This document presents lecture notes from a Medical Physics course at Madenat Alelem University College.Golgi apparatus Chemically processes the molecules from the endoplasmic reticulum and the packages them into vesicles; nicknamed "chemical processing and packaging center". Mitochondria Involved in cellular metabolism and respiration; provides the principle source of cellular energy and is the place where complex, energy-releasing chemical reactions occur continuously; nicknamed "power plants".Golgi apparatus Chemically processes the molecules from the endoplasmic reticulum and the packages them into vesicles; nicknamed "chemical processing and packaging center". Mitochondria Involved in cellular metabolism and respiration; provides the principle source of cellular energy and is the place where complex, energy-releasing chemical reactions occur continuously; nicknamed "power plants"."Types of Cells 1-Prokaryotes o Pro = before; karyon = nucleus o relatively small 5 – 10 um o lack membrane-bound organelles o earliest cell type 2-Archaea o Originally thought to be prokaryotes o relatively small 5 – 10 um o lack membrane-bound organelles o Usually live in extreme environments (thermophiles, halophiles) etc) 3-Eukaryotes o Eu = true; karyon = nucleus o contain membrane-bound organelles o Evolved from prokaryotes by endosymbiosis association o Include Protozoans , Fungi, Animals, and Plants structure of typical prokaryotic cells: characteristic of eukaryotic cells: The difference between prokaryotic and eukaryotic: Animal cell Animal cells are generally small in size 2.Cell wall is absent. 3. absent plastids. 4. Vacuoles are many and small. 5. Single highly complex Golgi apparatus. 6. present centrosome and centrioles. Plant cell 1. Plant cells are larger than animal cells. 2. Rigid cell wall of cellulose 3. present plastids. 4. Vacuoles are few and large 5. many simpler units of Golgi apparatus, called dictyosomes. 6. Absent centrosome and centrioles. What is the difference between an animal cell and a plant cell? The Cell Theory of Biology 1- All living organisms (Animals, plants and microbes) are made up of one or more cells and cell products. 2-All metabolic reactions in unicellular and multicellular organisms take place in cells. 3- Cells arise by division of preexisting cells. 4- The smallest clearly defined unit of life is the cell. 5-Cells can be cultured to produce more cells in vitro = outside organism or cell in vivo = inside organism or cell Properties of Cells o They contain numerous internal structures o Some are membrane bound (organelles) while others do not Genes are instructions for cells to create specific proteins All cells use the same types of information The genetic code is universal Information transfer must be error free Errors are called mutations 3-Cells arise from the division of other cells oDaughter cells inherit the genes from the mother cells oDaughter cells inherit cytoplasm and organelles from the mother cells oBinary fission – cell division in bacteria oMitosis – the genetic complement of each daughter cell is identical to the other and to the mother cell. This is asexual reproduction oMeiosis – the genetic complement of each daughter cell is reduced by half. This is sexual reproduction The difference between sexual and sexual reproduction as in the following scheme: Cells can engage in mechanical activities Cells can move Organelles can move Cells can respond to stimuli chemotaxis – movement towards chemicals phototaxis – movement towards light hormone responses touch responses Major Cell Structures and Primary Functions Cell Membrane Protects the cell; provides for communication via receptor proteins; surface proteins serve as positive identification tags; allows some substances to pass into and out of the cell while denying passage to other substances; this selectivity allows cells to receive nutrition and dispose of waste. Cytoplasm Provides storage and work areas for

the cell; the work and storage elements of the cell, called organelles, are the ribosomes, endoplasmic reticulum, Golgi apparatus, mitochondria, lysosomes, and centrioles. Ribosomes Make enzymes and other proteins; nicknamed "protein factories"."Types of Cells 1–Prokaryotes o Pro = before; karyon = nucleus o relatively small 5 – 10 um o lack membrane–bound organelles o earliest cell type 2–Archaea o Originally thought to be prokaryotes o relatively small 5 – 10 um o lack membrane–bound organelles o Usually live in extreme environments (thermophiles, halophiles) etc) 3–Eukaryotes o Eu = true; karyon = nucleus o contain membrane–bound organelles o Evolved from prokaryotes by endosymbiosis association o Include Protozoans , Fungi, Animals, and Plants structure of typical prokaryotic cells: characteristic of eukaryotic cells: The difference between prokaryotic and eukaryotic: Animal cell Animal cells are generally small in size 2.Cell wall is absent. 3. absent plastids. 4. Vacuoles are many and small. 5. Single highly complex Golgi apparatus. 6. present centrosome and centrioles. Plant cell 1. Plant cells are larger than animal cells. 2. Rigid cell wall of cellulose 3. present plastids. 4. Vacuoles are few and large 5. many simpler units of Golgi apparatus, called dictyosomes. 