UNIT-2

CELLS

(Structure and Function)

Cell Structure & Function

http://koning.ecsu.ctstateu.edu/cell/cell.html

Essential Question:

What is the relationship between the structure and function of cell organelles?

Standard: S7L2b. Relate cell structures (cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria) to basic cell functions.

Some Random Cell Facts

- The average human being is composed of around 100 Trillion individual cells!!!
- It would take as many as 50 cells to cover the area of a dot on the letter "i"

WOW!!!

Discovery of Cells



- https://www.youtube.com/watch?v=FUqORLDDwVM
- 1665- English Scientist, Robert Hooke, discovered cells while looking at a thin slice of cork.
- He described the cells as tiny boxes or a honeycomb
- He thought that cells only existed in plants and fungi





Anton van Leuwenhoek



- 1673- Used a handmade microscope to observe pond scum & discovered single-celled organisms
- He called them "animalcules"



- He also observed blood cells from fish, birds, frogs, dogs, and humans
- Therefore, it was known that cells are found in animals as well as plants

150-200 Year Gap???

- Between the Hooke/Leuwenhoek discoveries and the mid 19th century, very little cell advancements were made.
- This is probably due to the widely accepted, traditional belief in Spontaneous Generation.
- Examples:
 - -Mice from dirty clothes/corn husks -Maggots from rotting meat



19th Century Advancement

Much doubt existed around Spontaneous Generation
 Conclusively disproved by Louis Pasteur



Pasteur: Ummm, I don't think so!!!

Development of Cell Theory

- <u>https://www.youtube.com/watch?v=dscY_2QQbKU&inde</u> x=16&list=PLMm2qcdBsrtqc4O24BmxrDHTDc0FSI_Xb
- 1838- German Botanist, Matthias Schleiden, concluded that all plant parts are made of cells
- 1839- German physiologist, Theodor Schwann, who was a close friend of Schleiden, stated that all animal tissues are composed of cells.





Development of Cell Theory

 1858- Rudolf Virchow, German physician, after extensive study of cellular pathology, concluded that cells must arise from preexisting cells.





The Cell Theory

- 1. All living things are composed of one or more cells.
- 2. Cells are organisms' basic units of structure and function.
- 3. Cells come only from existing cells.

Prokaryote/Eukaryote Comparison [see resources]



•Scientists separate cells into two broad categories based on the location of the genetic material that cells need to reproduce and function.

PROKARYOTIC CELL VS.EUKARYOTIC CELL

PROKARYOTIC CELL

 1. genetic material or structures are not surrounded by membranes

2. no or Few internal structures(organelles)

3. Are always One-celled organisms such as Bacteria



EUKARYOTIC CELL

- 1.Genetic material is in a structure enclosed by its own membrane (have nucleus)
- 2. Contain <u>organelles</u> surrounded bymembranes
- 3. Ex. -Most living organisms



Prokaryotes



Archaebacteria

Eubacteria





Protists

Paramecium

Fungus like

Eukaryotes



Algae

nerve cells



Animals



human

Fungus

mushroom





Plants

kitten

Eukaryote/Prokaryote Comparison



- Name as many differences as you can between the two cells.
- 2. Of the two cells, which one do you think can perform more activities? Explain your answer.
- 3. Which of the two cells do you think was the first to appear on Earth? Explain your answer.
- 4. If the prefix eu- means true and prefix pro- means prior to, which cell is a prokaryote and which is a eukaryote?

Two Types of Eukaryotic Cells

Plant Cells and Animal Cells



In most diagrams of plant and animal cells, you will notice many organelles (parts).

For our lesson on cell organelles, we will focus on just a few organelles.

Eukaryotic Cells: Plant & Animal

Plant and Animal cells both contain similar organelles (parts), but there are a few differences.



Use the Plant and Animal Cell Diagrams to Label Organelles





Plant Cell



Cell diagrams often vary. Let's look at another diagram of a Plant Cell for similarities.



With a seat partner, use your labeled Plant Cell Diagram to identify the organelles of this Plant Cell. Write your answers down.



With a seat partner, use your labeled Plant Cell Diagram Worgity the gweesmissisht Cell. Be ready to explain how you know.



Animal Cell



Before we begin to label Animal Cell Organelles, what are some of the similarities with a Plant Cell?

Animal Cell



With a <u>PENCIL</u>, write in your guess of the animal cell organelle name.

