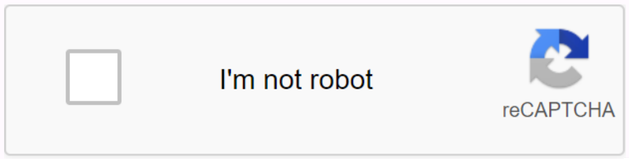

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Difference between photosynthesis and cellular respiration

Molecules are in constant motion and tend to move from regions where they are in higher concentration to regions where they are less concentrated. Diffusion is the net movement of molecules down their concentration gradient. Diffusion can occur in gases, in liquids, or through solids. An example of diffusion in gases occurs when a bottle of perfume is opened at the front of a room. Within minutes people farther and farther from the source can smell perfume. Bacteria and fungi come under different categories; the former is the prokaryotic cell while the latter are eukaryotic cells. Apart from this, there are many differences between them that bacteria need a host to live, and they can be autotrophs as well as heterotrophs, while fungi grow their own and are heterotrophs that depend on others for their food. Bacteria do not have core membraneen enveloping nucleus, while fungi (eukaryotes) have well-defined nucleus surrounded by the conceit. Prokaryotes and Eukaryotes are the two large umbrellas of classifications under which all organisms are kept. Prokaryotes are the most primitive type of microorganisms, which are single-celled and lack many organelles, while Eukaryotes evolved from prokaryotes alone, but they are multicellular and contain all organelles with the specific function. Bacteria and fungi share some similarities also like, as they both reproduce and live, they both can be parasitic and are microscopic as well. Below we will discuss the general differences between both microorganisms, with their different functions. Content: Bacteria Vs Fungi Comparison Chart Definition Key Differences Similarities Conclusion Comparison Chart Basis For ComparisionBacteria Fungi MeaningBacteria are the oldest organisms present to date. They are single-celled, prokaryotic, with simple cell structure. Fungi are the multicellular, eukaryotic organisms with complex cell structure. CharacteristicsProkaryoter.Eukaryoter. Encellig.Multicellig. Cell lacks organelles.Organelles present. They're missing the core. Nucleus present. The cell wall is made of peptidoglycan. The cell wall consists of chitin. Cell Membrane Present under the cell wall. Present. ShapesHave three distinct shapes (spiral, round, and rod shape). Rounded - Cocci. Rod - Bacilli. Spiral - Spirella.Vary in shapes, but most of them are in the form of the wire-like structure called hyphae. The mode of reproduction Asexual.May be either sexual or asexual. MotilityMove through flagellum. They're non-motile. Fashion of nutritionCan be autotrophs, but usually heterotrophs. Heterotrof, usually feed on the dead and decayed matter. HostThey don't need a host to grow. They grow their own. Derived energy fromBacteria obtain energy from sugars, proteins, and fats. Fungi obtain their energy from the used and pre-existing sources found in an environment. Disease of themTuberculosis, rabies, leprosy, tetanus, diphtheria, STREP neck, leprosy, pertussis, cholera. Athlete's foot, aspergillosis, aspergilloma, allergic bronchopulmonary, etc. Definition of Bacteria Bacteria are prokaryotic microorganisms, considered as the first organisms on the earth that evolved about 3.5 billion years ago. They can be either autotropic (which can prepare their food through photosynthesis process or chemosynthesis) or heterotrophs (which depends on their host for nutrition). Bacteria come in three forms that are spherical (e.g., cocci), rod-shaped (eg, Vibrio), and spiral (eg, Spirochetes) and reproduce asexually by binary fission method or by conjugation. They are useful for releasing nitrogen to the plants, in rotting organic issues, which are used in the fermentation process to make cheese, curd and yogurt, but sometimes cause disease (tuberculosis, salmonella, STREP throat), destroy food and contamination of water. The bacterial cell contains the following components: Glycocalyx – The layer of glycoca luxury acts as a surface receptor, and also protects the cell wall. Nukleoid – It is the place where the genetic material (DNA) is stored in the condensed little package. Pilus - It is a hair kind of hollow attachment found on the surface of bacteria. Pilus is used in transfers of DNA to other cells under the cell's adhesion. Mesosomes – Mesosomes are helpful during cell respi, They are considered as extension of the cell membrane, folded out in the cytoplasm. Flagellum – Flagellum is helpful in cellular movement, these are attached to the basal body of