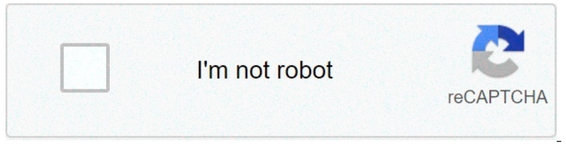

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Cell structure and function worksheet answers key pdf

1 What Is a Baby Elephant Called? 2 What Is a Baby Fox Called? 3 BTUs and the Human Body 4 What Is a Male Dog Called? 5 Ireland Vacation Castles: Where to Stay and What to Tour Plant cell walls perform many functions. Their main task is to support proper plant growth. This is accomplished by the cell wall creating a skeleton-like frame that enables plants to grow vertically and develop a rigid stem. Cell walls vary considerably in thickness and organization, which accounts for the wide range of plant shapes and sizes on the planet. They consist of two layers ‰ÛÓ a primary cell wall, which supports the cell as it matures, and a rigid secondary cell wall that appears after the primary wall stops growing. The primary cell wall is thinner and more flexible than the secondary wall. Internally, the primary and secondary walls have a similar physical composition. Over the course of a plant's life, they perform complementary functions to keep the plant healthy and vibrant. Primary Cell Walls Primary cell walls are comprised mostly of a complex carbohydrate called cellulose. Cellulose is a complex sugar that provides cells with shape and protection against outside harm including bacteria and dehydration. This cell wall also contains a group of polysaccharides, which breaks down into pectins and cross-linking glycans. Pectins, or pectic saccharides, congeal into a gel-like substance as they bind with neighboring polymers. Pectic saccharides provide cell walls with immunity and protection against environmental harms. They also facilitate cell recognition and enable plant cells to combine with each other. Cross-linking glycans bond with cellulose molecules by forming hydrogen bonds. As they form a network of bonds, cross-linking glycans give strength to the cellulose, which builds cell rigidity and structure. Primary cell walls also contain small amounts of protein, which produces enzymes that help cells grow, break down and change. These enzymes are responsible for common plant behavior, such as changing leaf color in autumn or when under stress.Secondary Cell Walls Secondary cell walls, which form inside primary cell walls as plants grow, have a similar composition to primary cell walls. However, they contain additional substances that aid in various plant functions. One such substance is lignin, which is a group of hard polymers. Lignin gives cell walls their rigid shape. It also provides cell walls with an extra layer of defense against bacteria and fungi. Lipids in the secondary cell wall, such as wax and cutin, keep cells from absorbing too much water. Surrounding the cell wall is a structure called the middle lamella, which is comprised mostly of pectins. The middle lamella acts as a binding agent that connects plant cells to their neighbors. This special glue-like substance has tiny passageways called plasmodesmata, which are essentially channels for inter-cellular communication. Plasmodesmata cross between the inner and outer cell walls, and they also branch out into a network that connects to other cells. Through these passageways, the middle lamella lets cells share vital nutrients and minerals. Collectively, the components of the cell wall work together to give the plant strength and immunity and regulate growth and development. Cell walls are constantly growing and changing to meet the plant's needs as it progresses through its life cycle. Cells are the fundamental building blocks of life and make up all living things. From microscopic bacteria to enormous blue whales, all living things are composed of these little structures. Some organisms consist of a single cell and others are made up of billions. Cells come in many shapes and sizes, and they all have different purposes. The structure and design of the cell all help it do its job. For example, nerve cells which transmit messages quickly have a much different shape than blood cells that transport oxygen throughout the body. Because cells have different jobs, they also have different components or structures within the cell that help them complete those tasks. However, there are four structures found in all cells no matter what type: plasma membrane, DNA, ribosomes and cytoplasm. Plasma Membrane The plasma membrane, also referred to as the cell membrane, is the structure that completely surrounds the outside of the cell. It holds all of the other cell components inside while separating them from the rest of the environment. It acts as a skin that offers protection for the cell and its components. The plasma membrane is made up of a thin coating of fats, known as the phospholipid bilayer, and proteins that prevent objects from the environment from passing through. However, the plasma membrane is selectively permeable and allows small, nonpolar molecules to pass through freely.DNA DNA is the