Cytology & The Discovery of Cells

Packet #3

Entry Checkpoint #1
KWHLAQ
Topic :-Cytology, Cell Theory, Hooke & Microscopes

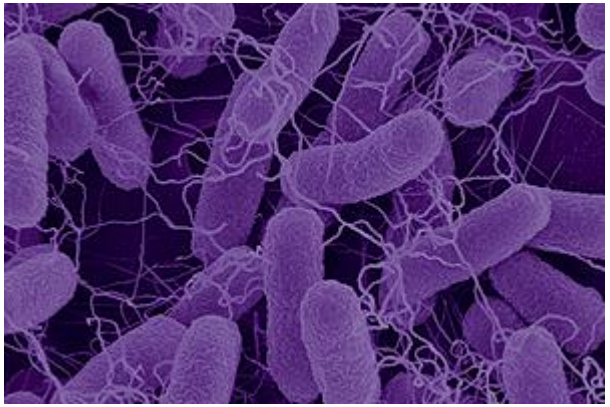
K
- What do I know?
  - ANS: -

W
- What do I want to know?
  - ANS: -

H
- How will I find out?
  - ANS: -

Cytology

* Cytology is the study of cells.



Importance of Cells & The Cell Theory

Cell Theory

* Why are cells important?
  * Schleiden and Schwann stated that **cells are the fundamental unit of life.**
  * Virchow stated that **cells arise from preexisting cells.**
  * Weismann described **that cells have a "common ancestor."**
    * These three thoughts compose the cell theory.

M.J. Schleiden

Theodor Schwann

Cytology, Hooke & Microscopes

Cytology

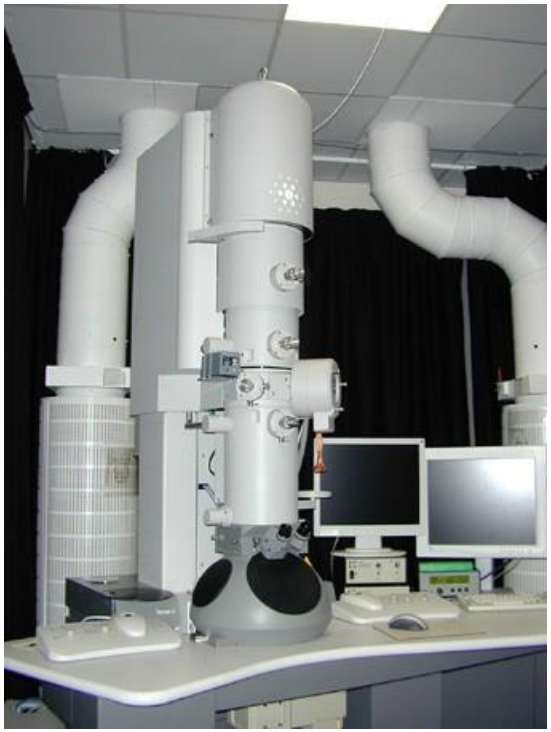
* Began with **Robert Hooke** and the light microscope in the early 1900's.
* Hooke is credited with seeing the first cells; however, he first identified the cell walls of dead cells

Light Microscopes

* **Light microscopes**, more commonly used to **study stained or living cells**, first identified organelles in the early 1900's
  * Discovery made using different stains.
* **Phase and contrast microscopes** allowed unstained living cells to be observed.
* **Fluorescence microscopes** can identify the location of molecules within cells.
* **Light microscopes, though useful, are limited by their resolution power.**