the cell. Cell Wall – Cell Wall is known to provide stiffness and support to the cell. Fimbriae – Fimbriae is the small hair-like structure, helpful when attaching to the surface and other bacteria while mating. Inclusion/Granules – These particles support the storage of glycogen, carbohydrates, phosphate, fats that can be used when needed. Ribosomes – These are small particles and play an important role in the synthesis of protein. Cell membrane – It is the thin layer of protein and lipids, which presents around the cytoplasm and control the flow of material through the cells. Endospore – It protects the cell from harsh conditions. Prokaryotes can be differentiated in two parts, on the basis of the amount of peptidoglycan present in their cell wall; Gram-positive and gram-negative bacteria. The gram-positive bacteria contain a large amount of peptidoglycan in their cell wall, while the gram-negative bacteria have the thin layer. Definition of Fungi Fungi are the eukaryotic organisms, which can be single-celled (yeast) or multicellular (hyphae), evolved 900 million years ago and derived from protists. They are found in the wire-like structure called hypha when these hyphal structure grows and forms a thick mass; it's called mycelium. Mushrooms are organic carbon for their nutrient. They secrete hydrolytic enzymes, by spreading in soil and rotten wood, feeding on the organic remains. As they obtain their nutrition from dead and decaying materials, they are considered as saprophytes. Fungi reproduce sexually as well as asexually, by developing branches, shredding, budding or by spores forming. Some fungi are used to make antibiotics (penicillin), some are used as edible and used to make bread, but they are also responsible for some plant and animal diseases can destroy food as well. The following are the components of fungi: Nucleus – DNA (genetic material) is stored in this and helps in protein synthesis and ribosomes. Cytoplasm – The cytoplasm is the site of other organelles, and metabolic activities occur here. Mitochondria – It's the powerhouse of the cell. Golgi Apparatus – Its function varies but helps in sorting lipids and proteins and modifications of the proteins. Lysosomes and peroxisomes – Active in degrading foreign particles. Endoplasmic Reticulum – It helped in the transport of the materials such as lipids and proteins and attached to the cornea. Cell Wall – It provides the correct structure and shape to the cell as well as support. Cytoplasmic membrane/plasma membrane – It is a semi-permeable membrane, surrounding cytoplasm and work as the cell barrier by controlling the inlet and outlet of molecules. Ribosomes – Help in the synthesis of protein. Similarities Food sources for them are almost the same. Both contain DNA (Deoxyribose Nucleic Acid) as their genetic material. They are both responsible for causing disease or infection to the body, as bacteria are responsible for tuberculosis, pneumonia, throat infection, stomach-related problems, while fungus causes ringworm and athlete's foot. Both contain cytoplasm, cell wall and cell membrane. Conclusion From the above discussion, we can say that the microorganisms that are everywhere, sometimes can be harmless or harmful. They both have different cellular makeup and differ in their features as well. In ecology also they play the important role where some bacteria help in the fermentation process, fungi help to make antibiotics while some can be harmful by causing disease such as tuberculosis, STREP throat, skin infection, athlete's foot. Together, the processes of photosynthesis and cell respination allow life on Earth to gather energy for use in other reactions. In addition to the organisms that depend on sulfur near hydrothermal vents, the majority of life on Earth depends on sugar glucose. Glucose is created by the process of photosynthesis. Cell respination involves the breakdown of glucose and storage of the energy received in the molecule ATP. Plants create their own energy through photosynthesis and also use breathing to produce ATP. Animals must rely on the sugar they have collected from plants to supply their mitochondria materials to produce ATP. Photosynthesis is the most important process that drives life on Earth. Photosynthesis captures energy from the sun in the bonds of organic molecules. These molecules, glucose molecules, are the basis of all life on Earth. Glucose will be used by the process of cell respiration to utilize chemical energy stored in the covalent bonds of sugar. Photosynthesis occurs in the leaves and green parts of plants. Organelles