genetic material of a cell. The DNA contains the genetic code or instructions for how to make proteins. Eukaryotic cells have a nucleus, which is like the control center for the cell. It is in this organelle that DNA resides. However, prokaryotic cells do not have a nucleus. Instead, the DNA exists in a coiled loop floating around in the cytoplasm in the nucleoid region.Ribosomes Ribosomes are small organelles that float in the cytoplasm or are attached to other structures. Their job is to synthesize proteins by connecting amino acids together to make long chains. Proteins are necessary for several purposes. Enzymes use proteins as catalysts for biological reactions. Likewise, the cells themselves need proteins to carry out their specific functions. Although ribosomes look different in prokaryotic and eukaryotic cells, their purpose is the same.Cytoplasm Cytoplasm is a fluid that fills the inside of the cell, except for the nucleus. It is made up of cytosol and all other organelles are suspended inside it. The cytoplasm has other purposes aside from just being a filler. however. Although this jelly-like substance is comprised of 80 percent water, it also contains dissolved enzymes that it uses to break down large molecules into usable smaller molecules. For example, the cytosol in cytoplasm can break down glucose into smaller molecules that are used to provide energy for the mitochondria. If the cell has a nucleus, the fluid inside is known as nucleoplasm. Although similar, they have very different compositions and purposes. 1 What Are Some Car Names That Start With the Letter "E"? 2 The Life of Sacagawea — and What Your History Book Didn't Tell You 3 What Defunding the Police Really Looks Like Around the World 4 Surprising Facts About Jackie Kennedy, America's Savvy First Lady 5 What Is a Count and Countess? The cell membrane (plasma membrane) is a thin semi-permeable membrane that surrounds the cytoplasm of a cell. Its function is to protect the integrity of the interior of the cell by allowing certain substances into the cell while keeping other substances out. It also serves as a base of attachment for the cytoskeleton in some organisms and the cell wall in others. Thus the cell membrane also serves to help support the cell and help maintain its shape. The cell membrane is a multifaceted membrane that envelopes a cell's cytoplasm. It protects the integrity of the cell along with supporting the cell and helping to maintain the cell's shape. Proteins and lipids are the major components of the cell membrane. The exact mix or ratio of proteins and lipids can vary depending on the function of a specific cell. Phospholipids are important components of cell membranes. They spontaneously arrange to form a lipid bilayer that is semi-permeable such that only certain substances can diffuse through the membrane to the cell's interior. Similar to the cell membrane, some cell organelles are surrounded by membranes. The nucleus and mitochondria are two examples. Another function of the membrane is to regulate cell growth through the balance of endocytosis and exocytosis. In endocytosis, lipids and proteins are removed from the cell membrane as substances are internalized. In exocytosis, vesicles containing lipids and proteins fuse with the cell membrane increasing cell size. Animal cells, plant cells, prokaryotic cells, and fungal cells have plasma membranes. Internal organelles are also encased by membranes. Encyclopaedia Britannica / UIG / Getty Images The cell membrane is primarily composed of a mix of proteins and lipids. Depending on the membrane’s location and role in the body, lipids can make up anywhere from 20 to 80 percent of the membrane, with the remainder being proteins. While lipids help to give membranes their flexibility, proteins monitor and maintain the cell's chemical climate and assist in the transfer of molecules across the membrane. Microscopic view of phospholipids. Stocktrek Images / Getty Images Phospholipids are a major component of cell membranes. Phospholipids form a lipid bilayer in which their hydrophilic (attracted to water) head areas spontaneously arrange to face the aqueous cytosol and the extracellular fluid, while their hydrophobic (repelled by water) tail areas face away from the cytosol and extracellular fluid. The lipid bilayer is semi-permeable, allowing only certain molecules to diffuse across the membrane. Cholesterol is another lipid component of animal cell membranes. Cholesterol molecules are selectively dispersed between membrane phospholipids. This helps to keep cell membranes from becoming stiff by preventing phospholipids from being too closely packed together. Cholesterol is not found in the membranes of plant cells. Glycolipids are located on cell membrane surfaces and have a carbohydrate sugar chain attached to them. They help the cell to recognize other cells of the body. Lipoproteins and PCSK9 bound to receptors. MAURIZIO DE ANGELIS / SCIENCE