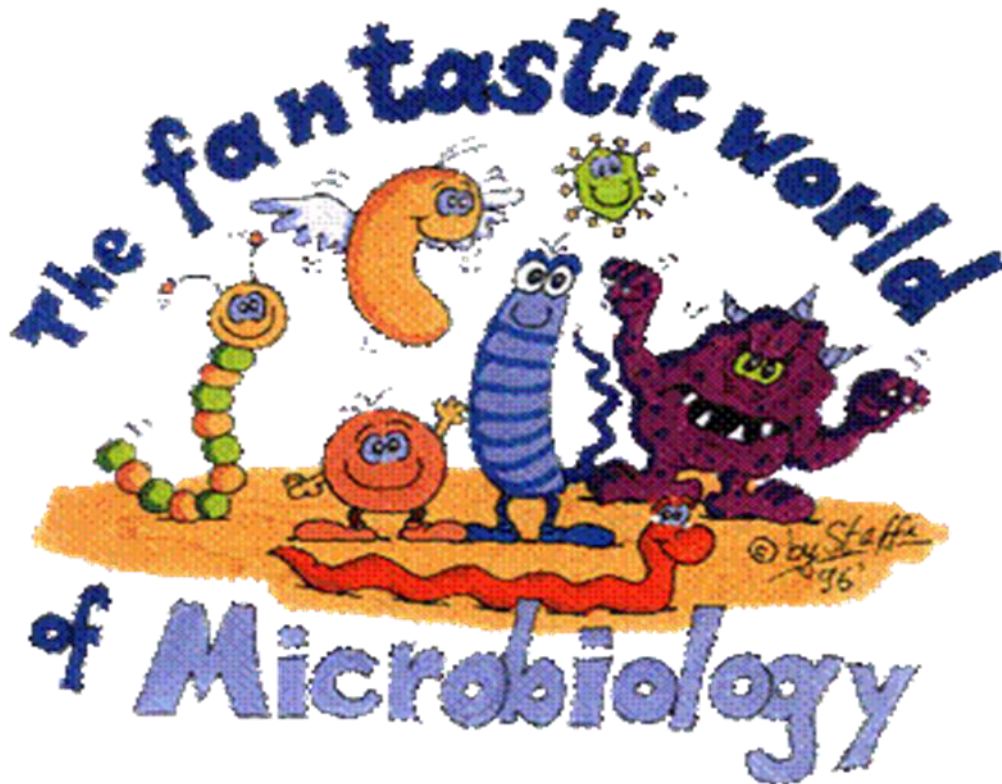


Introduction To Microbiology

CLS 311



What is microbiology?

- It is a branch of biology that studies microorganisms and their effects on humans
- **Microorganisms**
a collection of organisms that share the characteristic of being visible only with a microscope

Microorganisms - Microbes - Germs

Microbes & You

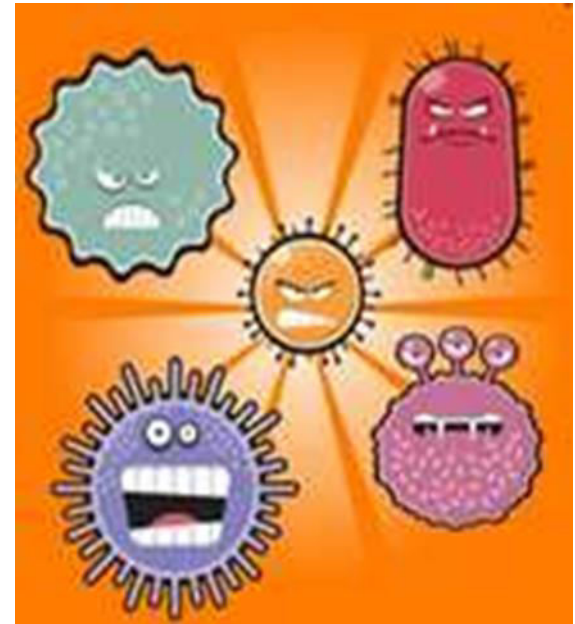
Normal Flora

- *Q: Did you always have them?*
- *Q: Are they everywhere on your body?*
- *Q: Are normal flora ever harmful?*

