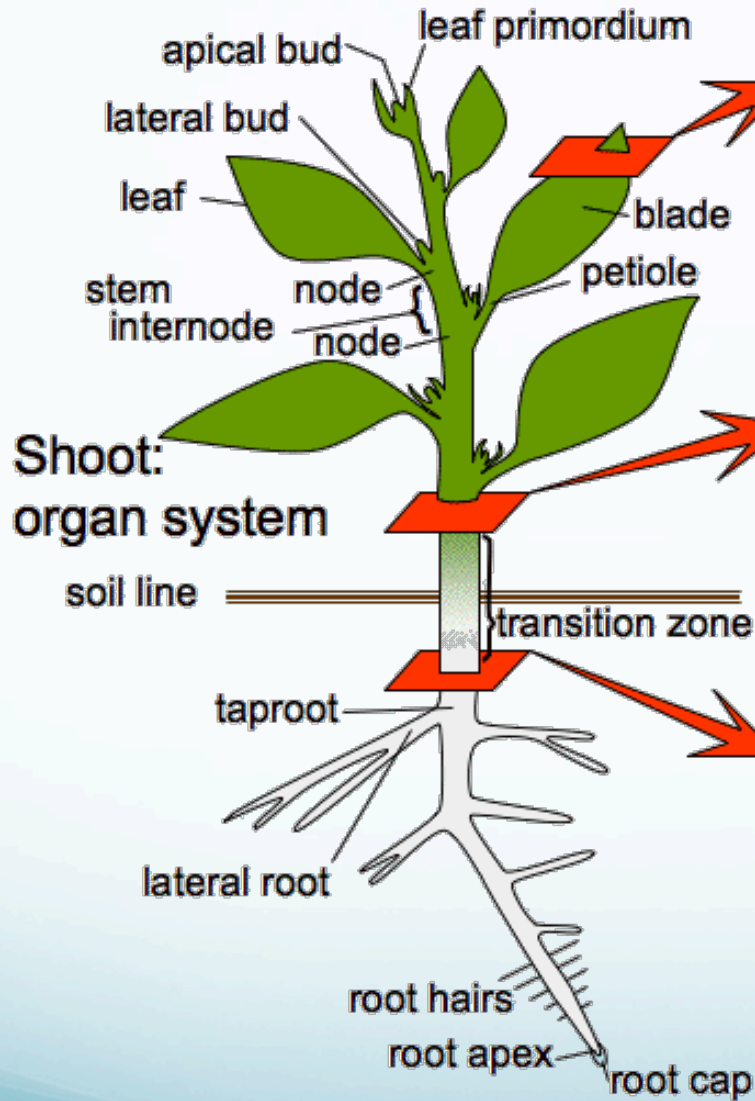


Photosynthesis & Plants

The most distinctive characteristic of plants is their ability to convert the energy of the Sun into chemical energy stored in sugar molecules. Plants do this inside a part of the plant cell called a chloroplast.

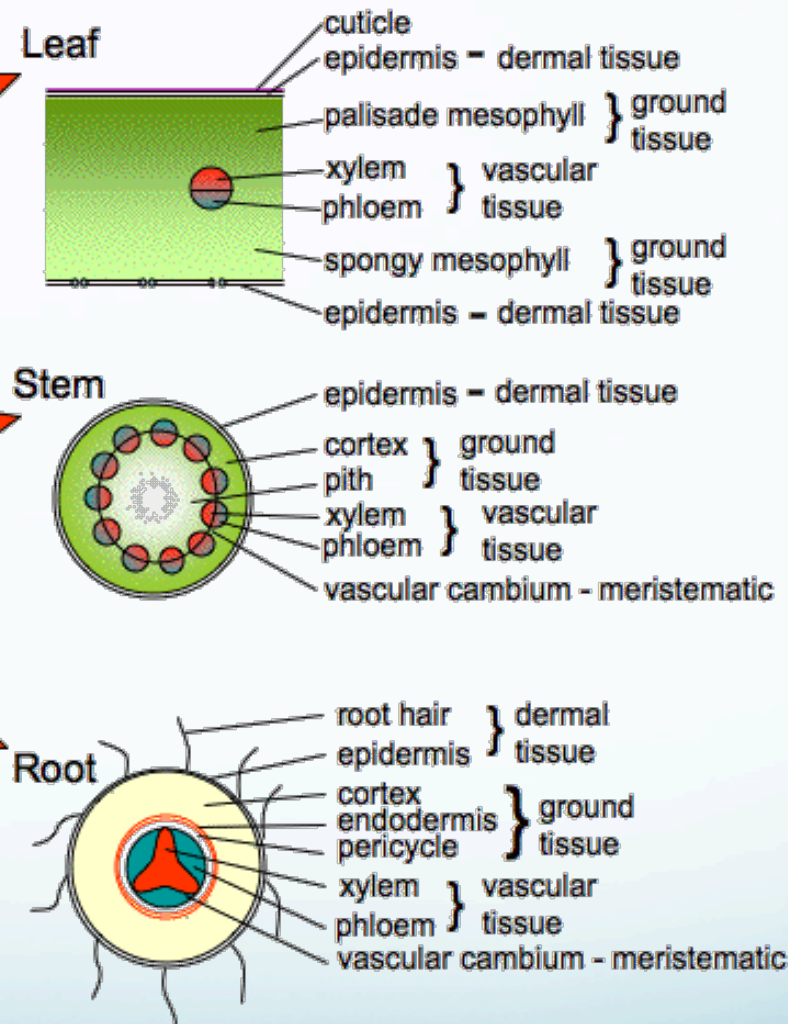
The most common sugar on Earth is glucose. Plants make glucose in different forms. The most common form of glucose is a polymer of glucose called cellulose.

