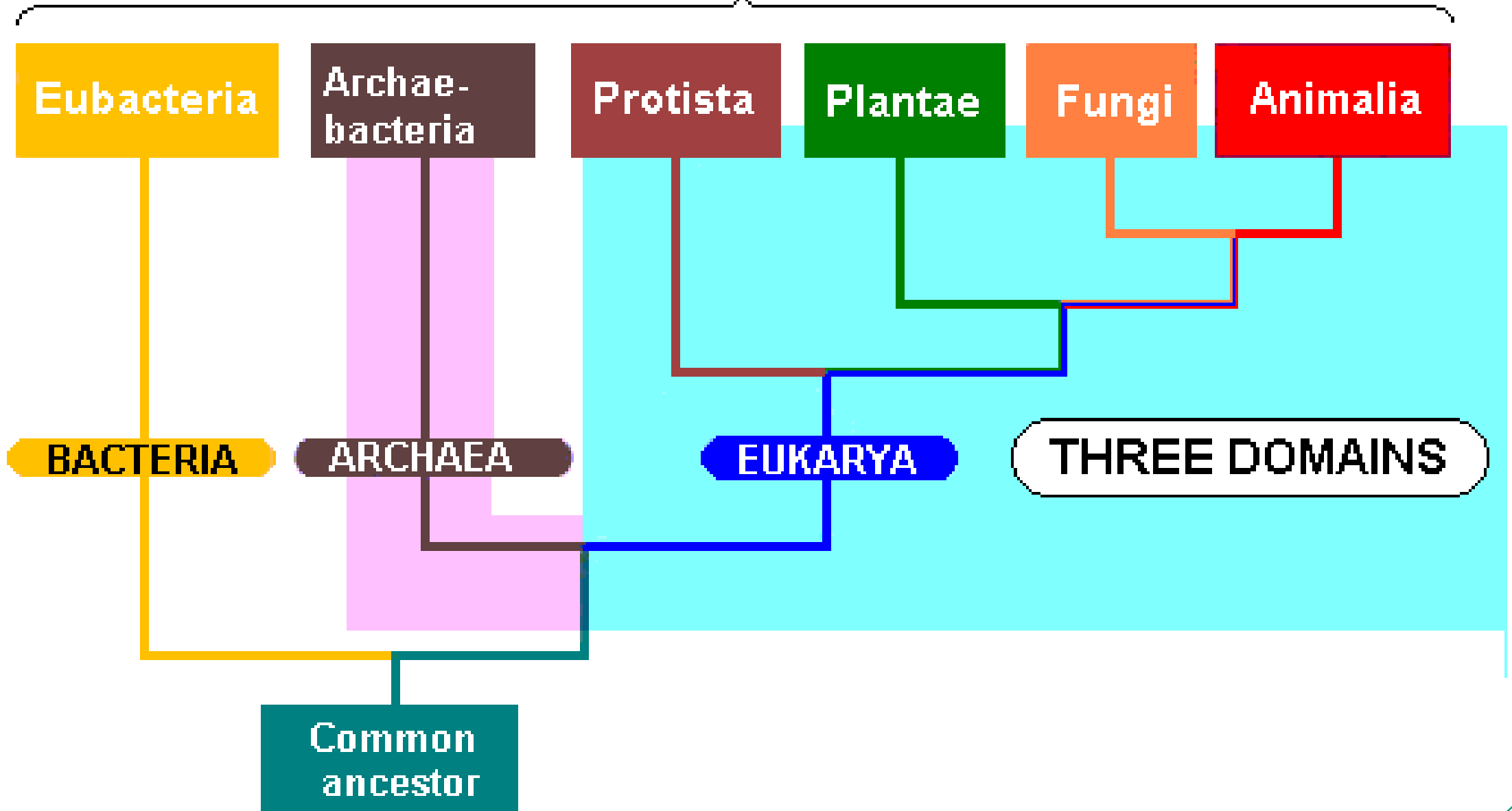


# Modern Taxonomy



- The most current taxonomic hierarchy uses the six kingdom system developed in the 1990s.
- Older systems used a five kingdom system, with Monera (or Prokaryotae) taking the place of both Archaeobacteria and Eubacteria.
- This separation of Monera was initiated by genetic comparisons that indicated that the ancient bacteria (Archaeobacteria), had different structures and very different ways of producing energy than the true bacteria (Eubacteria).