Pathogens

Non pathogens

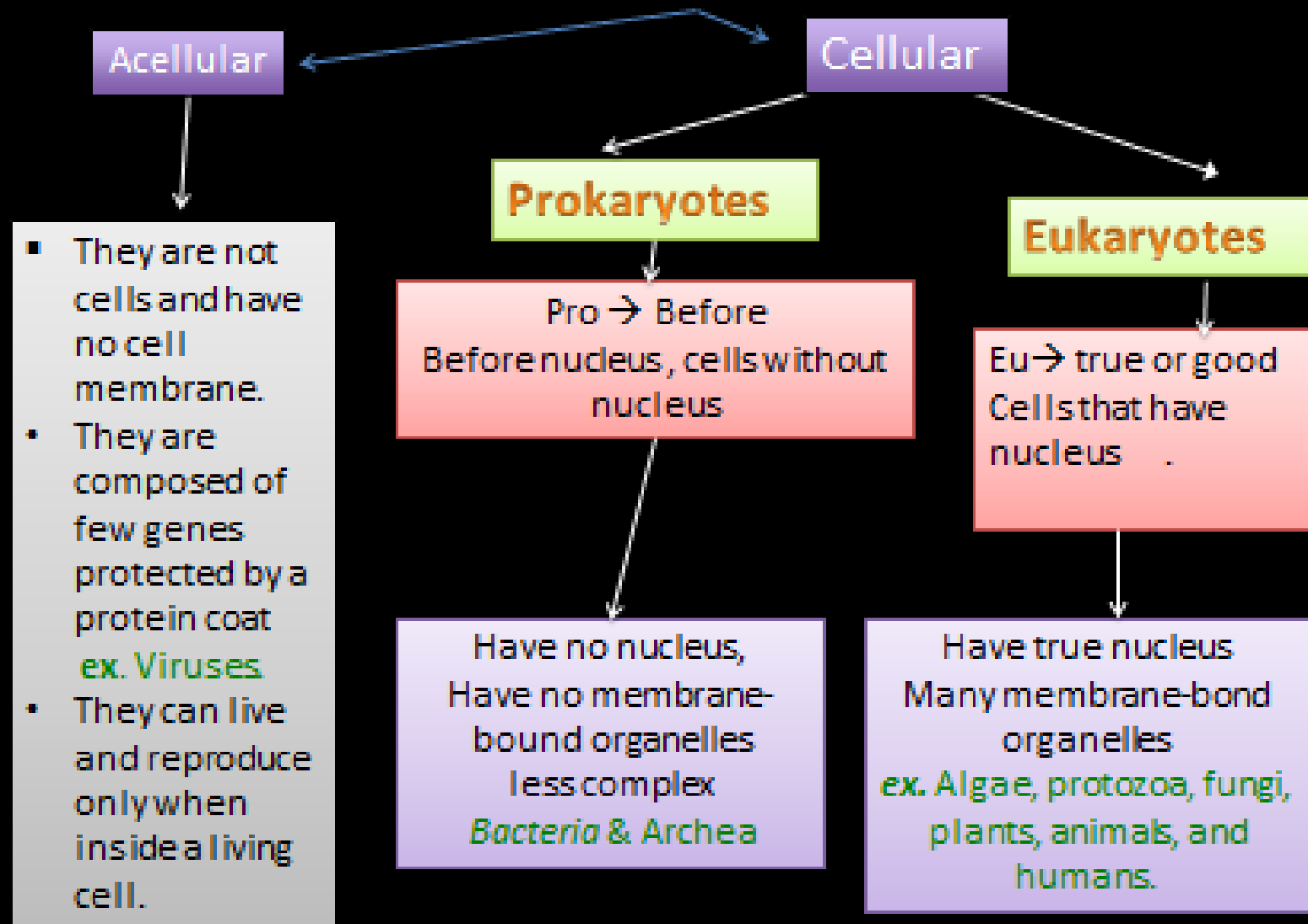
Opportunistic Pathogens



