What Does The Chloroplast Do

Symbiogenesis Mitochondria appear to be phylogenetically related to Rickettsiales bacteria, while chloroplasts are thought to be related to cyanobacteria. as chloroplasts, and possibly other organelles of eukaryotic cells are descended from formerly free-living prokaryotes (more closely related to the Bacteria Symbiogenesis (endosymbiotic theory, or serial endosymbiotic theory) is the leading evolutionary theory of the origin of eukaryotic cells from prokaryotic organisms. The theory holds that mitochondria, plastids such as chloroplasts, and possibly other organelles of eukaryotic cells are descended from formerly free-living prokaryotes (more closely related to the Bacteria than to the Archaea) taken one inside the other in endosymbiosis 19fa598a3a

Chromoplasts synthesize and store pigments such... 19fa598a3a Asexual reproduction occurs by biflagellate zoospores. Ultrastructurally, the flagella is covered in three-pronged scales, likened to a maple leaf. Sexual reproduction is oogamous, with small biflagellate male gametes and oogonia which are larger than vegetative cells. 19fa598a3a

Photosynthesis The term photosynthesis usually refers to oxygenic photosynthesis, a process that releases oxygen as a byproduct of water splitting. Photosynthetic organisms store the converted chemical energy within the bonds of intracellular organic compounds (complex compounds containing carbon), typically carbohydrates like sugars (mainly glucose, fructose and sucrose), starches, phytoglycogen and cellulose. 4 (3): 209. Genome Biology. ". PMID 17600460. 1186/gb-2003-4-3-209 Photosynthesis is a system of biological processes by which photopigment-bearing autotrophic organisms, such as most plants, algae and cyanobacteria, convert light energy—typically from sunlight—into the chemical energy necessary to fuel their metabolism. "Genomics and chloroplast evolution: what did cyanobacteria do for plants. doi:10. When needing to use this stored energy, an organism's cells then metabolize the organic compounds through cellular respiration. Photosynthesis plays a critical role in producing and maintaining the oxygen content of the Earth's atmosphere, and it supplies most of the biological energy necessary for complex life on Earth. Raven JA, Allen JF (2003) 19fa598a3a

They are generally found in mature tissues and are derived from preexisting mature plastids. Fruits and flowers are the most common structures for the biosynthesis of carotenoids, although other reactions occur there as well including the synthesis of sugars, starches, lipids, aromatic compounds, vitamins, and hormones. The DNA in chloroplasts and chromoplasts is identical. One subtle difference in DNA was found after a liquid chromatography analysis of tomato chromoplasts was conducted, revealing increased cytosine methylation. 19fa598a3a Cytoplasmic streaming is strongly dependent upon intracellular pH and temperature. It has been observed that the effect of temperature on cytoplasmic streaming created linear variance and dependence at different high temperatures in comparison to low temperatures. This process is complicated, with temperature alterations in the system increasing its efficiency, with other factors such as the transport of ions across... 19fa598a3a

Chloroplast Chloroplasts have a high concentration of chlorophyll pigments which capture the energy from sunlight, convert it to A chloroplast (KLOR-ə-plast, -plahst) is a type of organelle known as a plastid that conducts photosynthesis mostly in plant and algal cells. Chloroplasts carry out a number of other functions, including fatty acid synthesis, amino acid synthesis, and immune response in plants. The chemical energy created is then used to make sugar and other organic molecules from carbon dioxide in the Calvin cycle. Chloroplasts have a high concentration of chlorophyll pigments which capture the energy from sunlight, convert it to chemical energy and decomposing water to release oxygen. The number of chloroplasts per cell varies from one, in some unicellular algae, up to 100 in plants like Arabidopsis and wheat. photosynthesis mostly in plant and algal cells 19fa598a3a

Over 300 enzymes require the presence of magnesium ions for their catalytic action, including

all enzymes utilizing or synthesizing ATP, or those that use other nucleotides to synthesize DNA and RNA. 19fa598a3a Chromoplasts are found in fruits, flowers, roots, and stressed and aging leaves, and are responsible for their distinctive colors. This is always associated with a massive increase in the accumulation of carotenoid pigments. The conversion of chloroplasts to chromoplasts in ripening is a classic example. 19fa598a3a Researchers have found that the mitochondrial... 19fa598a3a