within plant cells, known as chloroplasts, contain specialized proteins that can interact with light. Cytochromes are these specialized proteins, which are attached to a heme group. Heme groups are also seen bound to hemoglobin, in blood cells. Instead of iron, these heme cells bind magnesium. The complex structure of the heme interacts with photons of light passing through them. Chloroplastuses the energy used from these photons and their interaction with the cytochromes and other proteins to drive the formation of glucose. To do this, chloroplasts will combine units of carbon dioxide into chains of 6 carbon, 12 hydrogen and 6 oxygen. This is glucose, which can then be modified and combined with other glucose molecules to be stored as starch and complex sugars like fructose. The photosynthesis reaction has two parts, commonly called the Light Reactions and Calvin Cycle. The whole process of photosynthesis can be seen below. Simple photosynthesis overview On the top of the diagram, light and water combine in the chloroplasts, where the hydrogens are separated from the oxygen in chains of proteins starting from the high-collecting cytochromes and accessory pigments. The hydrogen, electrons and associated energy are bound to ADP and NADP+. These molecules can bind a hydrogen, electrons, and energy. In this way, the most important products become of the light reactions, NADPH and ATP. Oxygen is produced as one of the product's help. ATP and NADPH are then used within calvin cycle, a series of reactions that recycle these electron-carriers and produce glucose. The energy within and hydrogen molecules are used to revitalize reactions throughout the cycle. Calvin Cycle has three phases, carbon fixation, reduction, and regeneration of ribose. These reactions can be seen in the image below. Note that the addition of a carbon dioxide in a turn of the reaction gives the 3-carbon molecule 3-phoshphoglycerate. Two of these molecules are then combined to produce a glucose, among other things. Calvin cycle When glucose is created by chloroplasts, it can be used to drive other reactions in the cell. It can also be exported to other cells within the organism. This is where the process of cell respination takes over. Cellular has 4 distinct processes, which drive the creation of ATP. This ATP can be used in a number of cellular reactions, and provides activation energy to help enzymes complete tasks. Cell respith happens in the mitochondria, a small organelle similar to the chloroplasts. While chloroplasts are only found in plants, the mitochondria are found in all living eukaryotes. Plants provide all the glucose their cells need, and more. This extra glucose they store as starch and complex sugars. Animals, and indeed the entire food chain, rely on glucose produced by plants. The first process of cell respination, glycolysis, is exactly what the name suggests. Glyco- refers to glucose, where -lysis refers to something that is divided or divided in half. Glycolysis happens within the cytosol of the cell, outside the mitochondria. In this process, the 6-carbon glucose molecule is divided into two molecules of pyruvate. This 3-carbon molecules are then converted into Acetyl CoA in the next step. This molecule will be an important part of the Krebs cycle. Acetyl CoA is also able to transfer to the mitochondria, where Krebs cycle and oxidative phosphorylation will take place. This can be seen in the chart below. The labels on the right show where the different reactions take place. The cell respination krebscycle is similar to the Calvin cycle, in that it recycles certain molecules to continuously drive the production of electrons and ATP. The electrons are then passed on to the inner mitochondrial membrane. This membrane is loaded with specialized proteins, which can transfer energy derived from passing electrons down their potential gradient. This electron transport chain uses a series of electron-driven enzymes, which specialize in binding phosphate groups to ADP. In this way, they store energy in the bond between these molecules, creating an ATP. These ATP molecules are then exported from the mitochondria, and can be used throughout the cell to provide energy in other reactions. For example, ATP is used to pump ions out of cells, creating the electrical potential needed for nervous reactions. There are countless other examples. In the Theory of Evolution, the origin of life on Earth is very untested. However, there is a large amount of evidence pointing to the fact that all life has a common ancestor. This ancestor then departed, for