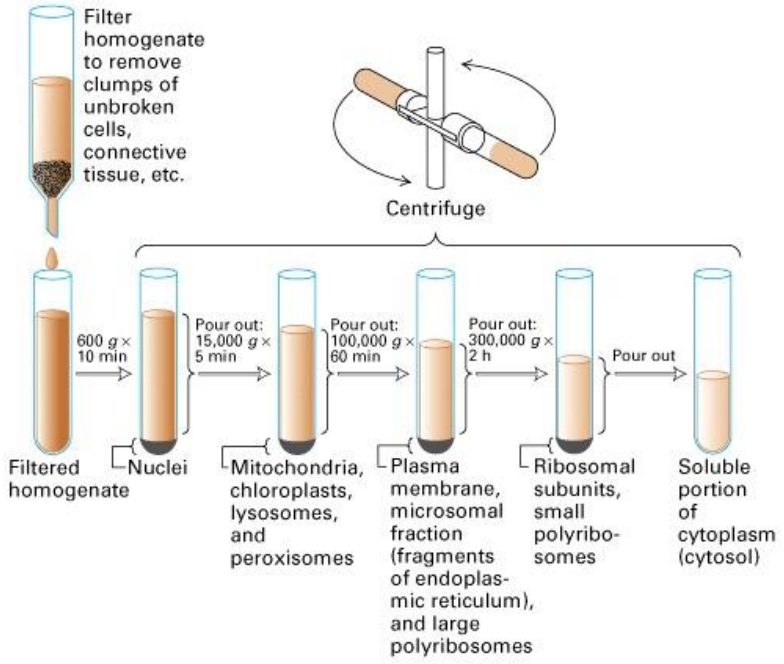
Electron Microscopes

* When **electron microscopes** became available, cells, and their contents, were greatly magnified.
  * **TEM {Transmission Electron Microscope}**
    * Visualization of structures within sections of tissues
  * **SEM {Scanning Electron Microscope}**
    * Visualization of entire specimens



Cell Fractionation

* **Cell fractionation** allowed the study of cell components.
  * Involves centrifugation
    * **Differential centrifugation** separate cellular components based on size and density.
    * **Density gradient centrifugation** allows further purification.



Exit Checkpoint #1A
KWHLAQ
Topic: -Cytology, Cell Theory, Hooke & Microscopes

L
- What have I learned?
- ANS: -

A
- What action will I take?
- ANS: -

Q
- What further questions do I have?
- ANS: -

Prokaryotic Cells vs. Eukaryotic Cells

Entry Checkpoint #2
KWHLAQ
Topic :-Prokaryotic Cells vs. Eukaryotic Cells

K

- What do I know?
  - ANS: -

W

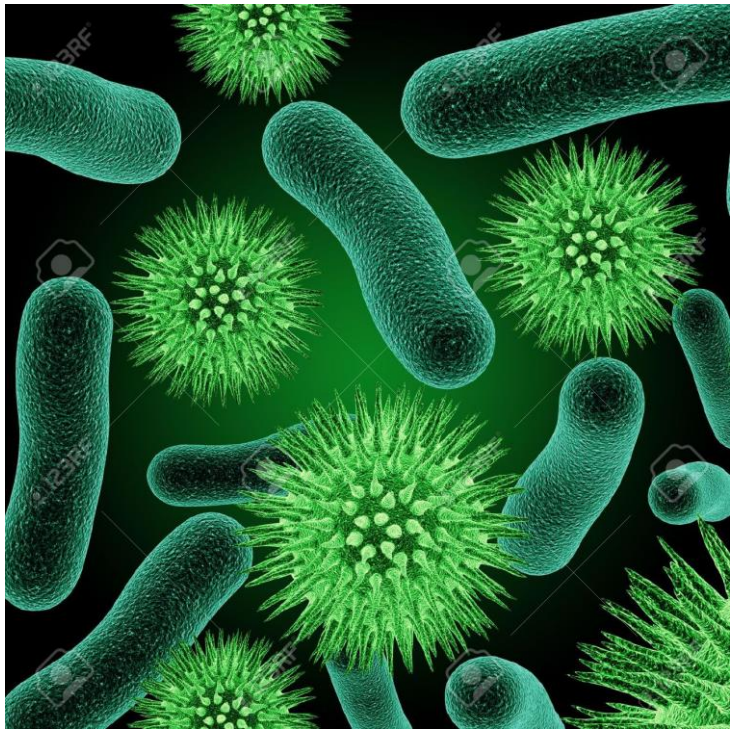
- What do I want to know?
  - ANS: -

H

- How will I find out?
  - ANS: -

Introduction

* The discovery of cells, and their components, led to the distinction between **prokaryotic cells and eukaryotic cells.**

