LECTURE 2 – Cell Theory

QUESTIONS TO TRY FOR PRACTICE

True or False

Write true if the statement is true or false if the statement is false.

_____1. All organisms are made of more than one cell.

_____2. Early microscopes created by Leeuwenhoek were almost as strong as modern light microscopes.

_____3. Proteins are made on ribosomes.

_____4. Prokaryotic cells have a nucleus.

_____5. The plasma membrane forms the physical boundary between the cell and its environment.

_____6. For cells, a smaller size is more efficient.

_____7. Compared to eukaryotic cells, prokaryotic cells are very complex.

_____8. Organelles are located within the cytoplasm.

_____9. Viruses are similar to prokaryotic cells.

_____10. All cells have a plasma membrane, cytoplasm, and ribosomes.

_____11. DNA is located in the nucleus of prokaryotic cells.

_____12. Organelles allow eukaryotic cells to carry out more functions than prokaryotic cells.

_____13. Viruses are considered living organisms.

_____14. Most cells are about the size of the period at the end of this sentence.

_____15. Observation of cork helped in the discovery of cells.

2) Critical Reading

Read these passages and answer the questions that follow.

Two Types of Cells

There is another basic cell structure that is present in many but not all living cells: the nucleus. The **nucleus** of a cell is a structure in the cytoplasm that is surrounded by a membrane (the nuclear membrane) and contains DNA. Based on whether they have a nucleus, there are two basic types of cells: prokaryotic cells and eukaryotic cells.

Prokaryotic Cells

Prokaryotic cells are cells without a nucleus. The DNA in prokaryotic cells is in the cytoplasm rather than enclosed within a nuclear membrane. Prokaryotic cells are found in single-celled organisms, such as bacteria. Organisms with prokaryotic cells are called **prokaryotes**. They were the first type of organisms to evolve and are still the most common organisms today.

Eukaryotic Cells

Eukaryotic cells are cells that contain a nucleus. Eukaryotic cells are usually larger than prokaryotic cells, and they are found mainly in multicellular organisms. Organisms with eukaryotic cells are called eukaryotes, and they range from fungi to people. Eukaryotic cells also contain other organelles besides the nucleus. An **organelle** is a structure within the cytoplasm that performs a specific job in the cell. Organelles called mitochondria, for example, provide energy to the cell, and organelles called vacuoles store substances in the cell. Organelles allow eukaryotic cells to carry out more functions than prokaryotic cells can.

Viruses: Prokaryotes or Eukaryotes?

Viruses are tiny particles that may cause disease. Human diseases caused by viruses include the common cold and flu. Do you think viruses are prokaryotes or eukaryotes? The answer may surprise you. Viruses are not cells at all, so they are neither prokaryotes nor eukaryotes.

Viruses contain DNA but not much else. They lack the other parts shared by all cells, including a plasma membrane, cytoplasm, and ribosomes. Therefore, viruses are not cells, but are they alive? All living things not only have cells; they are also capable of reproduction. Viruses cannot reproduce by themselves. Instead, they infect living hosts, and use the hosts' cells to make copies of their own DNA. For these reasons, most scientists do not consider viruses to be living things.

Questions

1. What is one main difference between prokaryotic and eukaryotic cells?
2. Give an example of a prokaryotic organism.
3. What is an organelle? Give three examples.
4. Describe the nucleus. What can be found inside the nucleus?
5. Are viruses alive? Discuss why or why not.

3) Multiple Choice

Circle the letter of the correct choice.