PHOTO LIBRARY / Getty Images The cell membrane contains two types of associated proteins. Peripheral membrane proteins are exterior to and connected to the membrane by interactions with other proteins. Integral membrane proteins are inserted into the membrane and most pass through the membrane. Portions of these transmembrane proteins are exposed on both sides of the membrane. Cell membrane proteins have a number of different functions. Structural proteins help to give the cell support and shape. Cell membrane receptor proteins help cells communicate with their external environment through the use of hormones, neurotransmitters, and other signaling molecules. Transport proteins, such as globular proteins, transport molecules across cell membranes through facilitated diffusion. Glycoproteins have a carbohydrate chain attached to them. They are embedded in the cell membrane and help in cell to cell communications and molecule transport across the membrane. Artwork of chromosomes. Science Photo Library - SCIEPRO / Getty Images The cell membrane is only one component of a cell. The following cell structures can also be found in a typical animal eukaryotic cell: Centrioles—help to organize the assembly of microtubules. Chromosomes—house cellular DNA. Cilia and Flagella—aid in cellular locomotion. Endoplasmic Reticulum—synthesizes carbohydrates and lipids. Golgi Apparatus—manufactures, stores and ships certain cellular products. Lysosomes—digest cellular macromolecules. Mitochondria—provide energy for the cell. Nucleus—controls cell growth and reproduction. Peroxisomes—detoxify alcohol, form bile acid, and use oxygen to break down fats. Ribosomes—responsible for protein production via translation. Reece, Jane B., and Neil A. Campbell. Campbell Biology. Benjamin Cummings, 2011. This is a microscope image of moss leaf cells showing cell walls (between cells) and chloroplasts (green). Alan Phillips/E+/Getty Images A cell wall is a rigid, semi-permeable protective layer in some cell types. This outer covering is positioned next to the cell membrane (plasma membrane) in most plant cells, fungi, bacteria, algae, and some archaea. Animal cells however, do not have a cell wall. The cell wall has many important functions in a cell including protection, structure, and support. Cell wall composition varies depending on the organism. In plants, the cell wall is composed mainly of strong fibers of the carbohydrate polymer cellulose. Cellulose is the major component of cotton fiber and wood, and it is used in paper production. Bacterial cell walls are composed of a sugar and amino acid polymer called peptidoglycan. The main components of fungal cell walls are chitin, glucans, and proteins. By LadyofHats (Own work) [Public domain], via Wikimedia Commons The plant cell wall is multi-layered and consists of up to three sections. From the outermost layer of the cell wall, these layers are identified as the middle lamella, primary cell wall, and secondary cell wall. While all plant cells have a middle lamella and primary cell wall, not all have a secondary cell wall. Middle lamella: This outer cell wall layer contains polysaccharides called pectins. Pectins aid in cell adhesion by helping the cell walls of adjacent cells to bind to one another. Primary cell wall: This layer is formed between the middle lamella and plasma membrane in growing plant cells. It is primarily composed of cellulose microfibrils contained within a gel-like matrix of hemicellulose fibers and pectin polysaccharides. The primary cell wall provides the strength and flexibility needed to allow for cell growth. Secondary cell wall: This layer is formed between the primary cell wall and plasma membrane in some plant cells. Once the primary cell wall has stopped dividing and growing, it may thicken to form a secondary cell wall. This rigid layer strengthens and supports the cell. In addition to cellulose and hemicellulose, some secondary cell walls contain lignin. Lignin strengthens the cell wall and aids in water conductivity in plant vascular tissue cells. This micrograph image shows a plant cell and its internal organelles. The cell wall appears as the thin layer between the cells and the nucleus is the prominent, round organelle with the smaller red nucleolus. Dr. Jeremy Burgess/Science Photo Library/Getty Images A major role of the cell wall is to form a framework for the cell to prevent over expansion. Cellulose fibers, structural proteins, and other polysaccharides help to maintain the shape and form of the cell. Additional functions of the cell wall include: Support: The cell wall provides mechanical strength and support. It also controls the direction of cell growth. Withstand turgor pressure: Turgor pressure is the force exerted against the cell wall as the contents of the cell push the plasma membrane against the cell wall. This pressure helps a plant to remain rigid and erect, but can also cause a cell to rupture. Regulate growth: The cell