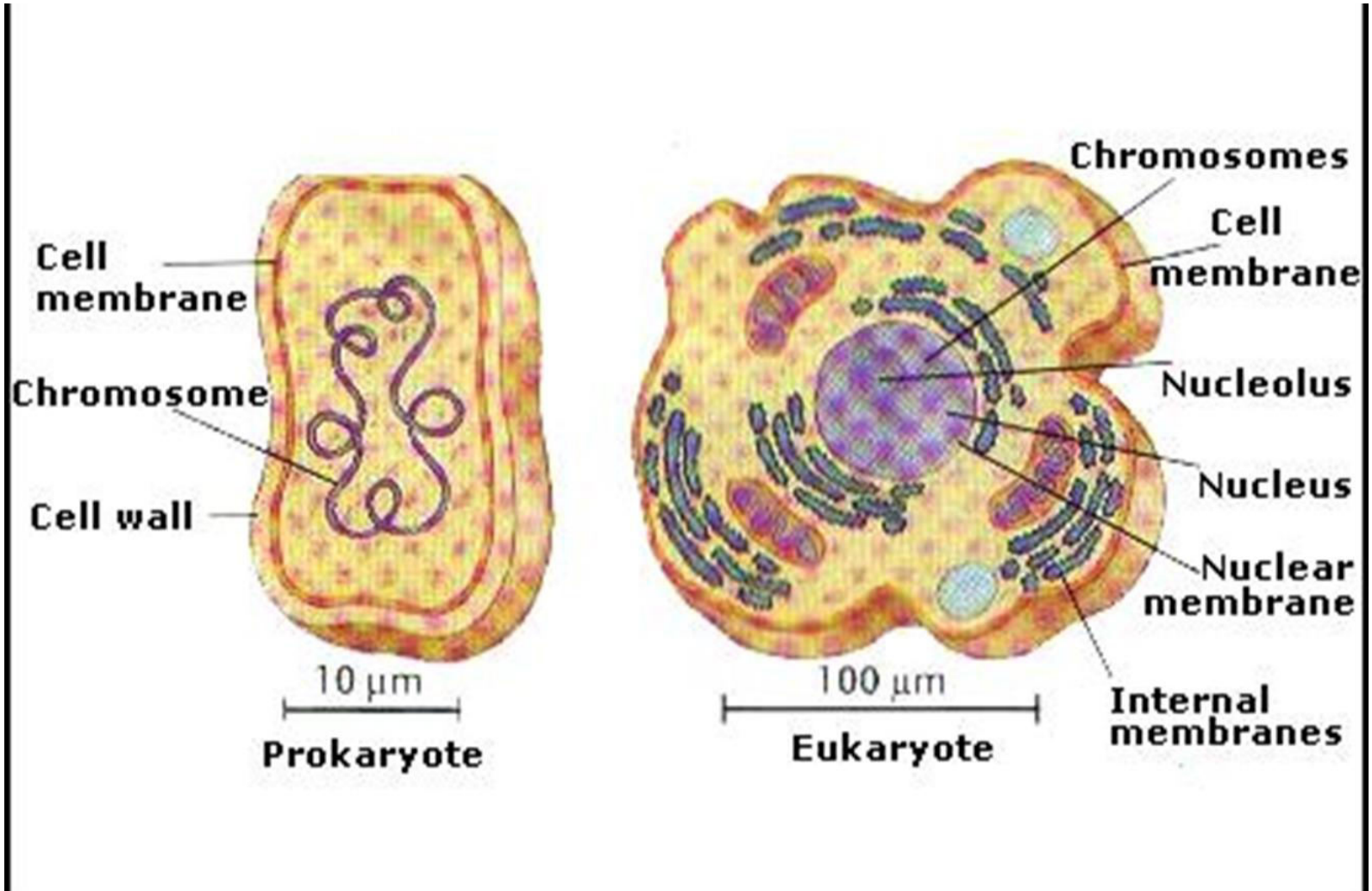
Organisms included in the study of Microbiology