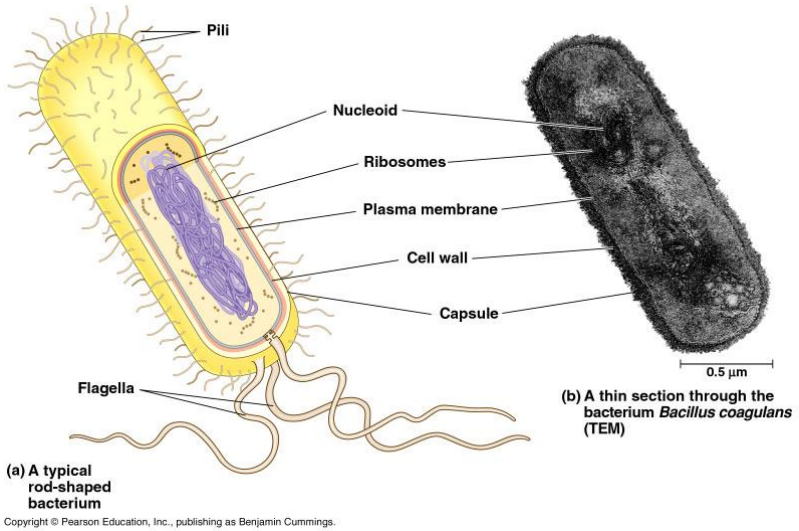


Prokaryotic Cells

* Prokaryotic cells are structurally simpler than eukaryotic cells.
* Prokaryotic cells lack membrane-bound organelles and are typically smaller than eukaryotic cells.

Prokaryotic Cells

* Prokaryotic cells have a plasma membrane and typically a cell wall.
* In prokaryotes, DNA is located in the nuclear area or nucleoid.
* Prokaryotes have ribosomes and storage granules.



Eukaryotic Cells

* Characterized by membrane bound organelles.
* Increasing cell size allows increased specialization in eukaryotes.
* Some organelles are only found in certain eukaryotic cells
  * Others are common to most or all eukaryotic cells.

Prokaryotes vs. Eukaryotes

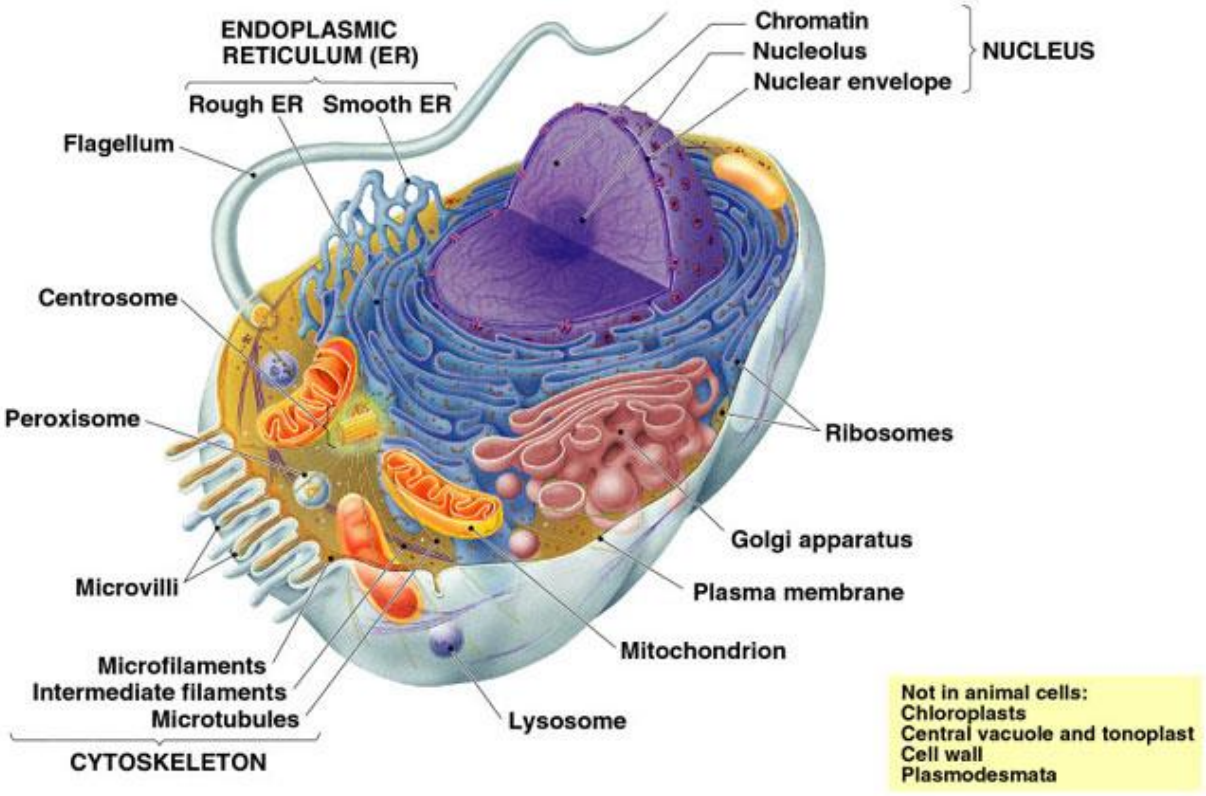
Prokaryotic Cells

* **No membrane bound organelles**
* No distinct nucleus
* No chromosomes
  * Circular strands of DNA known as plastids
* Ribosomes are smaller
* No mitosis or meiosis occurs