Animal Cell



View Inside a Cell

http://learn.genetics.utah.edu/ content/cells/insideacell/

- Cell Membrane <u>semi-permeable</u> membrane that forms the boundary of the cell and controls what comes in and goes out of the cell.
- Nucleus- <u>Control Center of the Cell</u>; controls the functions within the cell and <u>contains the genetic material</u>.
- Chromosomes Physical structures in a nucleus that contain the cell's genetic material which provides instructions for the cell's functions (more to come in next unit).

- Cell Wall Provides additional structure and support for cells(in plant cells).
- Chloroplast found in cells that contain chlorophyll (plants)and uses light energy to make food for the cell.
- Cytoplasm Gel-like substance that move nutrients through in the cell and also acts as a shock absorber.
- Mitochondria (singular Mitochondrion) Breaks down food material and releases energy into the cell.

- Vacuole- stores food, water and waste products. Is much larger in plant cells.
- Ribosomes- produces proteins in the cell.
- Rough Endoplasmic Reticulum (ER)transports molecules throughout the cell. The surface contains ribosomes

- Smooth ER- transports molecules throughout (within)the cell.
- Golgi Body- receives, processes, packages and ships molecules around and out of the cell.
- Lysosomes- breaks down food particles, invading objects, or worn out cell parts. they are also called suicidal bags of the cells

PLANT CELLS VS. ANIMAL CELL

PLANT CELL

- 1. HAS CELL WALL
- 2. HAS LARGE CENTRAL VACCOULE TO STORE LARGE AMOUNTS OF WATER
- 3. HAS CHLOROPLAST TO DO



ANIMAL CELL

- 1. NO CELL WALL
- 2. NO CENTRAL VACCOULE BUT HAS MANY SMALL FOOD VACOULES
- 3. HAS NO CHLOROPLAST



Brain Pop Video on Cell Structures and Function

http://glencoe.mheducation.com/sites/dl/fr ee/0078778425/164155/00035804.html

Possible Activities for Reviewing Cell Organelles:

- Onion and Cheek Cell Lab or view microscope slides of cells
- Cell Organelle Matching Activities
- Cell Diagram Variation Worksheet
- QR Codes Cell Organelle Review
- Give students an unlabeled cell diagram and have them work in pairs to quiz each other
- Cell Organelle Slipcover Put unlabeled cell diagrams in clear slipcovers. Give each student a slipcover, vis-à-vis or expo marker, and paper towel (a sock is also good and cheaper). Call out cell organelles and have students circle the organelle and hold up their slipcover when instructed.
- Break Up Letter
- Tiered Activity

Cell Analogies are often used to help understand the functions of cell organelles.



Use the Cell Analogy Handout to Record your Answers.

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Part I: With a partner, identify which cell organelle is similar to each factory job.

INALLIC

Dale Fellou



Part II: Identify which cell organelle is similar to each part of the "cell city" below.

What type of Cell is this? How do you know?



Cell Organelle Analogy: Factory



Cell Organelle Analogy: City Matching Cards Activity

After completing the activity, do Part II of the Cell Analogies handout.



Cell Organelle Songs [select one or two]

<u>The Cell Song</u>
<u>Cells, Cells Parts of the Cell Rap</u>
<u>http://youtu.be/BTicXXxzQA4</u>
<u>Cell Song to the tune of "The</u>
<u>Lion Sleeps Tonight"</u>

Activities to Review Cell Organelles and Functions

- Cell Organelle Tic-Tac-Toe
- Cell Organelle STUDY [BINGO]

Cell Organelle Summarizer

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_____ Date _____ Fellou ___

Label the following organelles on the diagram below: Cell Wall, Cell Membrane, Nucleus, Chromosomes, Chloroplast, Mitochondrion, Cytoplasm.

INALLE



Match the organelles below to their correct function.

1. Nucleus	A. Control Center of the Cell
2. Cell Wall	B. Uses light energy to make food for the cell
3. Cytoplasm	C. Provides additional structure and support for cells
4. Chloroplast	D. Breaks down material and releases energy into the cell
5. Mitochondria	E. Gel-like substance that nutrients move through in the cell
6. Chromosomes	F. Physical structures in a cell that contain the cell's genetic material
7. Cell Membrane	G. Forms the boundary of the cell and controls what comes in and goes out of the cell