- **Bacteria**
- **Algae**
- **Parasites**
- **Fungi**
- **Viruses**
- **Bacteriology**
- **Phycology**
- **Parasitology**
- **Mycology**
- **Virology**

Classification of Microorganism

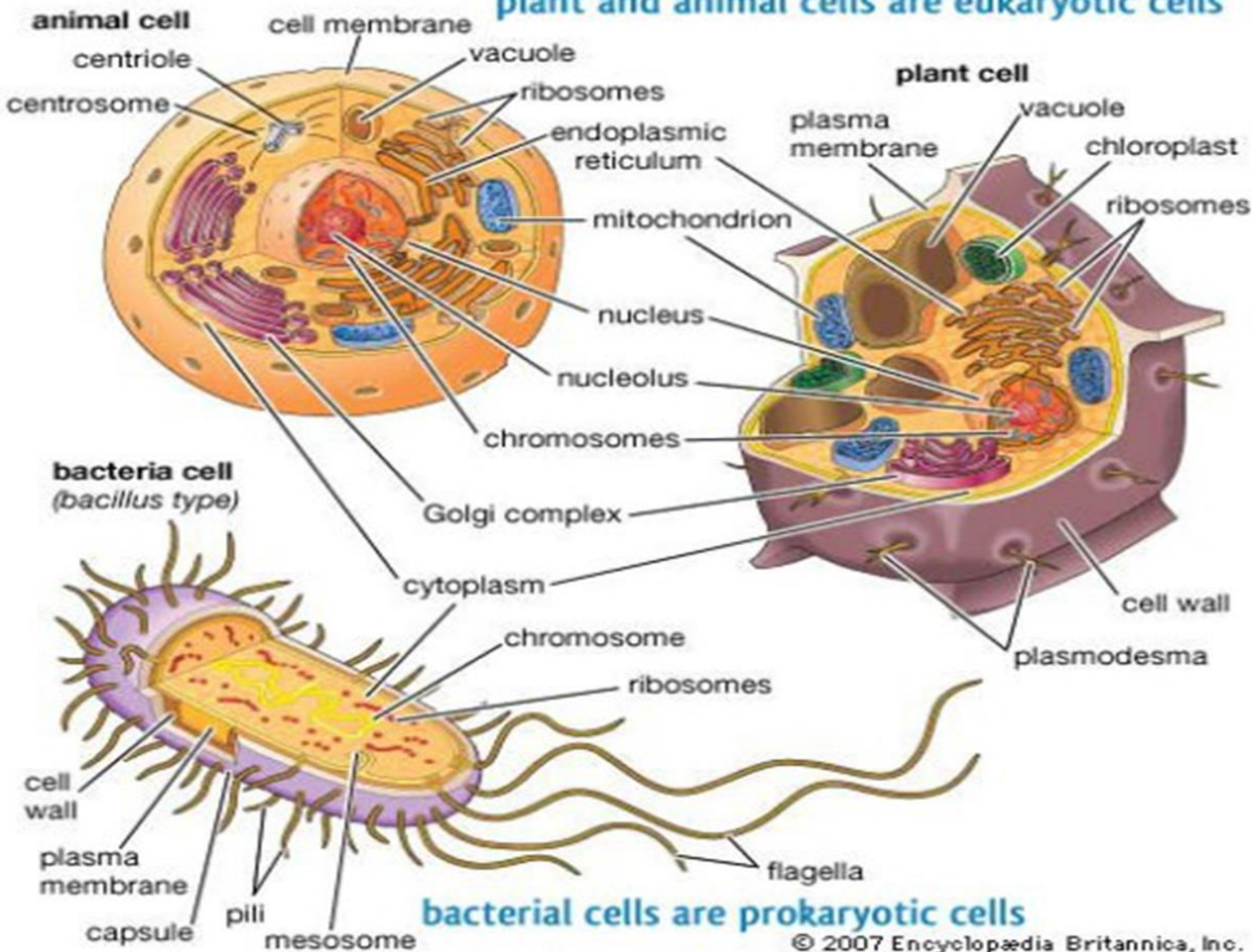


Prokaryotic Cell & Eukaryotic Cell



Some typical cells

plant and animal cells are eukaryotic cells



Eukaryotic vs. Prokaryotic

	Eukaryotic Cell	Prokaryotic Cell
Biological distribution	All animals and protozoa	All bacteria
Nucleus	Present	Absent
Cell Type	Usually multicellular	Usually unicellular (some cyanobacteria may be multicellular)
Nuclear membrane	Present	Absent
Cell wall	Absent	Present
Membranous structures other than cell membrane	Presents	Generally absent
Chromosomes	Composed of DNA and Proteins	Composed of DNA only
Reproduction	Mitosis	Binary fission

5 Kingdoms of Living Organisms

1. Monera kingdom

unicellular prokaryotes, ex: bacteria, cyanobacteria.

2. Protista kingdom

unicellular eukaryotes, ex: amoeba, some algae

3. Fungi kingdom

mold, yeast (multicellular)