# SIX KINGDOMS





# Non-Cellular Life



- The three-domain system does not include any form of non-cellular life.
- The primary candidates for non-cellular life are viruses. Some biologists consider viruses to be living organisms, but others do not. Their primary objection is that no known viruses are capable of autonomous reproduction: they must rely on cells to copy them.
- Stefan Luketa proposed (not accepted yet) a five-domain system in 2012, adding Prionobiota (acellular and without nucleic acid) and Virusobiota (acellular but with nucleic acid) to the traditional three domains.

# Current Taxa...

The seven levels of taxa today are

- kingdom,
- phylum,
- class,
- order,
- family,
- genus, and
- species.



# Examples

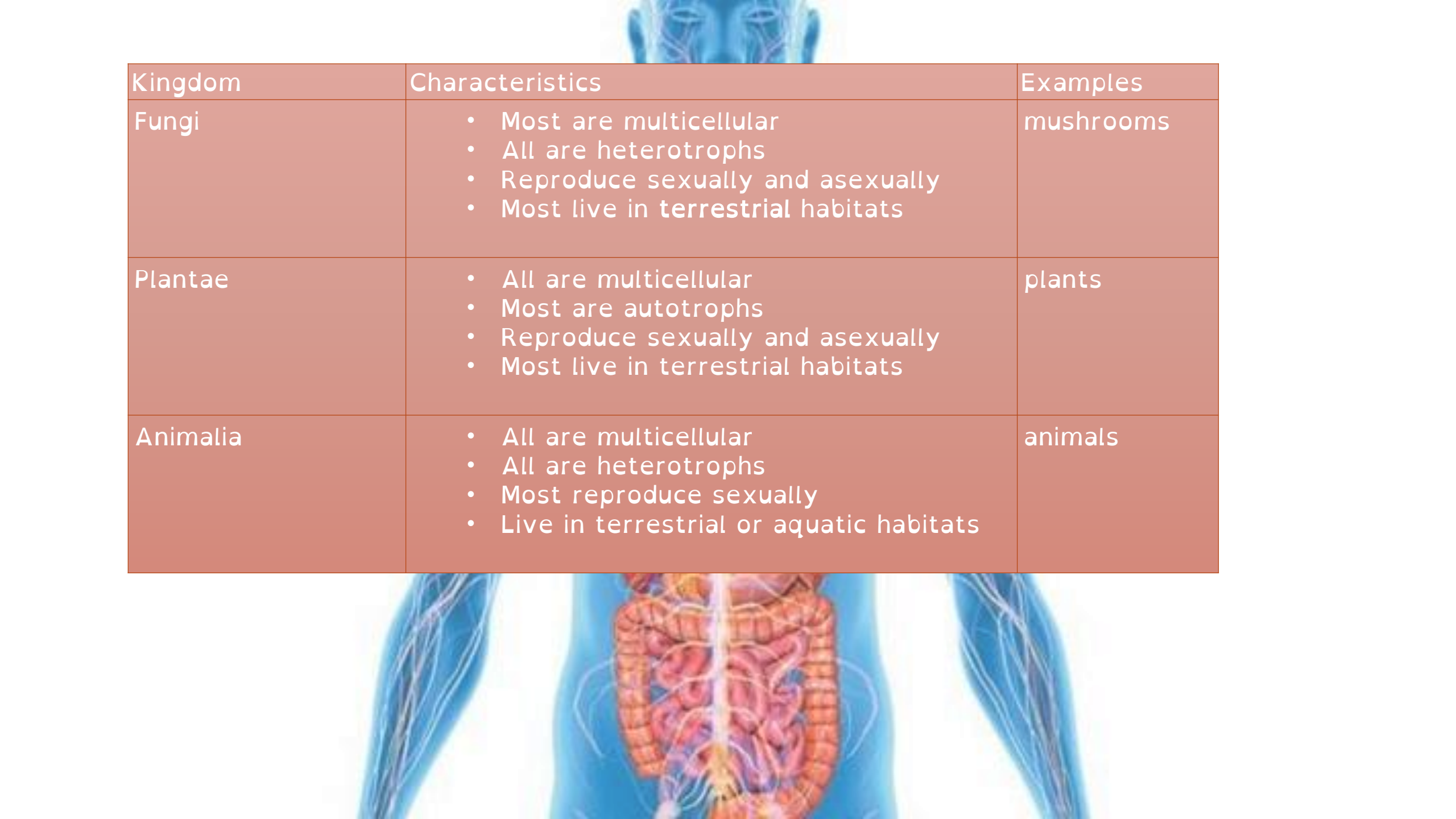
- The example to the right shows the organization of a plant and animal:

