

BIO152: Cell Biology Exam Notes

2017

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1.0 Introduction

Cell Theory

- Explains the relationship between life and properties of cells
 - All living organisms are composed of cells. Unicellular or multicellular
 - The cell is the basic unit of life and all organisms
 - All cells come from pre-existing, living cells. Every cell comes from a cell

Similarities Between Cells

- Similarities between Bacterial, Protozoan, Plant and Animal Cells:
 - Can duplicate their DNA
 - Use DNA and RNA to direct the synthesis of protein
 - Handle energy transfer
 - Regulate the exchange of materials
- Replicate Independently
- Selective permeable membrane
- Double helix DNA
- Ribosomes

Structure Similarities

- Plasma Membrane
 - An outer covering that separates the internal environment of the cell from the external environment
 - Made of a phospholipid bilayer with proteins
 - Bacteria, plants and fungi have complex membranes composed of complex carbohydrates
 - Selective barrier for the import and export of materials
- DNA
 - Found in the nonmembrane-bound nucleoid in Prokaryotes
 - Found in the membrane-bound nucleus in Eukaryotes
- Cytoplasm
 - Suspends organelles and other particulates
 - Composed of fluid called cytosol
 - Mostly water with various other nutrients
- Ribosomes
 - Site of synthesis of protein
 - Very small cellular structures

Size Limitations

- Having a large surface area to volume is crucial
 - If SA: V is not sufficient enough, cell will have trouble exchanging gases, nutrients and waste
 - Rate of diffusion
 - Can form - $\text{CO}_2(\text{g}) + \text{Aqueous Solution}(\text{aq}) \rightarrow \text{Carbonic Acid}$

1.1 Cell Types

Prokaryotes

- Smaller + simpler than Eukaryotes
- Grows rapidly
- Single-celled
- No nucleus
- No membrane-bound organelles
 - 70s Ribosomes
- 0.1 – 3.0 micrometres
- Most of DNA found in nucleoid
- Circular chromosome
 - Without histones
- Cell wall made of peptidoglycan (Polymer composed of linked carbohydrates and small proteins containing muramic acid)
 - For protection
 - Maintain shape
 - Prevents dehydration
- Many bacteria have an outermost layer of carbohydrates called the capsule
 - Sticky
 - Helps it to attach to surfaces in its environment
- Cell division through binary fission

Eukaryotes

- Bigger + more complex than Prokaryotes
- Grows slowly
- Membrane-bound nucleus
 - Nucleolus
 - Histones
- Membrane-bound organelles
- Multiple linear chromosomes
- 5-20 micrometres
- 80s ribosomes
- Linear chromosome
- Single-celled or multicellular
- Cell division through mitosis