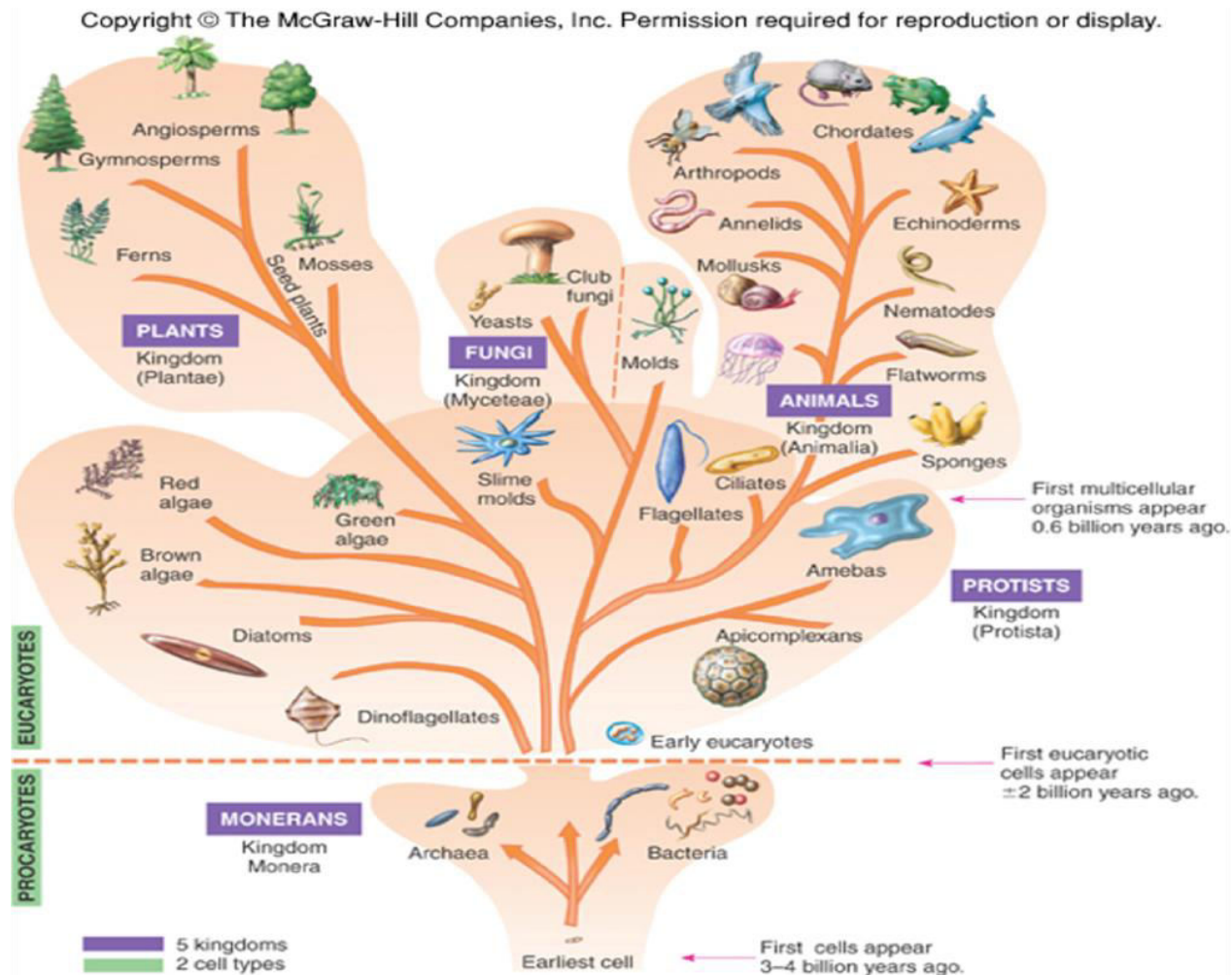
4. Plantae kingdom

trees, flowers (multicellular)

5. Animalia kingdom

fish, frog, human (multicellular)

5 Kingdoms of Living Organisms



Taxonomic Classification

Cat

- **Kingdom**
 - **Phylum**
 - **Class**
 - **Order**
 - **Family**
 - **Genus**
 - **species**
- Animalia
 - Chordata
 - Mammalia
 - Carnivora
 - Felidae
 - Felis
 - domestica

Binomial System of Taxonomic Classification

- Use only the Genus and species
- Genus is **always** capitilized
- species is **never** capitilized
- Genus and species are either underlined or *italicized*

EX: escherichia coli

Escherichia coli

Escherichia coli

Microbes Benefit Humans

- Bacteria in intestine help in digestion of food and production of some vitamins.
- Many microbes produce various food products
 - cheese, pickles, green olives
 - yogurt, soy sauce, vinegar, bread
 - Beer, Wine, Alcohol
- Many microbes produce certain enzymes, chemicals and antibiotics
- essential for life on this planet as some produce oxygen **e.g.** algae and cyanobacteria