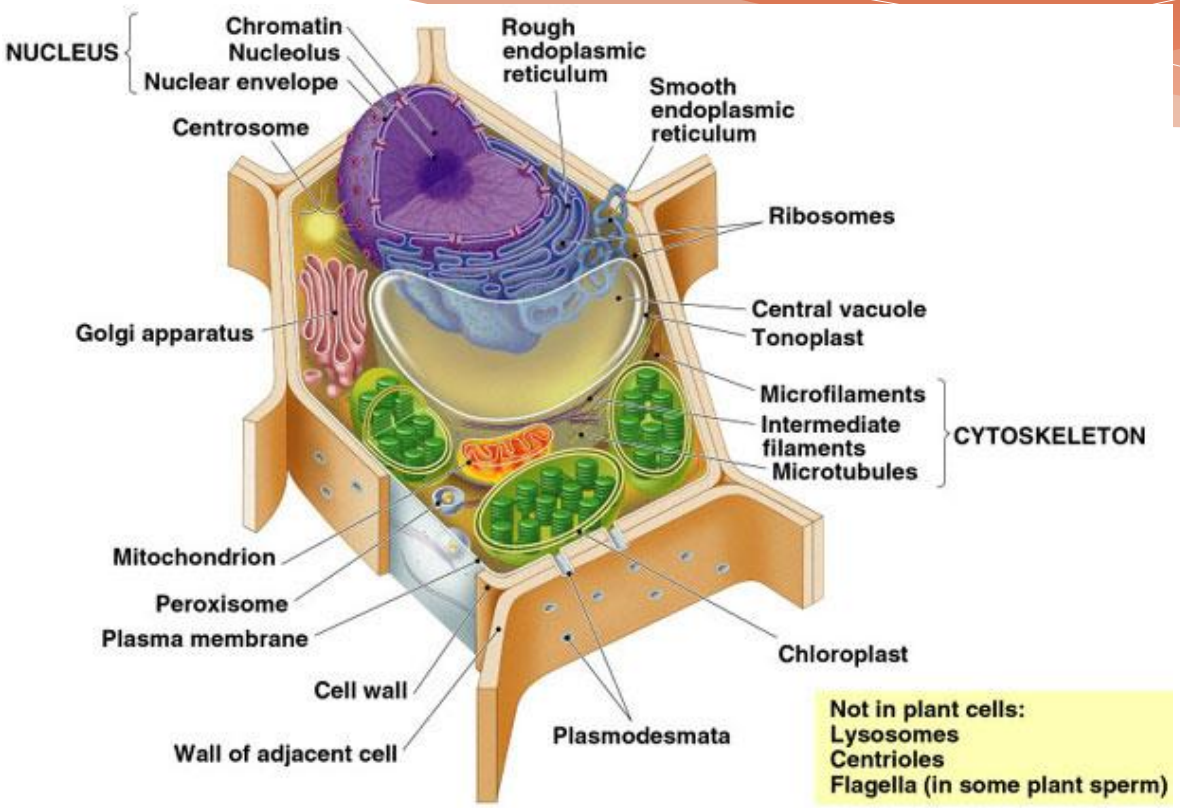
Eukaryotic Cells

* Distinct, membrane-bounded nucleus
* Chromosomes present on which DNA is located
* Chloroplasts and mitochondria may be present
* Ribosomes are larger
* Mitosis and/or meiosis occurs

Eukaryotic Animal Cell



Eukaryotic Plant Cell



Exit Checkpoint #2A
KWHLAQ
Topic: -Prokaryotic Cells vs. Eukaryotic Cells

L
- What have I learned?
- ANS: -

A
- What action will I take?
- ANS: -

Q
- What further questions do I have?
- ANS: -

Review