6. Absent centrosome and centrioles. What is the difference between an animal cell and a plant cell? The Cell Theory of Biology 1–All living organisms (Animals, plants and microbes) are made up of one or more cells and cell products. 2–All metabolic reactions in unicellular and multicellular organisms take place in cells. 3– Cells arise by division of preexisting cells. 4– The smallest clearly defined unit of life is the cell. 5–Cells can be cultured to produce more cells in vitro = outside organism or cell in vivo = inside organism or cell Properties of Cells o They contain numerous internal structures o Some are membrane bound (organelles) while others do not Genes are instructions for cells to create specific proteins All cells use the same types of information The genetic code is universal Information transfer must be error free Errors are called mutations 3–Cells arise from the division of other cells oDaughter cells inherit the genes from the mother cells oDaughter cells inherit cytoplasm and organelles from the mother cells oBinary fission – cell division in bacteria oMitosis – the genetic complement of each daughter cell is identical to the other and to the mother cell. This is asexual reproduction oMeiosis – the genetic complement of each daughter cell is reduced by half. This is sexual reproduction The difference between sexual and sexual reproduction as in the following scheme: Cells can engage in mechanical activities Cells can move Organelles can move Cells can respond to stimuli chemotaxis – movement towards chemicals phototaxis – movement towards light hormone responses touch responses Major Cell Structures and Primary Functions Cell Membrane Protects the cell; provides for communication via receptor proteins; surface proteins serve as positive identification tags; allows some substances to pass into and out of the cell while denying passage to other substances; this selectivity allows cells to receive nutrition and dispose of waste. Cytoplasm Provides storage and work areas for the cell; the work and storage elements of the cell, called organelles, are the ribosomes, endoplasmic reticulum, Golgi apparatus, mitochondria, lysosomes, and centrioles. Ribosomes Make enzymes and other proteins; nicknamed "protein factories"."8–Regulation Even the smallest organisms are complex and require multiple regulatory mechanisms to coordinate internal functions, respond to stimuli, and cope with environmental stresses. Two examples of internal functions regulated in an organism are nutrient transport and blood flow. Organs (groups of tissues working together) perform specific functions, such as carrying oxygen throughout the body,

removing wastes, delivering nutrients to every cell, and cooling the body.""8- Regulation Even the smallest organisms are complex and require multiple regulatory mechanisms to coordinate internal functions, respond to stimuli, and cope with environmental stresses. Two examples of internal functions regulated in an organism are nutrient transport and blood flow. Organs (groups of tissues working together) perform specific functions, such as carrying oxygen throughout the body, removing wastes, delivering nutrients to every cell, and cooling the body."Key characteristics of life are detailed: cellular composition, reproduction (sexual and asexual), growth and development, energy metabolism (anabolism and catabolism), adaptation, respiration (external and internal, aerobic and anaerobic), homeostasis, and genetic information (DNA/RNA).The notes further delve into cell biology, outlining the history of cell discovery (Hooke, Leeuwenhoek, Schleiden, Schwann), cell structures (cilia, flagellum, nucleus), and cell types (prokaryotes, archaea, eukaryotes), comparing and contrasting animal and plant cells.Key characteristics of life are detailed: cellular composition, reproduction (sexual and asexual), growth and development, energy metabolism (anabolism and catabolism), adaptation, respiration (external and internal, aerobic and anaerobic), homeostasis, and genetic information (DNA/RNA).The notes further delve into cell biology, outlining the history of cell discovery (Hooke, Leeuwenhoek, Schleiden, Schwann), cell structures (cilia, flagellum, nucleus), and cell types (prokaryotes, archaea, eukaryotes), comparing and contrasting animal and plant cells."5- Respiration A process in living organisms involving the production of energy, with the intake of oxygen and the release of carbon dioxide from the oxidation of complex organic substances. Types of Respiration a- External respiration (Breathing). b- Internal reparation (Cellular respiration) which is divieded into anaerobic respiration (no need oxygen) and aerobic respiration (need oxygen).""5- Respiration A process in living organisms involving the production of energy, with the intake of oxygen and the release of carbon dioxide from the oxidation of complex organic substances. Types of Respiration a- External respiration (Breathing). b- Internal reparation (Cellular respiration) which is divieded into anaerobic respiration (no need oxygen) and aerobic respiration (need oxygen)."The notes cover introductory biology, including definitions of biology and its various fields (botany, zoology, anatomy, bacteriology, cytology, ecology, embryology, and