Taxa	Human	Red Clover
Kingdom	Animalia	Plantae
Phylum	Chordata	Magnoliophyta
Class	Mammalia	Magnoliopsida
Order	Primates	Fabales
Family	Hominidae	Fabaceae
Genus	Homo	Trifolium
Species	sapiens	pratense





Kingdom	Characteristics	Examples
Archaeobacteria	<ul style="list-style-type: none"><li>• Simple organisms</li><li>• No nucleus (prokaryote)</li><li>• Live everywhere</li><li>• Do not cause disease</li><li>• Do not contain the polymer peptidoglycan</li></ul>	thermophiles
Eubacteria	<ul style="list-style-type: none"><li>• Simple organisms</li><li>• No nucleus (prokaryote)</li><li>• Can reproduce asexually</li><li>• Found everywhere</li><li>• Can cause disease</li><li>• Contain the polymer peptidoglycan</li></ul>	bacteria
Protista	<ul style="list-style-type: none"><li>• Most are single celled</li><li>• Some have a nucleus</li><li>• Can be autotrophs, heterotrophs, or both</li><li>• Reproduce sexually and asexually</li><li>• Live in aquatic or wet habitats</li></ul>	algae and protozoa



Kingdom	Characteristics	Examples
Fungi	<ul style="list-style-type: none"><li>• Most are multicellular</li><li>• All are heterotrophs</li><li>• Reproduce sexually and asexually</li><li>• Most live in <b>terrestrial</b> habitats</li></ul>	mushrooms
Plantae	<ul style="list-style-type: none"><li>• All are multicellular</li><li>• Most are autotrophs</li><li>• Reproduce sexually and asexually</li><li>• Most live in terrestrial habitats</li></ul>	plants
Animalia	<ul style="list-style-type: none"><li>• All are multicellular</li><li>• All are heterotrophs</li><li>• Most reproduce sexually</li><li>• Live in terrestrial or aquatic habitats</li></ul>	animals

# Our Focus...

- When we look at the Kingdoms we will be looking at the transition from cells, to tissues, to organs and organs systems in both the Plant and Animal Kingdom...
- Both of these kingdoms have eukaryotic cells... meaning true nuclei with the genetic information inside.
- Yesterday you learned about Mitosis... and the parts of a cells life cycle.



# Tasks



- Work thorough the [‘Cells Alive’](#) interactive plant and animal cells.
- Complete the [Cells and Their Organelles](#) fill in the blank worksheet.
- Label the diagrams of the [plant](#) and [animal cell](#) – either digitally or physically.
- After play the [Cell Organelle Memory Game](#). Take a screen capture when you have won and submit this to Teams.
- Go to [‘The Incredible MegaCell’](#)– it is a comic book and a organelle GAME!! Now how quickly can you save Professor MegaCell? Sort his organelles by the jobs that they do and restore them to his body – Do it in time and Prof. MegaCell lives! \*\* Class record is 13s !! Take a screen capture of this when you have saved Professor MegaCell and submit to Teams.