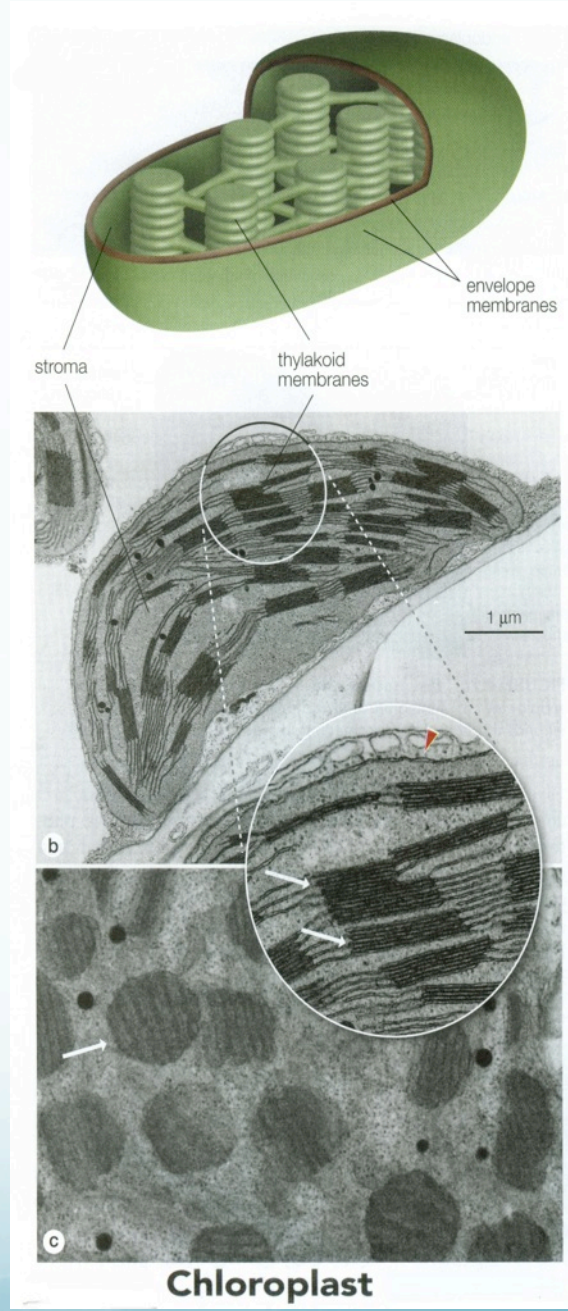
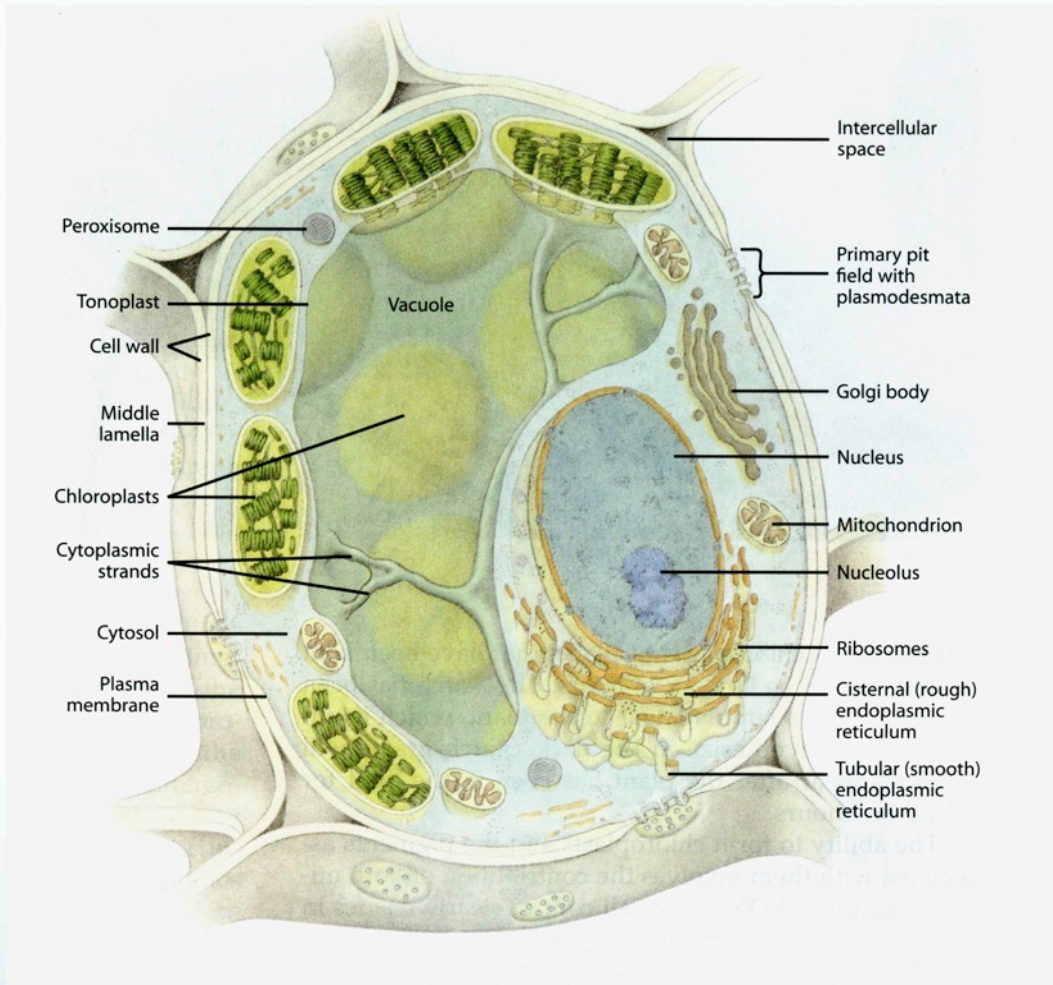
Plant