entomology).The notes cover introductory biology, including definitions of biology and its various fields (botany, zoology, anatomy, bacteriology, cytology, ecology, embryology, and entomology).Finally, the document describes major cell structures and their functions: cell membrane, cytoplasm, ribosomes, endoplasmic reticulum, Golgi apparatus, mitochondria, lysosomes, and centrioles."7- Genetic information (Code) Living things are based on a universal genetic code. Organisms store the information they need to live, grow, and reproduce in a genetic code in a molecule called DNA and RNA. The genetic code is the set of rules used by living cells to translate information encoded within genetic material (DNA or mRNA sequences of nucleotide) which classified each organism from others."Finally, the document describes major cell structures and their functions: cell membrane, cytoplasm, ribosomes, endoplasmic reticulum, Golgi apparatus, mitochondria, lysosomes, and centrioles."7- Genetic information (Code) Living things are based on a universal genetic code. Organisms store the information they need to live, grow, and reproduce in a genetic code in a molecule called DNA and RNA. The genetic code is the set of rules used by living cells to translate information encoded within genetic

material (DNA or mRNA sequences of nucleotide) which classified each organism from others.""4- (Energy) Living organism need energy to maintain organization, to grow and reproduce. a- Anabolism: The synthesis of complex molecules in living organisms from simpler ones together with the storage of energy; constructive metabolism. b- Catabolism: The breakdown of complex molecules in living organisms to form simpler ones, together with the release of energy; destructive metabolism.""4- (Energy) Living organism need energy to maintain organization, to grow and reproduce. a- Anabolism: The synthesis of complex molecules in living organisms from simpler ones together with the storage of energy; constructive metabolism. b- Catabolism: The breakdown of complex molecules in living organisms to form simpler ones, together with the release of energy; destructive metabolism."This forms the basis of the Cell Theory of Biology." Nucleus Controls every organelle (little organ) in the cytoplasm; contains the generic matter necessary for cell reproduction as well as control over activity within in the cell's cytoplasm; responsible for the cell's metabolism, growth, and reproduction."This forms the basis of the Cell Theory of Biology." Nucleus Controls every organelle (little organ) in the cytoplasm; contains the generic matter necessary for cell reproduction as well as control over activity within in the cell's cytoplasm; responsible for the cell's metabolism, growth, and reproduction.""2- Reproduction It is the ability to produce new individual organisms. A-In sexual reproduction: cells from two different parents unite to form the first cell of the new organism. B-In asexual reproduction: a single parent produces offspring that are identical to itself.""Cilia Hair-like processes that project from epithelial cells; help propel mucus, dust particles, and other foreign substances from the respiratory tract."Lysosomes Contain enzymes that can digest food compounds; nicknamed "digestive bags". Centrioles Play an important role in cell reproduction" ?????"2- Reproduction It is the ability to produce new individual organisms. A-In sexual reproduction: cells from two different parents unite to form the first cell of the new organism. B-In asexual reproduction: a single parent produces offspring that are identical to itself.""Cilia Hair-like processes that project from epithelial cells; help propel mucus, dust particles, and other foreign substances from the respiratory tract."Lysosomes Contain enzymes that can digest food compounds; nicknamed "digestive bags". Centrioles Play an important role in cell reproduction" ?????"3- Grow and develop. -Growth, result of cell division creates a larger organism and/or growth from immature to mature (life cycle). -During an organism's development, cells differentiate, which means that the cells look different from one another and perform different functions.""The discovery of the cells 1- 1665 - Robert Hooke looks at cork under a microscope. Calls the chambers he see "cells" 2- 1665 -1675 Anton van Leeuwenhoek, the invention of the microscope ,studies organisms living in pond water ."3- Grow and develop. -Growth, result of cell division creates a larger organism and/or growth from immature to mature (life cycle). -During an organism's development, cells differentiate, which means that the cells look different from one another and perform different functions.""The discovery of the cells 1- 1665 - Robert Hooke looks at cork under a microscope. Calls the chambers he see "cells" 2- 1665 -1675 Anton van Leeuwenhoek, the invention of the microscope ,studies organisms living in pond water .1" "General Biology Lecture One Dr. Nawar Bahaa Almuhsin Biology Department/Madenat Alelem University College Unit One: Introduction to Biology Topic 1 What Is Life? What is Biology?""Fields of Biology Just as the term science is quite general, so too, is biology. The wide field can be broken down into more specific