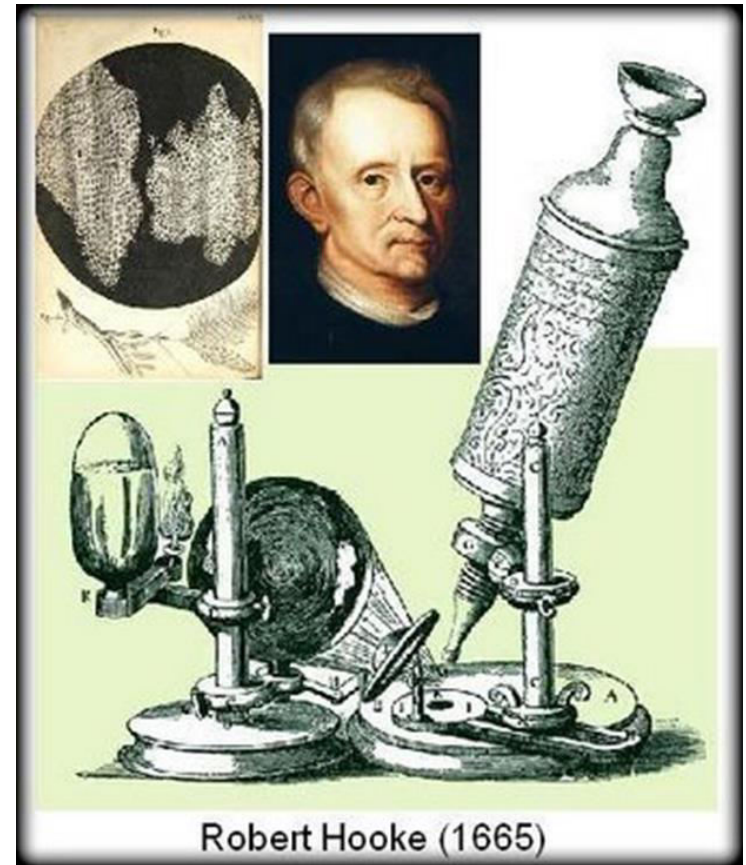
Microbes Benefit Humans

- Are involved in the decomposition of dead organisms and the waste product of living organisms. These are called (**Decomposers** or **Saprophytes**)
- Decompose industrial waste like oil spills
- Part of the food chain as tiny animals feed on them
- Essential in the field of genetic engineering

History of the Study of Microorganisms

Robert Hooke, UK (1665)

- Proposed the Cell Theory
- All living things are composed of cells



History of the Study of Microorganisms

Anton van Leeuwenhook (1632 - 1732s)

- Father of Microbiology
- Made a simple one-lens microscope
- Observed and provided accurate descriptions of protozoa, fungi and bacteria
- Examine almost anything around him then he called the small living organisms “**animalcules**”.

History of the Study of Microorganisms

Spontaneous Generation Theory:

- Theory that life just “spontaneously” developed from non-living matter

Pioneers of Microbiology

Louis Pasteur (1822-1895), Chemist

- Disproved SGT
- Fermentation
- Pasteurization: heat liquid enough to kill spoilage bacteria
- Vaccine development
- Contributed in the **germ theory of disease** (specific microbes cause specific infectious diseases)
- Proposed aseptic techniques (prevent contamination by unwanted microbes)