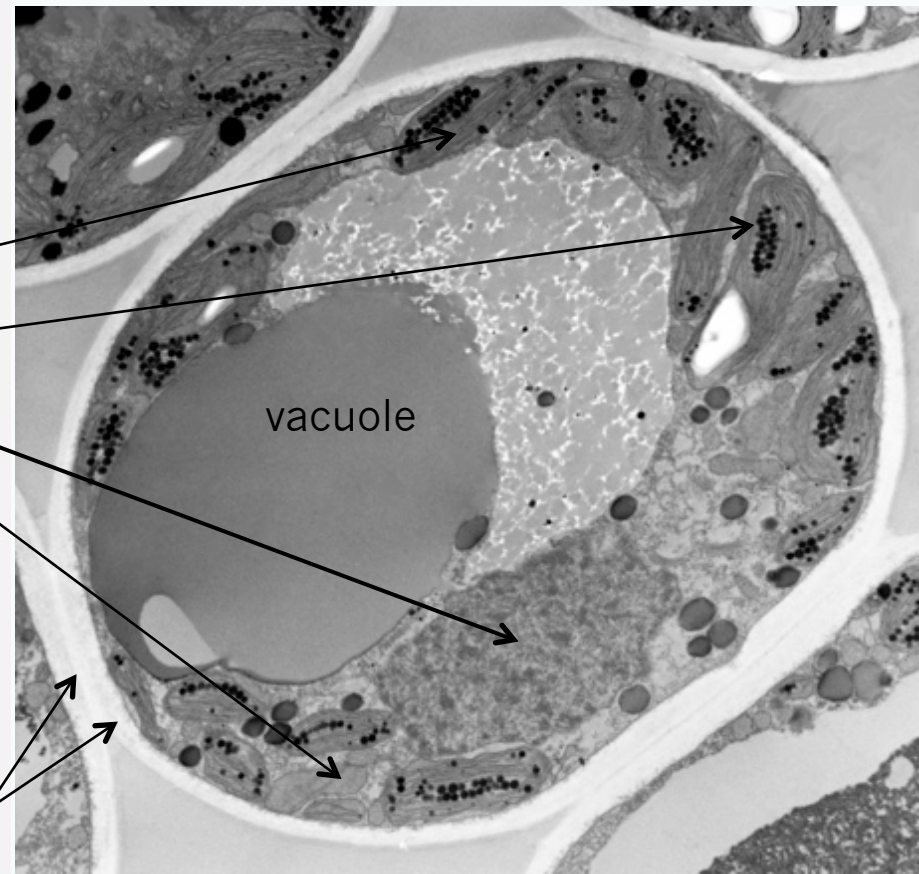
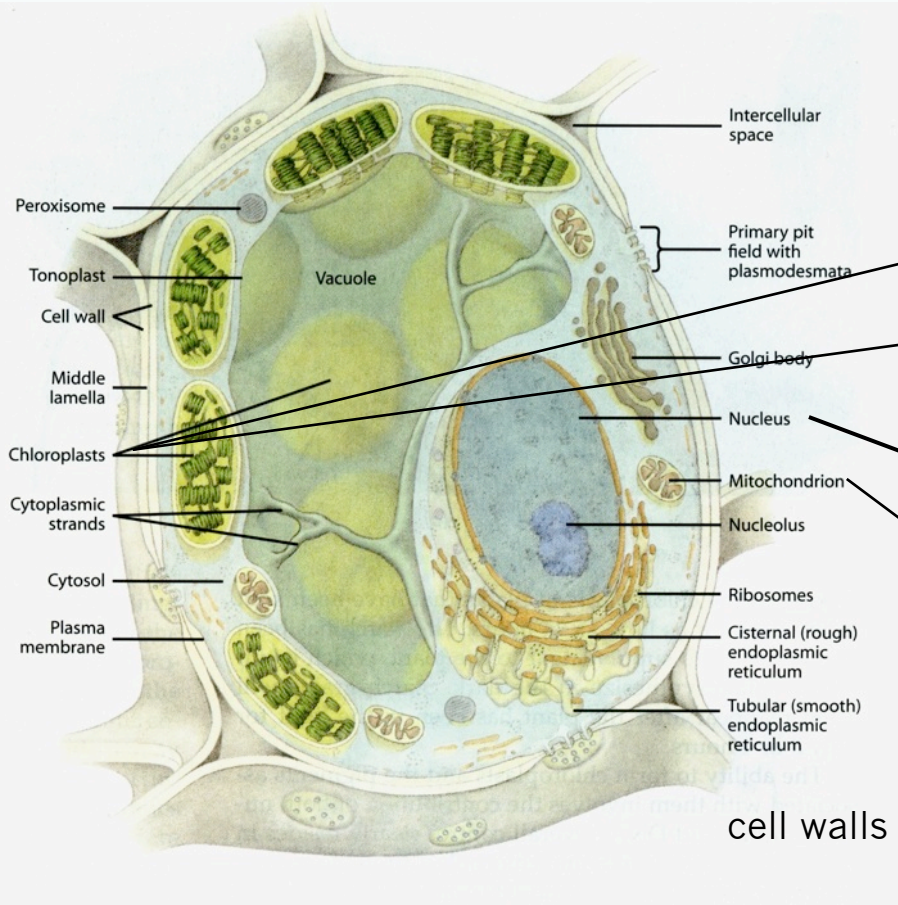
Plant Organs