areas. A common division is into: Botany (a study of plants) Zoology (a study of animals) ...but there are other divisions.""5- Adaptation: The ability to change over time in response to the environment. This ability is fundamental to the process of evolution and is determined by the organism's heredity, diet, and external factors."1" "General Biology Lecture One Dr. Nawar Bahaa Almuhsin Biology Department/Madenat Alelem University College Unit One: Introduction to Biology Topic 1 What Is Life? What is Biology?""Fields of Biology Just as the term science is quite general, so too, is biology. The wide field can be broken down into more specific areas. A common division is into: Botany (a study of plants) Zoology (a study of animals) ...but there are other divisions.""5- Adaptation: The ability to change over time in response to the environment. This ability is fundamental to the process of evolution and is determined by the organism's heredity, diet, and external factors.""6- Homeostasis Living things maintain a stable internal environment. Although conditions outside an organism may change, conditions inside an organism tend to remain constant. This process is called homeostasis. It is a self-regulating process by which biological systems maintain stability while adjusting to changing external conditions."Cell Biology "Introduction of cell biology Cell biology The branch of biology dealing with the study of structure, function, molecular organization, growth, reproduction and genetics of the cells, is called cytology or cell biology."Endoplasmic reticulum (ER) Carries proteins and other substances through the cytoplasm."6- Homeostasis Living things maintain a stable internal environment. Although conditions outside an organism may change, conditions inside an organism tend to remain constant. This process is called homeostasis. It is a self-regulating process by which biological systems maintain stability while adjusting to changing external conditions."Cell Biology "Introduction of cell biology Cell biology The branch of biology dealing with the study of structure, function, molecular organization, growth, reproduction and genetics of the cells, is called cytology or cell biology."Endoplasmic reticulum (ER) Carries proteins and other substances through the cytoplasm.The Cell Theory is explained, along with cell properties, including gene function, information transfer, and cell division (binary fission, mitosis, meiosis).I'll extract the text from the files you've provided.Biology and its Fields "The Meaning of Biology -Whenever you see "...ology" or "...logy" you will be involved in a study of a particular area of, as the stem comes from the Greek "logos" which really means the knowledge or study of."I'll extract the text from the files you've provided.The Cell Theory is explained, along with cell properties, including gene function, information transfer, and cell division (binary fission, mitosis, meiosis).I'll extract the text from the files you've provided.Biology and its Fields "The Meaning of Biology -Whenever you see "...ology" or "...logy" you will be involved in a study of a particular area of, as the stem comes from the Greek "logos" which really means the knowledge or study of."I'll extract the text from the files you've provided.3- 1838-1839 German scientists Schleiden and Schawann , all living organisms are made of cells."Flagellum "Tail" of the sperm that enables for the sperm to "swim" or move toward the ovum.As the manager ... As the manager of XYZ Company, I would strategically use publicity and corporate advertising to stre...3- 1838-1839 German scientists Schleiden and Schawann , all living organisms are made of cells."Flagellum "Tail" of the sperm that enables for the sperm to "swim" or move toward the ovum.As the manager ... As the manager of XYZ Company, I would strategically use publicity and corporate advertising to stre...A comparison of sexual and asexual reproduction is provided.Study of the structure

and function of cells" "4. Ecology... Study of organisms and their interaction with each other and the environment."Study of insects" Characteristics of Life "Characteristics of Life oAll living organisms have the same characteristics which are: 1-Living things are made up of cells." ?????????) This document presents lecture notes from a Medical Physics course at Madenat Alelem University College.A comparison of sexual and asexual reproduction is provided.Study of the structure and function of cells" "4. Ecology... Study of organisms and their interaction with each other and the environment."Study of insects" Characteristics of Life "Characteristics of Life oAll living organisms have the same characteristics which are: 1-Living things are made up of cells.""Greek "bios means life, so the general meaning of biology is the study of living things.""A cell is the smallest unit of an organism that can be considered alive."Key Points Extracted from the Docu...Copyright (C) Lakhasly.com 2025 ????"Greek "bios means life, so the general meaning of biology is the study of living things.""A cell is the smallest unit of an organism that can be considered alive."Key Points Extracted from the Docu...PDF ??PDF
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