- discovered forms of life that can exist in the presence of oxygen called “aerobes” and ones that can exist in the absence of oxygen “anaerobes”.

Pioneers of Microbiology

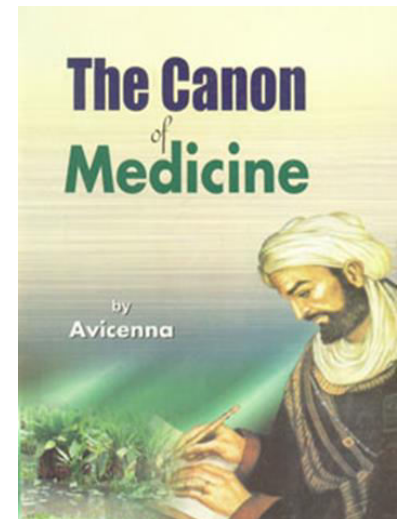
Robert Koch (Germany 1843-1910)

- He made significant contribution to the germ theory of disease.
- He developed methods of fixing, staining, and photographing bacteria.
- He developed methods for culturing bacteria on solid media.
- He discovered the bacterium *Mycobacterium tuberculosis* that cause tuberculosis and Invented skin test to diagnose the Tb.
- He discovered the bacterium *Vibrio cholerae* that causes cholera.

Pioneers of Microbiology

Ibn Sina (Avicenna)

- States that "Body secretions of a host organism are contaminated by tainted foreign organisms that are not visible by naked eye before the infection
- He also discovered the contagious nature of tuberculosis
- Introduced quarantine as a means of
Limiting the spread of contagious
diseases



Objectives

- Defining Microbiology
- Defining Microorganisms
- Comparing between pathogens, non pathogens, Opportunistic Pathogens, normal flora
- Comparing between cellular and a cellular microbes
- Comparing between prokaryotes and eukaryotes
- List the microbes benefits
- Write the microbial name correctly (Binomial system).
- Outline some scientists contributions