Chaetosphaeridium globosum Genomics and Chloroplast Evolution: What did Cyanobacteria Chaetosphaeridium globosum is a species of green algae in the class Coleochaetophyceae. It is widely distributed and probably has a cosmopolitan distribution. BMC Biol 2005 Oct 20; 3:22. Chaetosphaeridium globosum is a streptophyte, the lineage from which land plants evolved. Allen, John. Because of this, its genome is of considerable interest for the study of the evolution of plants. Raven, John. Changes During the Evolution of the Zygnemateles 19fa598a3a

Because of their endosymbiotic origins, chloroplasts... 19fa598a3a

Chromoplast It is thought (according to symbiogenesis) that like all other plastids including chloroplasts and leucoplasts they are descended from symbiotic prokaryotes. (according to symbiogenesis) that like all other plastids including chloroplasts and leucoplasts they are descended from symbiotic prokaryotes. Chromoplasts Chromoplasts are plastids, heterogeneous organelles responsible for pigment synthesis and storage in specific photosynthetic eukaryotes 19fa598a3a

Although extrachromosomal circular DNA (eccDNA) is found in normal eukaryotic cells, extrachromosomal DNA (ecDNA) is a distinct entity that has been identified in the nuclei of cancer cells and has been shown to carry many copies of driver oncogenes. ecDNA is considered to be a primary mechanism of gene amplification... 19fa598a3a One variety, var. depressum, is known from the British Isles; it differs from the typical variety in having somewhat depressed cells (8.5–9.5 µm high). 19fa598a3a The reason for product synthesis at high concentrations is because a single plant cell can potentially carry up to 100 chloroplasts. If all these plastids are... 19fa598a3a == Function == 19fa598a3a == Genomics == 19fa598a3a In plants, magnesium is necessary for synthesis of chlorophyll and photosynthesis. 19fa598a3a Some organisms also perform anoxygenic photosynthesis, which does not produce oxygen. Some bacteria (e.g. purple bacteria) use bacteriochlorophyll to split hydrogen sulfide as a reductant instead of water, releasing sulfur... 19fa598a3a $CO_2 + H_2O + RuBP \rightarrow$ (2) 3-phosphoglycerate 19fa598a3a Chaetosphaeridium globosum consists of solitary cells, or groups of cells connected to each other by their cell walls or by a common layer of mucilage. The cells are typically 11–18 µm in diameter, spherical to flask-shaped, and has a long bristle which is surrounded by a prominent tube or sheath at the base. Each cell contains one or two parietal, plate-like chloroplast. 19fa598a3a

Magnesium in biology from the cell is not known. What is called ATP is often actually Mg-ATP. It is an essential mineral nutrient (i. Likewise, the light-regulated Mg^{2+} concentration changes in chloroplasts are not fully understood, but do require the transport Magnesium is an essential element in biological systems. , element) for life and is present in every cell type in every organism. e. As such, magnesium plays a role in the stability of all polyphosphate compounds in the cells, including those associated with the synthesis of DNA and RNA. For example, adenosine triphosphate (ATP), the main source of energy in cells, must bind to a magnesium ion in order to be biologically active. Magnesium occurs typically as the Mg^{2+} ion 19fa598a3a

Chloroplasts are highly dynamic - they circulate and are moved around within cells. Their behavior is strongly influenced by environmental factors, such as light color and intensity. Chloroplasts cannot be made anew by the plant cell and must be inherited by each daughter cell during cell division, which is thought to be inherited from their ancestor—an ancient photosynthetic cyanobacterium that was engulfed by an early eukaryotic cell. 19fa598a3a