wall sends signals for the cell to enter the cell cycle in order to divide and grow. Regulate diffusion: The cell wall is porous allowing some substances, including proteins, to pass into the cell while keeping other substances out. Communication: Cells communicate with one another via plasmodesmata (pores or channels between plant cell walls that allow molecules and communication signals to pass between individual plant cells). Protection: The cell wall provides a barrier to protect against plant viruses and other pathogens. It also helps to prevent water loss. Storage: The cell wall stores carbohydrates for use in plant growth, especially in seeds. This micrograph image of a section through a plant cell reveals its internal structure. Inside the cell wall are chloroplasts (dark green), the site of photosynthesis, and the nucleus (orange), which contains the cell's genetic information. Dr. David Furness, Keele University/Science Photo Library/Getty Images The plant cell wall supports and protects internal structures and organelles. These so called 'tiny organs' perform needed functions for the support of cell life. Organelles and structures that can be found in a typical plant cell include: Cell (Plasma) Membrane: This membrane surrounds the cytoplasm of a cell, enclosing its contents. Cell Wall: The outer covering of the cell that protects the plant cell and gives it shape is the cell wall. Centrioles: These cell structures organize the assembly of microtubules during cell division. Chloroplasts: The sites of photosynthesis in a plant cell are chloroplasts. Cytoplasm: This gel-like substance within the cell membrane supports and suspends organelles. Cytoskeleton: The cytoskeleton is a network of fibers throughout the cytoplasm. Endoplasmic Reticulum: This organelle is an extensive network of membranes composed of both regions with ribosomes (rough ER) and regions without ribosomes (smooth ER). Golgi Complex: This organelle is responsible for manufacturing, storing and shipping certain cellular products. Lysosomes: These sacs of enzymes digest cellular macromolecules. Microtubules: These hollow rods function primarily to help support and shape the cell. Mitochondria: These organelles generate energy for the cell through respiration. Nucleus: This large, membrane bound structure with in the cell contains the cell's hereditary information. Nucleolus: This circular structure within the nucleus helps in the synthesis of ribosomes. Nucleopores: These tiny holes within the nuclear membrane allow nucleic acids and proteins to move into and out of the nucleus. Peroxisomes: These tiny structures are bound by a single membrane and contain enzymes that produce hydrogen peroxide as a by-product. Plasmodesmata: These pores, or channels, between plant cell walls allow molecules and communication signals to pass between individual plant cells. Ribosomes: Composed of RNA and proteins, ribosomes are responsible for protein assembly. Vacuole: This typically large structure in a plant cell helps to support the cell and participates in a variety of cellular functions including storage, detoxification, protection, and growth. This is a diagram of a typical prokaryotic bacterial cell. By Ali Zifan (Own work)/ Wikimedia Commons/CC BY-SA 4.0 Unlike in plant cells, the cell wall in prokaryotic bacteria is composed of peptidoglycan. This molecule is unique to bacterial cell wall composition. Peptidoglycan is a polymer composed of double-sugars and amino acids (protein subunits). This molecule gives the cell wall rigidity and helps to give bacteria shape. Peptidoglycan molecules form sheets which enclose and protect the bacterial plasma membrane. The cell wall in gram-positive bacteria contains several layers of peptidoglycan. These stacked layers increase the thickness of the cell wall. In gram-negative bacteria, the cell wall is not as thick because it contains a much lower percentage of peptidoglycan. The gram-negative bacterial cell wall also contains an outer layer of lipopolysaccharides (LPS). The LPS layer surrounds the peptidoglycan layer and acts as an endotoxin (poison) in pathogenic bacteria (disease causing bacteria). The LPS layer also protects gram-negative bacteria against certain antibiotics, such as penicillins. The cell wall is an outer protective membrane in many cells including plants, fungi, algae, and bacteria. Animal cells do not have a cell wall. The main functions of the cell wall are to provide structure, support, and protection for the cell. The cell wall in plants is composed mainly of cellulose and contains three layers in many plants. The three layers are the middle lamella, primary cell wall, and secondary cell wall. Bacterial cell walls are composed of peptidoglycan. Gram-positive bacteria have a thick peptidoglycan layer and gram-negative bacteria have a thin peptidoglycan layer. Lodish, H, et al. "The Dynamic Plant Cell Wall." 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