Plant Tissues





The most distinctive part of a plant cell is the chloroplast because it is here where photosynthesis occurs.



- PHOTOSYNTHESIS → The Sun's energy shines down on a plant leaf. In the plant leaf, there are photosynthetic cells that contain chloroplasts which have evolved from photosynthetic bacteria,. The chloroplasts have pigments that capture the electromagnetic energy of the photons of visible light. This energy drives a series of complex chemical reactions called photosynthesis in the chloroplast that combine carbon dioxide in the air and water from the ground to form sugar molecules called glucose. The photosynthetic reactions release oxygen molecules that escape through pores in the leaves into the air.

Carbon Cycle - Photosynthesis



carbon
dioxide

water

sun

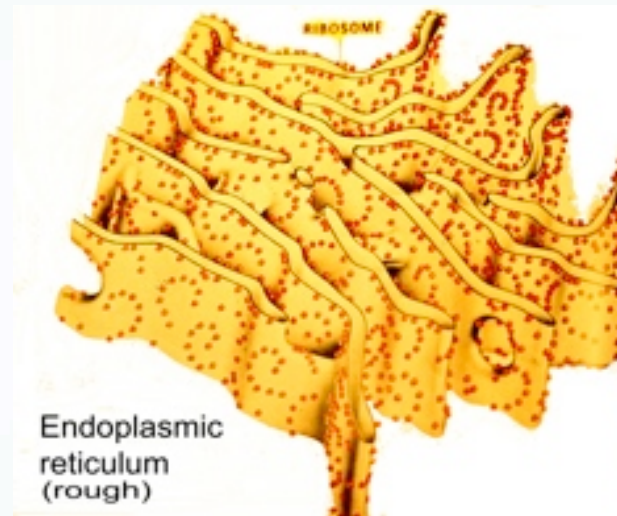
glucose

oxygen

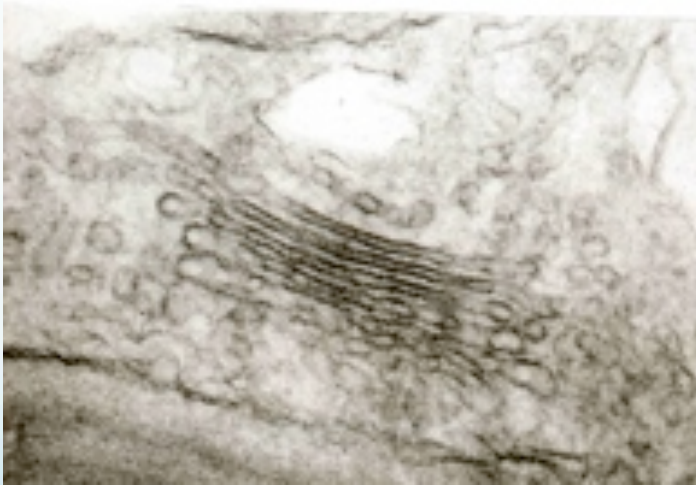
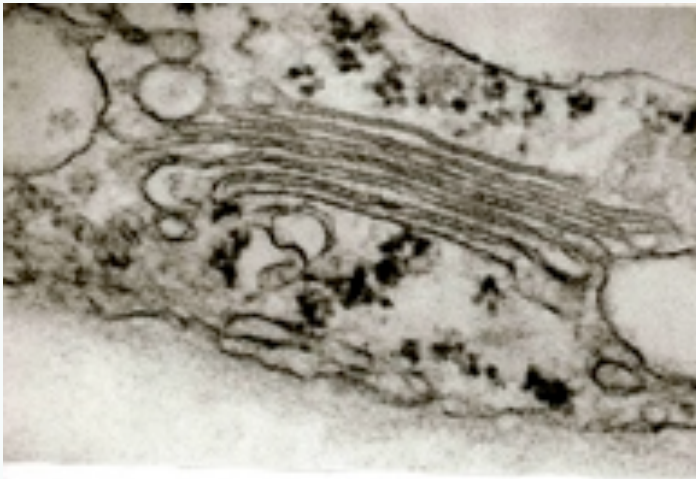
represents
any organic
matter in
plants

NRG USAGE

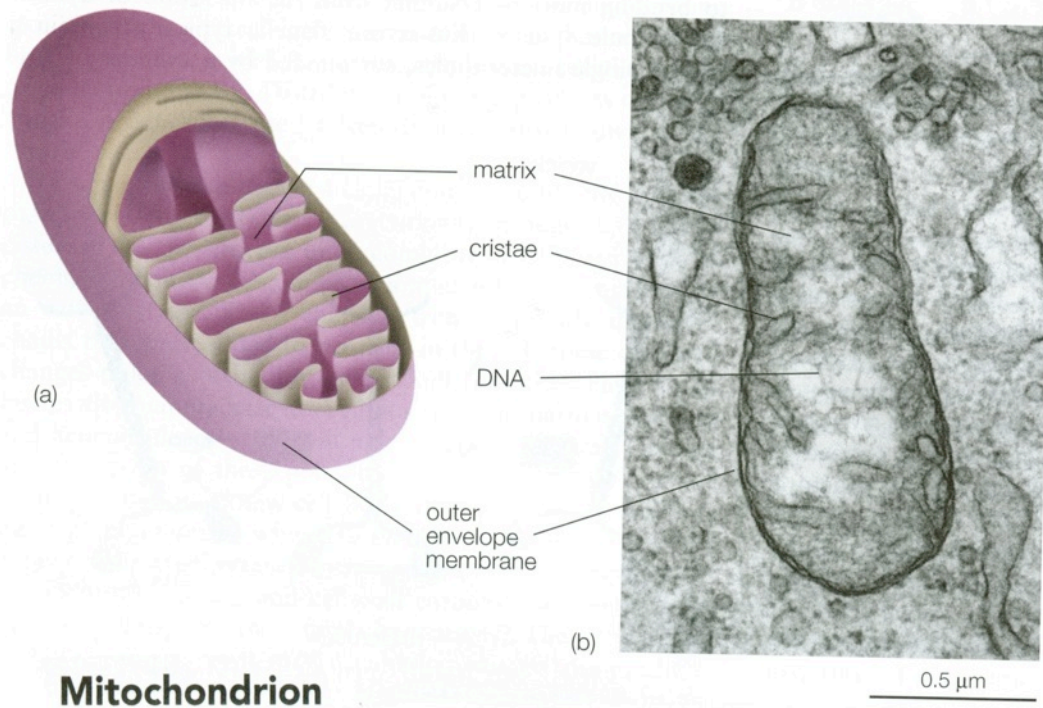
- The glucose sugar molecules ($C_6H_{12}O_6$) are transported to the mitochondria where another set of complex chemical reactions directed by enzymes convert the chemical energy from the sugar into an easily usable form of energy called adenosine triphosphate (ATP). During this conversion, carbon dioxide is released from the mitochondria. ATP is the most common form of easily accessed energy in any animal or plant cell and is the quick energy source to drive most chemical reactions that need energy in a cell. The ATP is transported to the nucleus and is used to copy DNA into a recipe for a protein called messenger RNA (mRNA). The mRNA is transported out of the nucleus through nuclear pores in the nuclear membrane and joins with ribosomes on the rough endoplasmic reticulum (RER). The ribosomes use the mRNA as a recipe to join (polymerize) amino acids into a chain. This chain of amino acids is a protein. As the protein is made, it is transported into the RER. A small vesicle of RER with protein inside will break away and be transported to a stack of membranes called the golgi. The vesicle will join with the golgi. The protein that is now in the golgi will often have sugars added to it (this sugar-protein is called a glycoprotein ...glycol is the prefix for sugar) and be packed into another vesicle which is transported to the cell membrane. The vesicle will fuse with cell membrane and the glycoprotein will either become part of the cell membrane or be released from the cell to be used somewhere else in the organism. This is how the protein called insulin is made.