Cytoplasmic streaming It is likely that its function is, at least in part, to speed up the transport of molecules and organelles around the cell. It is usually observed in large and complex plant and animal cells, as well as amebae, fungi and slime molds. cytoplasmic particles do cross the

indifferent zones even if the chloroplasts at the surface do not. 1 mm. Particles, as they rise in the cell, spiral around Cytoplasmic streaming, also called protoplasmic streaming and cyclosis, is the flow of the cytoplasm inside the cell, driven by forces from the cytoskeleton. In smaller cells, the diffusion of molecules is more rapid, but diffusion slows as the size of the cell increases, so larger cells may need cytoplasmic streaming for efficient function. It is seen in cells greater than approximately 0 19fa598a3a

This reaction was first discovered by Melvin Calvin, Andrew Benson and James Bassham in 1950. C3 carbon fixation occurs in all plants as the first step of the Calvin–Benson cycle. (In C4 and CAM plants, carbon dioxide is drawn out of malate and into this reaction rather than directly from the air.) 19fa598a3a Currently, the majority of transplastomic plants are a result of chloroplast manipulation due to poor expression in other plastids. However, the technique has been successfully applied to the chromoplasts of tomatoes. 19fa598a3a

Transplastomic plant Currently, the majority of transplastomic plants are a result of chloroplast manipulation A transplastomic plant is a genetically modified plant in which genes are inactivated, modified or new foreign genes are inserted into the DNA of plastids like the chloroplast instead of nuclear DNA. into the DNA of plastids like the chloroplast instead of nuclear DNA 19fa598a3a

C3 carbon fixation Cucurbita maxima malate synthase into the chloroplast of tobacco (a C3 model organism). These enzymes, plus the chloroplast's own, create a catabolic cycle: C3 carbon fixation is the most common of three metabolic pathways for carbon fixation in photosynthesis, the other two being C4 and CAM. This process converts carbon dioxide and ribulose bisphosphate (RuBP, a 5-carbon sugar) into two molecules of 3-phosphoglycerate through the following reaction: 19fa598a3a

The green alga genus Chara possesses some very large cells, up to 10 cm in length, and cytoplasmic streaming has been studied in these large cells. 19fa598a3a Among the many lines of evidence supporting symbiogenesis are that mitochondria and plastids contain their own chromosomes and reproduce by splitting in two, parallel but separate from the sexual... 19fa598a3a In prokaryotes, nonviral extrachromosomal DNA is primarily found in plasmids, whereas, in eukaryotes extrachromosomal DNA is primarily found in organelles. Mitochondrial DNA is a main source of this extrachromosomal DNA in eukaryotes. The fact that this organelle contains its own DNA supports the hypothesis that mitochondria originated as bacterial cells engulfed by ancestral eukaryotic cells. Extrachromosomal DNA is often used in research into replication because it is easy to identify and isolate. 19fa598a3a

Extrachromosomal DNA Multiple forms of extrachromosomal DNA exist, and, while some of these serve important biological functions, they can also play a role in diseases such as cancer. "Motif analysis unveils the possible co-regulation of chloroplast genes and nuclear genes encoding chloroplast proteins". Plant Molecular Biology Extrachromosomal DNA (abbreviated ecDNA) is any DNA that is found off the chromosomes, either inside or outside the nucleus of a cell. 2012). Most DNA in an individual genome is found in chromosomes contained in the nucleus 19fa598a3a

Chloroplasts in plants are thought to have originated from an engulfing event of a photosynthetic bacteria (cyanobacterial ancestor) by a eukaryote. There are many advantages to chloroplast DNA manipulation because of its bacterial origin. For example, the ability to introduce multiple genes (operons) in a single step instead of many steps and the simultaneous expression of many genes with its bacterial gene expression system. Other advantages include the ability to obtain organic products like proteins at a high concentration and the fact that production of these products will not be affected by epigenetic regulation. 19fa598a3a The idea that chloroplasts were originally independent organisms that merged into a symbiotic relationship with other one-celled organisms dates back to the 19th century, when it was espoused by researchers such as Andreas Schimper. The endosymbiotic theory was articulated in 1905 and 1910 by the Russian botanist Konstantin Mereschkowski, and advanced and substantiated with microbiological evidence by Lynn Margulis in 1967. 19fa598a3a

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