Topic 06

Cell Division

Learning Objectives

At the end of this module, students will be able to:
- Recall differences of prokaryotic & eukaryotic cells
- Recognize difference of fission and mitosis
- Recognize difference of meiosis and mitosis
- Recognize key words and abbreviations in mitosis
- Describe steps of mitosis using a diagram

Outline

a. Prior concepts
b. Fission, meiosis & mitosis
c. Mitosis cycle
d. Cellular differentiation
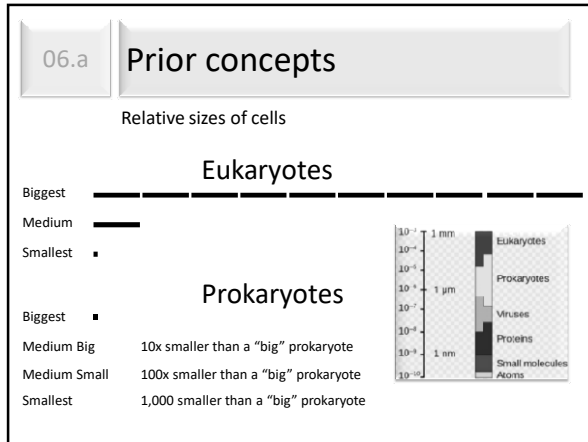
06.a Prior concepts

Overview

Prokaryotes are unicellular organisms that lack organelles or other internal membrane-bound structures.

Prokaryotic cells preceded eukaryotic cells on the evolutionary timeline.

Eukaryotes are organisms whose cells have a nucleus enclosed within membranes.

Slide 1

06.a | Prior concepts

Relative sizes of cells

Eukaryotes

Biggest
Medium
Smallest

Prokaryotes

Biggest
Medium Big   10x smaller than a "big" prokaryote
Medium Small   100x smaller than a "big" prokaryote
Smallest   1,000 smaller than a "big" prokaryote

Slide 2

06.a | Prior concepts

Single-celled organisms are able to carry out all the processes of life without help from other cells.

• **All** prokaryotes are single-celled organisms.

• **Some** eukaryotes are single-celled.

Slide 3

06.a | Prior concepts

Multicellular organisms carry out their life processes through division of labor. They have specialized cells that do specific jobs.

• All eukaryotes are multi-cell organisms.
• Plants & animals have a variety of cell types.

~ obvious examples ~

• Tree bark and leaves have different cells.
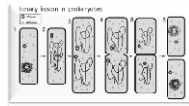• Human skin and bones have different cells.

Slide 4

06.a | Prior concepts   **Cell examples**

Staphylococcus
Bacteria
Prokaryotic

Euglena
Protist
Single cell
flagellate Eukaryote

Human Cell
With Organelles
Eukaryote

Plant Cell
With Organelles
Eukaryote
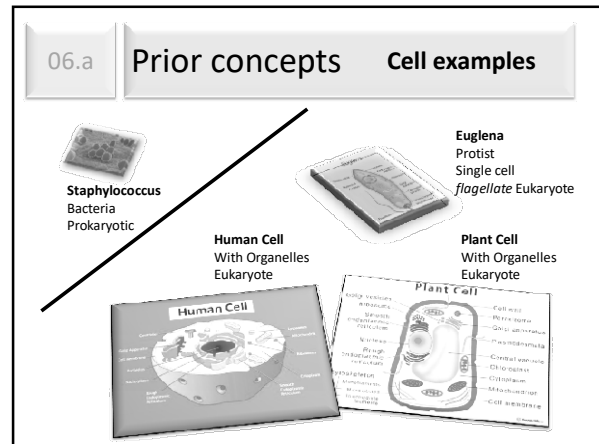
06.a Prior concepts

Shoots & roots	Plant cell organelles

Tissue

Meristematic
Continuous division

Non-meristematic
No more division

Sexual reproduction

Sexual

Cyclical
parthenogenesis

Egg
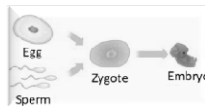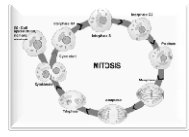Sperm
Zygote
Embryo