Besides making sugar in the chloroplast, a plant cell needs to make proteins called enzymes that direct the functions of how the cell will do everything. For examples, enzymes allow photosynthesis to occur and allow mitochondria to make energy. Most chemical reactions in a cell are regulated by enzymes. The cell makes enzymes in the RER. The recipes for all cellular proteins are in the DNA. We call them genes. The genes are written in a molecule called DNA. DNA is protected in the nucleus. When a cell needs to make proteins it will copy the recipe of the DNA into a photocopy called messenger RNA (mRNA). The mRNA is transported out of the nucleus through nuclear pores in the nuclear membrane and joins with ribosomes on the rough endoplasmic reticulum (RER). The ribosomes use the mRNA as a recipe to join (polymerize) amino acids into a chain. This chain of amino acids is a protein. As the protein is made, it is transported into the RER. A small vesicle of RER with protein inside will break away and be transported to a stack of membranes called the golgi.



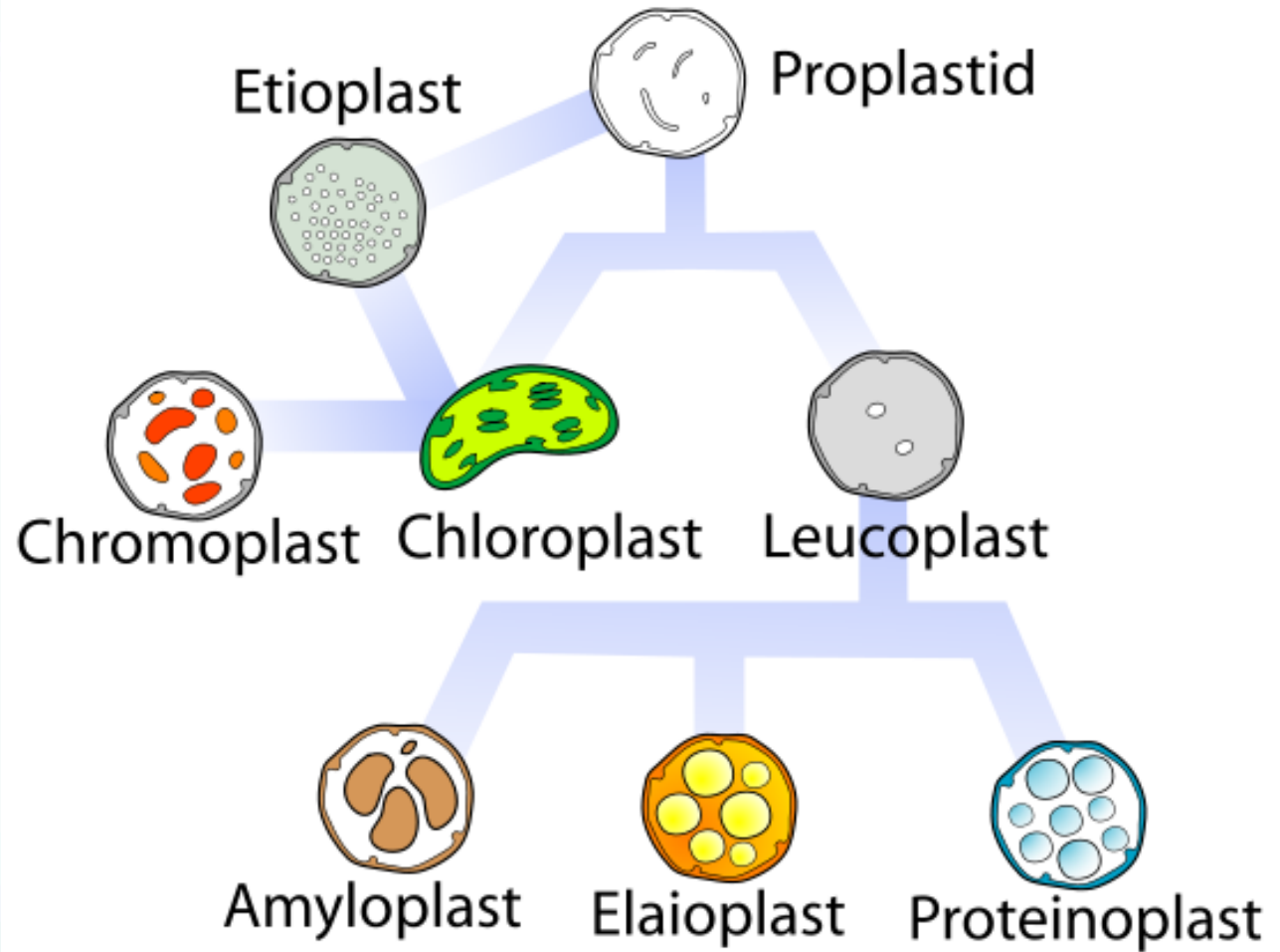
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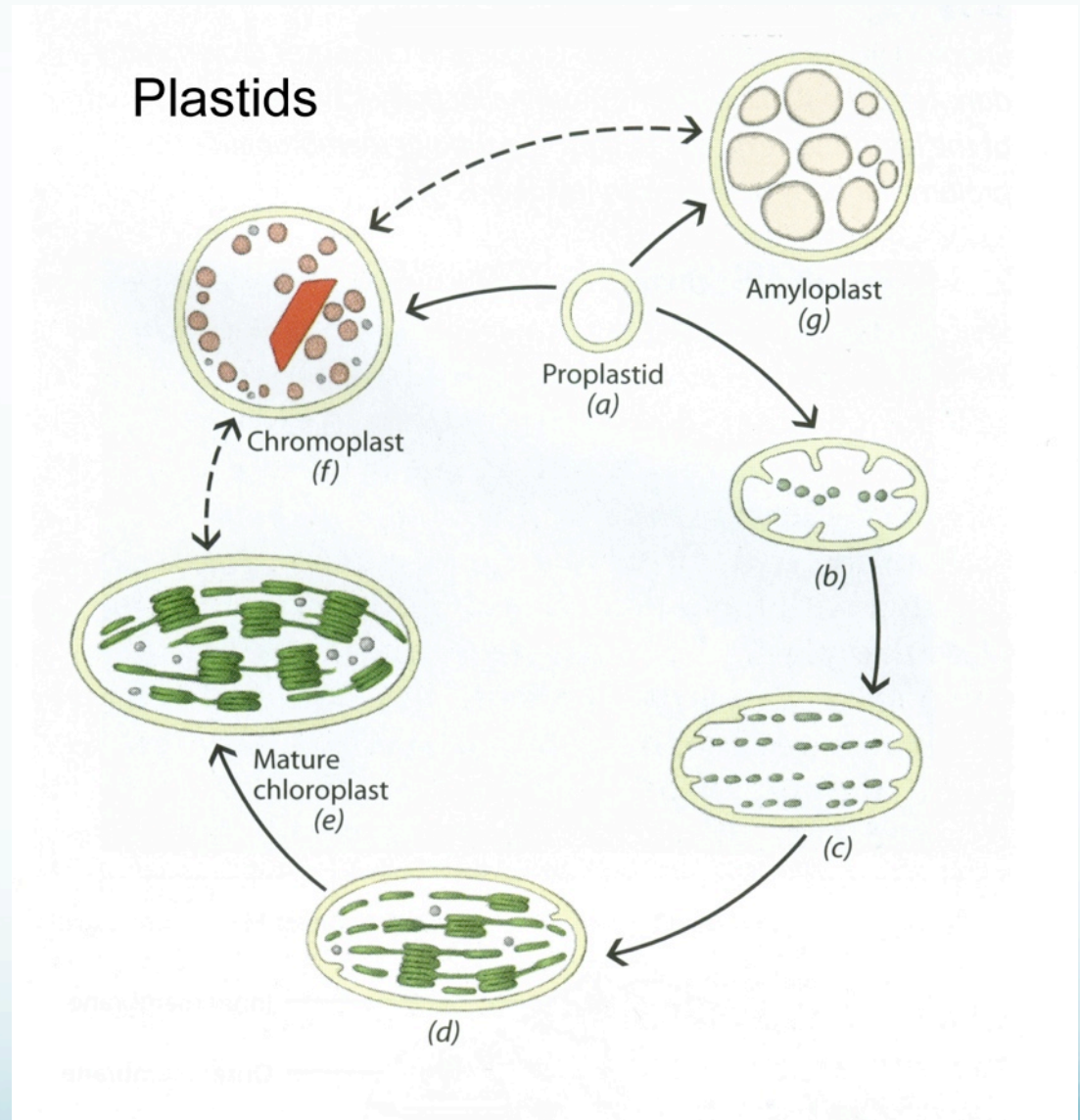
Mitochondria are sometimes described as "cellular power plants" because they generate most of the cell's supply of adenosine triphosphate (ATP), used as a source of chemical energy. In addition to supplying cellular energy, mitochondria are involved in other tasks such as signaling, cellular differentiation, cell death, as well as the control of the cell cycle and cell growth. Mitochondria have been implicated in several human diseases, including mitochondrial disorders and cardiac dysfunction, and may play a role in the aging process. The word mitochondrion comes from the Greek $\mu\iota\tau\omicron\varsigma$ mitos, thread, + $\chi\omicron\nu\delta\rho\iota\omicron\nu$ chondrion, granule.