hundreds of millions of years, into the millions of species we see on Earth today. The process of endosymbiosis would account for this complexity. Bacteria, the simplest organisms, likely represent a fairly unchanged version of the first form of life. Bacteria have no organelles, and complete all the reactions they need for metabolism within a single compartment. Many bacteria are able to complete glycolysis, which can provide them with energy. Others are capable of photosynthesize, primitive single-celled plants. According to Endosymbiotic theory, these ancient bacteria began to interact and the evolutionary processes drove them into different niches within the environment. Some would take advantage of sunlight, while others would feed on them. Eventually, some of the predatory bacteria became quite large. As such, they can take in large amounts of smaller bacteria. Instead of digesting them, they created a safe place for them and helped them produce more energy. Thus the smaller endosymbiotic bacteria became the first organelles. This theory suggests that chloroplasts were originally photosynthetic bacteria, and that the mitochondria were originally bacteria capable of oxidative phosphorylation. The larger bacteria became eukaryotes, and developed other organelles. This theory is backed up by evidence that both chloroplasts and mitochondria are surrounded in double membranes, a presumed remnant of the ancestral immersive process. Furthermore, both the mitochondria and chloroplast contain pieces of circular DNA, similar to those found in bacteria. This DNA is replicated separately from the head DNA found in the nucleus. Hundreds of millions of years after this division of organelles, and evolution has given us what we see today. Plants are related to algae, which are related to photosynthetic bacteria. Animals are related to the ancient organisms that did not receive photosynthetic endosymbionts, and instead relied on consuming other organisms. At the bottom of the food chain are the photosynthetic organisms. They represent by far the largest biomass on earth, limited only by the amount of sunlight, nutrients and water they receive. One step above plants and algae, herbivores exploit the bounty that plants produce. Some of the largest animals in the world, such as the elephant, are completely herbivorous. But there are herbivores of all sizes, all the way down to grasshoppers and small insects. Since a herbivore must consume many photosynthetic organisms to grow, there are many smaller organisms at this level of the food chain. Similarly, there are many smaller carnivores than there are herbivores, as they have to feed on many smaller organisms throughout their lives in order to grow and reproduce. In this way, the entire food chain and ecology are generally completely based away from the processes of photosynthesis and cell respination. Ecology is also the study of how different organisms interact with each other while performing these reactions. 1. Which of the following is NOT a difference between photosynthesis and cell respimtion A. Only one uses sunlight B. Only one breaks down glucose C. Only one relies on a cycle of carbon molecules C is correct. The Krebs cycle and the Calvin cycle, while different in their outputs, both rely on a chain of carbon molecules that are constantly recycled. The molecules are different, but the processes are Similar. 2. As a human being, your cells depend on glucose to function. Where does this glucose come from? A. Your body B. Plants C. Meat B is correct. All the food that you consume was at one point a plant. If you eat meat, the nutrients you get from that meat are the same nutrients that the animal ate before it died. Even protein and fat in animals is simply a reuse of protein and glucose found in plants. 3. Which of the following things would be MOST devastating to an ecosystem? A. All the grass in a meadow is killed with a herbicide. B. whereas all butterflies in a meadow are killed with a pesticide; C. All birds in a meadow are killed by hunters. A is correct. Without the grass, the entire food chain will collapse. The other two examples represent higher levels of the food chain. Without grass, all insects would die, and all birds. But also remember that none of the options are good. Without the birds, insects can eat all the grass and the same results will occur. References Lodish, H., Berk, A., Kaiser, C. A., Krieger, M., Scott, M. P., Bretscher, A., . . . Matsudaira, P. (2008). Molecular Cell Biology (6th Ed.). New York: W.H. 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