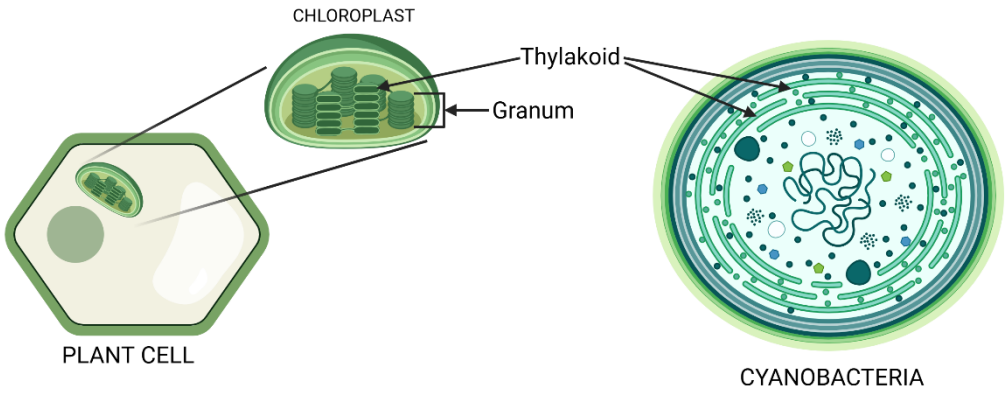
Thylakoid

(Carlos Azogue Palma & José Manuel Borrero-de Acuña)



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What function does it serve?
Thylakoids act as small motors in photosynthetic organisms to produce the energy necessary for cells to fulfill vital functions: respiration, reproduction, defense and growth.

What does it look like? How big is it?
The thylakoids look like small, flattened sacs. In the case of cyanobacteria, they are distributed homogeneously throughout the cell, creating membranes. In plants and algae, they are found inside the chloroplasts, grouped together, one on top of the other, forming structures called a 'granum'. The size of the thylakoid can vary depending on the organism, with diameters ranging from 200-400 nanometres.

How does the cell make it?
All photosynthetic cells carry in their genome the information to produce thylakoids, and the pigments and enzymes needed in photosynthesis. On one hand, the cell creates the membranes that will give rise to the thylakoids and, on the other, the proteins and photosynthetic pigments that will later reside in the thylakoid membrane.

How does it work?
Thylakoids contain photosynthetic pigments in their membranes that are responsible for absorbing light energy, and specialized proteins that transform light energy into chemical energy, which is used for all the cellular functions in photosynthetic organisms.

Where is it found? Which organisms?
Thylakoids are found mainly in the chloroplasts of the cells of plants and photosynthetic algae, but also in cyanobacteria. Cyanobacteria, also called blue-green algae, are very versatile organisms given their ability to perform photosynthesis and fix nitrogen, which is why we can find them in

a great diversity of environments, ranging from aquatic environments, soils, in symbiosis, and extreme environments, like thermal springs and geysers, polar areas, and wastewater.

Its importance to the microbe?
Thylakoids are vital structures for cyanobacteria, since they are responsible for obtaining the energy molecules that allow growth and survival. In addition, thylakoids endow the organism with great versatility to grow in diverse environments.

Its importance to us?
During photosynthesis, thylakoids carry out the process of photolysis: the splitting of water into hydrogen, which is combined with carbon dioxide to produce sugars, and oxygen, which is released into the atmosphere for us and all other oxygen-requiring forms of life to breathe. Half of the oxygen produced by photosynthesis is produced by cyanobacteria, so they are verrrrry important to us!

The other part of photosynthesis carried out in thylakoids, the reduction of carbon dioxide by hydrogen formed by photolysis to produce glucose, removes carbon dioxide, which is a greenhouse gas, from the atmosphere. Thylakoids thus play a major role in lowering a key greenhouse gas and hence in countering global warming.

And, finally, the glucose produced in the thylakoids is used to create all the materials cells need to grow, i.e. to create the biomass which is the basis of the food web and hence of virtually all life on the planet, including us. Moreover, some of the biomass produced contributes to improvement of soil health, which is fundamental for our crops.

Thylakoids are indeed mighty powerful nanomachines that power life on the planet!