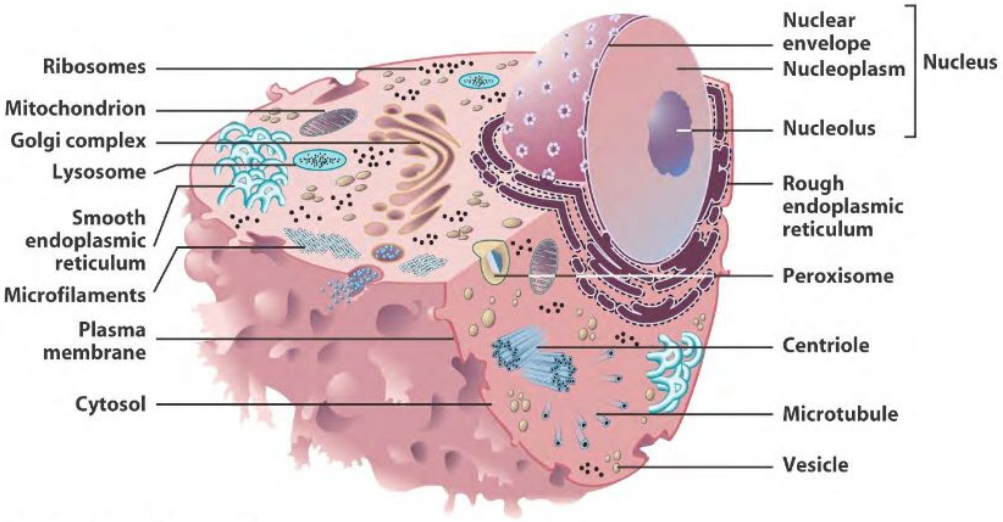
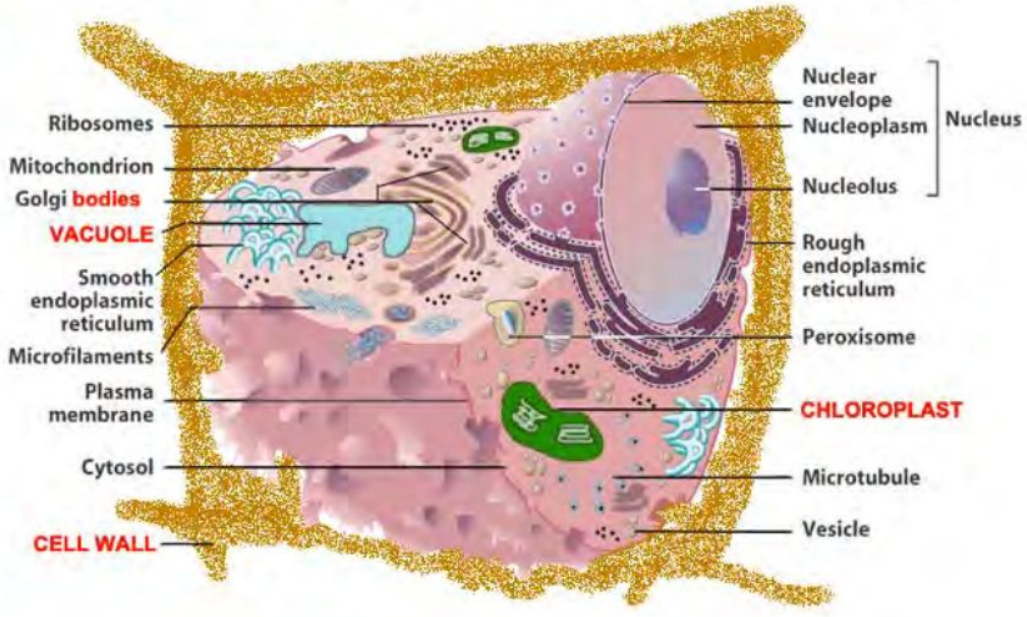
Lecture 1: Introducing the cell

- Who discovered cells? Robert Hooke
- Who discovered “animalcules”? Anton van Leeuwenhoek

Properties of Cell theory

1. All organisms are composed of one or more cells.
2. The cell is the structural unit of life.
3. Cells can arise only by division from a preexisting cell.





List the fundamental properties shared by all cells. Describe the importance of each of these properties.

The cell wall is the defence property of the cell, keeping it in shape & protecting it from exogenic substances. The nucleus is the genetic power house of reproduction. Mitochondria if I have got it correct, controls metabolism within the cytoplasm providing the cell with chemical materials for survival.

Describe the features of cells that suggest that all living organisms are derived from a common ancestor.

- a common genetic code,a plasma membrane,and ribosomes

Basic Properties of Cells

- Highly COMPLEX and organized
- Activity controlled by a GENETIC program
- Can REPRODUCE - make copies of themselves
- Assimilate and utilize ENERGY
- Carry out many CHEMICAL Reactions - Enzymes
- Engage in MECHANICAL activities
- Respond to STIMULI Capable of SELF-REGULATION
- They EVOLVE

Prokaryotic VS. Eukaryotic Cells

in common	Features only found in eukaryotic cells
■ Plasma membrane of similar construction ■ Genetic information encoded in DNA using identical genetic code ■ Similar mechanisms for transcription and translation of genetic information,including similar ribosomes ■ Shared metabolic pathways(e.g.,glycolysis) ■ Similar mechanism of photosynthesis ■ Similar mechanism for synthesizing and inserting membrane proteins	■ Complex membranous cytoplasmic organelles ■ Cellulose-containing cell wall (plants) ■ Sexual reproduction requiring meiosis and fertilization ■ Consists of a nuclear membrane

Nucleoid: Genetic material of a prokaryotic cell is inside. Separating it from cytoplasm
Nucleus: For eukaryotes. True nucleus.

Prokaryotes move using a protruding tail like protein called flagellum to propel itself. Eukaryotes like protists and sperm cell posses much complex ones.

<u>Types of Prokaryotic Cells</u>

- Archaea (closely related to eukaryotes) and Bacteria

Archaea: usually known to live in extreme environments

- ***Methanogens***: they convert CO2 and H2 into methane gas
- ***Halophiles***: Live in extremely salty environments
- ***Acidophiles***: Live in extremely acidic environments
- ***Thermophiles***: Live in extremely high temperatures

Cyanobacteria: Can perform photosynthesis.

What Is The Importance Of Cell Differentiation?
Helps the organism be as effective as possible at carrying its job.

Why are cells almost always microscopic?
As the cell's size increase, its area to volume ratio decreases and becomes hard for the cell to absorb sufficient nutrients.

- One **um** is equal to 10^-6 meters, and one **nm** is equal to 10^-9 meters. **angstrom** (Å), is equal to one-tenth of a nm