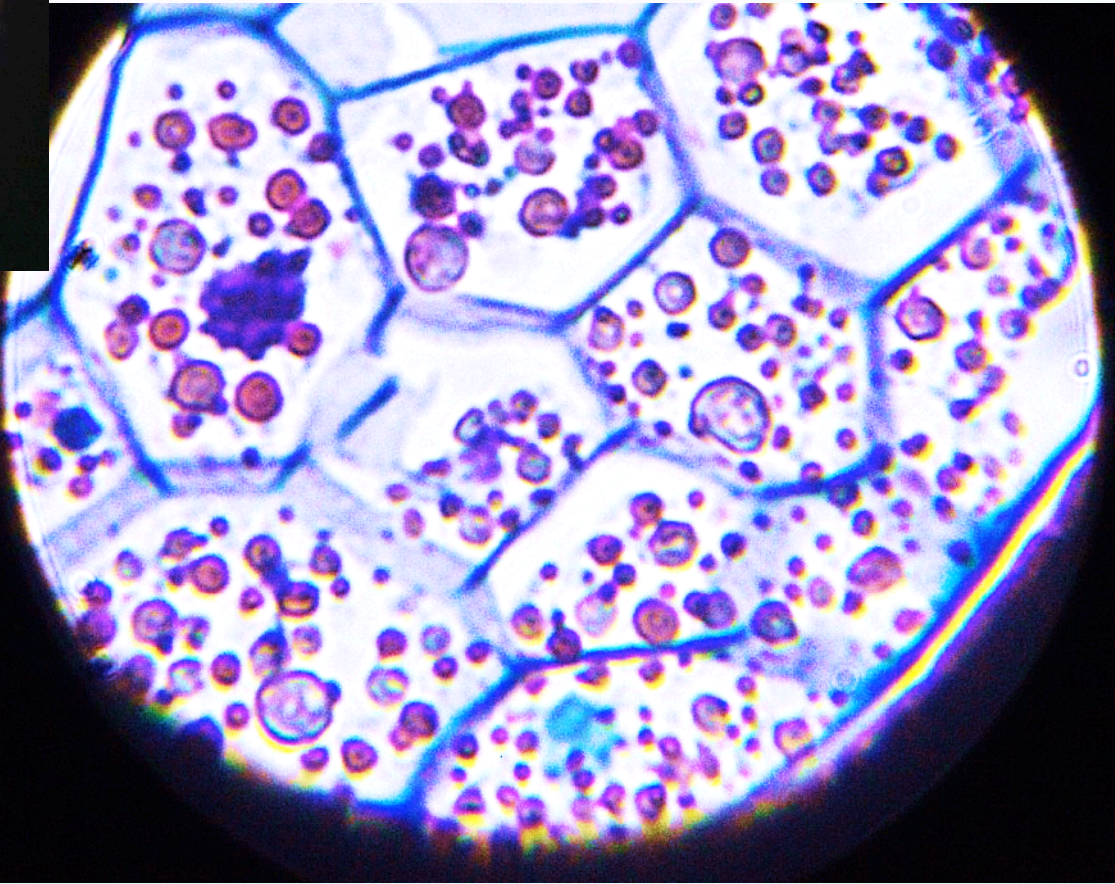
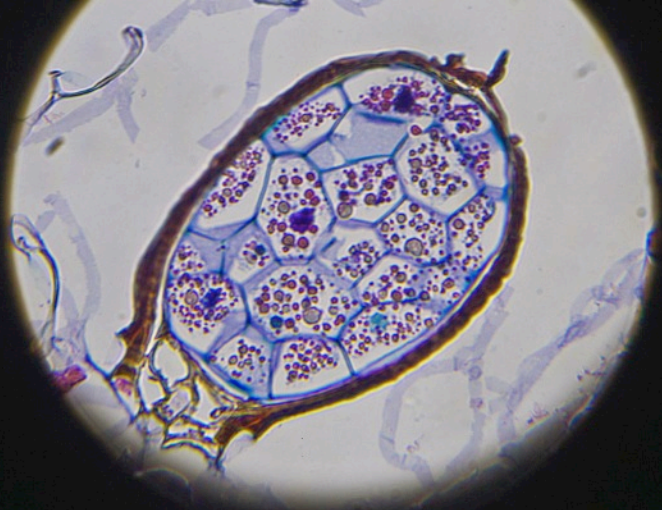
Plastids

Plastids are major organelles found in the cells of plants and algae. They are the site of manufacture and storage of important chemical compounds used by the cell. Plastids often contain pigments used in photosynthesis, and the types of pigments present can change or determine the cell's color. They have their own chromosomes, which is circular, like that of bacteria.



Plastids are a large group of organelles that can function in photosynthesis, store starch, or form pigments to give petals their color. The most notable plastid is the chloroplast.





In the embryo of a lady's slipper seed we find leucoplasts. These plastids possibly contain starch and maybe lipids to provide the embryo with some nutrition since orchid seeds lack endosperm. If you remember, endosperm is the 3N nutritive substance formed after the double fertilization of the ovary by the 2 pollen nuclei.

Some of these leucoplasts will develop into chloroplasts