1. Organelles in prokaryotic cells include the
   (a) mitochondria.
   (b) cytoskeleton.
   (c) Golgi complex.
   (d) none of the above
2. A major difference between prokaryotic and eukaryotic cells is that
   (a) prokaryotic cells have a flagellum.
   (b) eukaryotic cells have a nucleus.
   (c) prokaryotic cells have cytoplasm.
   (d) eukaryotic cells have ribosomes.
3. Robert Hooke was the first person to observe cells. He observed these cells in
   (a) a piece of cork.
   (b) a slice of honeycomb.
   (c) human blood.
   (d) plaque from his own teeth.
4. Cell size is limited by the
   (a) amount of cytoplasm.
   (b) cell's ability to get rid of wastes.
   (c) the size of the nucleus.
   (d) the size of the plasma membrane.
5. The spikes on pollen grains probably
   (a) allow the pollen grain to stick to insects.
   (b) allow the pollen grain to fly through the air.
   (c) protect the pollen grain from being eaten.
   (d) allow insects to stick to the pollen grain.
6. All cells have the following:
   (a) plasma membrane, cytoplasm, and ribosomes.
   (b) plasma membrane, nucleus, and DNA.
   (c) DNA, ribosomes, and cell wall.
   (d) plasma membrane, cytoplasm, and nucleus.
7. The first microscopes were made around
   (a) 1965.
   (b) 1665.
   (c) 1950.
   (d) 1776.
8. The cell theory states that
   (a) all organisms are made of one or more cells.
   (b) all cells come from already existing cells.
   (c) all the life functions of organisms occur within cells.
   (d) all of the above

4) Vocabulary I

Match the vocabulary word with the proper definition.

Definitions

_____1. organism that has cells containing a nucleus and other organelles

_____2. an organelle inside eukaryotic cells where the DNA is located

_____3. cell without a nucleus

_____4. a structure within the cytoplasm of a cell that is enclosed within a membrane and performs a specific job

_____5. phospholipid bilayer that surrounds and encloses a cell

_____6. first person to use the word "cell"

_____7. tiny, non-living particles that may cause disease

_____8. the material inside the plasma membrane of a cell

_____9. cell that contains a nucleus and other organelles

_____10. organelle where proteins are made

_____11. discovered human blood cells

_____12. a single-celled organism that lacks a nucleus

Terms

a. Anton van Leeuwenhoek

b. cytoplasm

c. eukaryote

d. eukaryotic cell

e. nucleus

f. organelle

g. plasma membrane

h. prokaryote

i. prokaryotic cell

j. ribosome

k. Robert Hooke

l. virus

5) Vocabulary II

Name_____**Class**_____**Date**_____

Fill in the blanks with the appropriate term.

1. All organisms are made up of one or more _____.
2. All cells have certain parts in common, including a plasma membrane, _____, _____-_____, and DNA.
3. Proteins are made on the _____.
4. A _____is a typical prokaryotic cell.
5. _____cells are usually larger than _____cells.
6. Leeuwenhoek discovered _____by looking at the plaque from his own teeth.
7. _____contain DNA, but do not contain cytoplasm or ribosomes.
8. In an eukaryotic cell, DNA is found in the _____.
9. _____is the genetic instructions that cells need to make proteins.
10. The plasma membrane is a bilayer of _____that surrounds a cell.
11. A cell's shape is generally related to the cell's _____.
12. _____are cells without a nucleus.

6) Critical Writing

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Compare and contrast eukaryotic cells with prokaryotic cells. Include at least 5 specific similarities and/or differences.

7) Cell Structures

Write true if the statement is true or false if the statement is false.

_____ 1. The water-hating hydrophobic tails of the phospholipid bilayer face the outside of the cell membrane.

_____2. The cytoplasm essentially acts as a "skeleton" inside the cell.

_____ 3. Roundworms have organ system-level organization, in which groups of organs work together to do a specific job.

_____4. Plant cells have special structures that are not found in animal cells, including a cell membrane, a large central vacuole, and plastids.

_____5. Centrioles help organize chromosomes before cell division.

_____6. Ribosomes can be found attached to the endoplasmic reticulum.

_____7. ATP is made in the mitochondria.

_____8. Many of the biochemical reactions of the cell occur in the cytoplasm.

_____9. Animal cells have chloroplasts, organelles that capture light energy from the sun and use it to make food.

_____10. Small hydrophobic molecules can easily pass through the plasma membrane.

_____11. In cell-level organization, different cells are specialized for different functions.

_____12. The flagella on your lung cells sweep foreign particles and mucus toward the mouth and nose.

_____13. Mitochondria contains its own DNA.

_____ 14. The plasma membrane is a single phospholipid layer that supports and protects a cell and controls what enters and leaves it.

_____15. The cytoskeleton is made from thread-like filaments and tubules.