06.b Fission Meiosis & Mitosis

Binary fission in prokaryotes

Mitosis happens in **all eukaryotic cells** (plants, animals, and fungi). In plants, mitosis only occurs in the **meristematic tissue.**
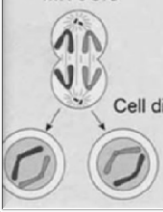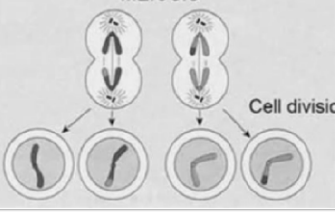
With humans, mitosis occurs in the nucleus of the body's normal cells (the somatic cells). Mitosis happens in all cell types such as **skin, bone, blood, and structural cells**, among others, except the germ cells.

Meiosis
Sexual reproduction in eukaryote
Mitosis doesn't occur in gamete cells.

Egg
Sperm
Zygote
Embryo

MITOSIS

06.b Fission Meiosis & Mitosis

Differences Between
Mitosis and Meiosis

MITOSIS   MEIOSIS

Cell division   Cell division

06.b Fission Meiosis & Mitosis

Compare & Contrast Mitosis & Meiosis

Mitosis

* Occurs in body cells
* Divides once
* Creates 2 cells
* Are genetically identical

Both

* Creation of new cells
* DNA replicates once

Meiosis

* Occurs in gametes cells
* Divides twice (meiosis I & II
* Creates 4 cells
* Are NOT genetically identical
* Increases genetic diversity
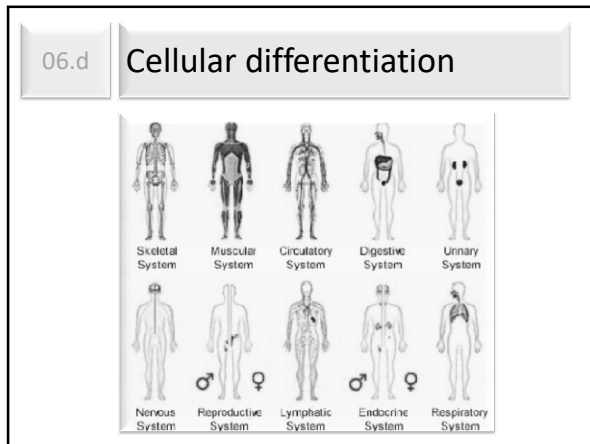
06.c Mitosis cycle
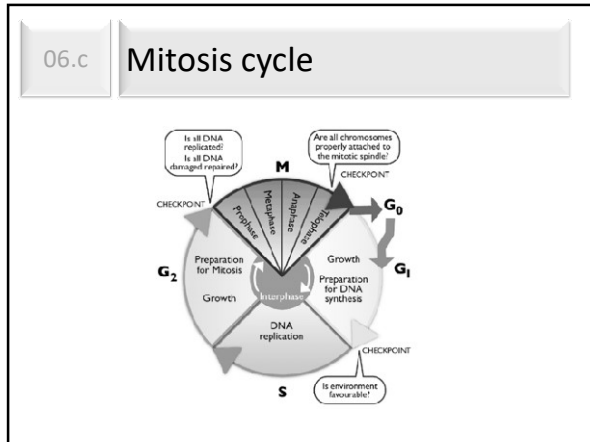
06.d Cellular differentiation

Types of Stem Cells
- Embryonic
- Totipotent
- Pluripotent
- Multipotent
- Oligopotent
- Unipotent

Cellular differentiation is the process in which a cell changes from one cell type to another. Usually, the cell changes to a more specialized type. Differentiation occurs numerous times during the development of a multicellular organism as it changes from a simple zygote to a complex system of tis

06.d Cellular differentiation

Skeletal System — Muscular System — Circulatory System — Digestive System — Urinary System

Nervous System — Reproductive System — Lymphatic System — Endocrine System — Respiratory System

Summary

Prior concepts	Mitosis cycle

Fission, meiosis & mitosis	Cellular differentiation

Check

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