

Biochemicals, like sugar, enter mitochondria and are broken down into water and carbon dioxide—the reverse of photosynthesis. In the process, ATP is produced. This fascinating way that our Lord Jesus creates ATP—via ATP synthase—has only recently been discovered and is the “hidden treasure” of this issue.

Isn't it wonderful how our Creator tirelessly provides for our every need? We don't need to run to the store to buy batteries to keep our bodies going. We do need to eat healthy food, which God converts into ATP. It is Christ Jesus who has created this means to “energize” us. Without the ATP fashioned by God's loving hands, the organs and tissues of our body would quickly stop working. And so, His Word is again proved true, even on the submicroscopic level.

For in Him we live and move and exist (Acts 17:28a).

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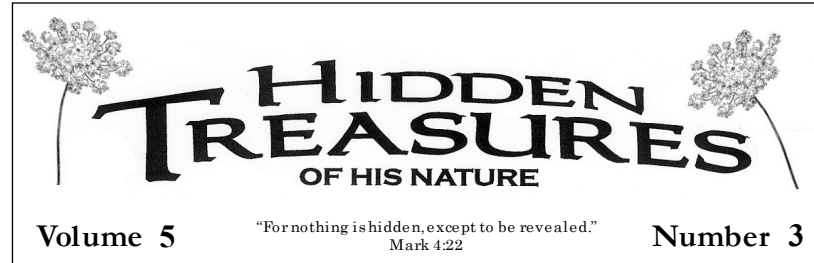
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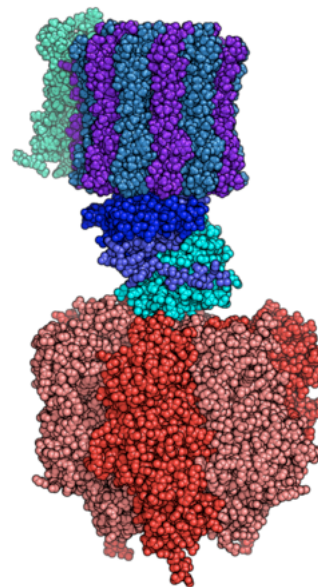
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I will give thanks to You, for I am fearfully and wonderfully made; Wonderful are Your works, And my soul knows it very well. (Psalm 139:14).

The Motor Designed by Christ



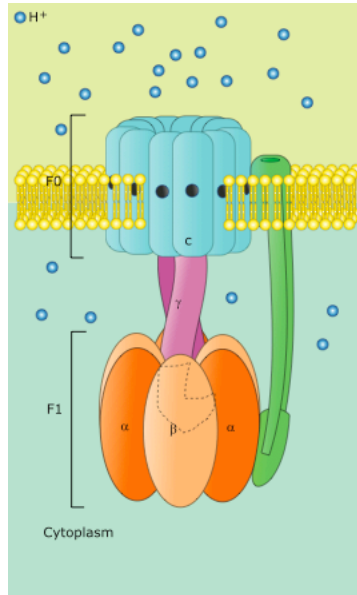
ATP synthase
(the different colored dots represent atoms)

Many modern electronic devices are powered by batteries, but did you know that all living organisms are “battery powered?” The “battery” that drives life is a submicroscopic molecule called adenosine triphosphate, or ATP for short. ATP has been called “the universal energy currency” of life. Every cell in your body needs a constant supply of ATP in order to survive.

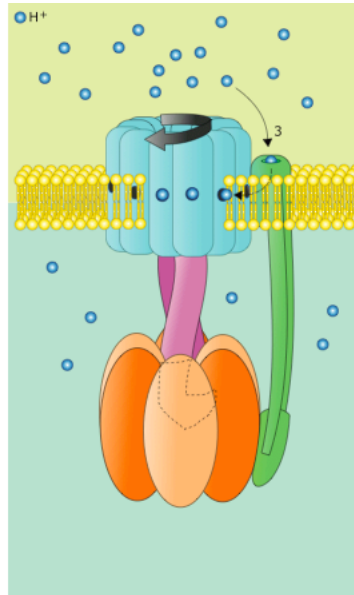
All living cells also possess an enzyme (a special protein) called ATP synthase, which—as the name implies—helps to synthesize ATP.

This is an artist's drawing of ATP synthase. As H^+ ions (the tiny blue balls) move through the molecule, it spins, creating ATP in the process.

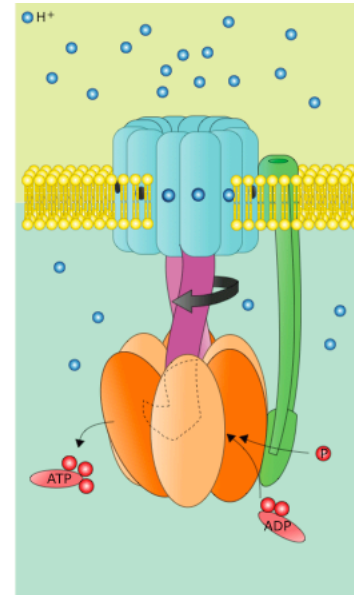
Like an electric motor, ATP synthase is composed of several parts.



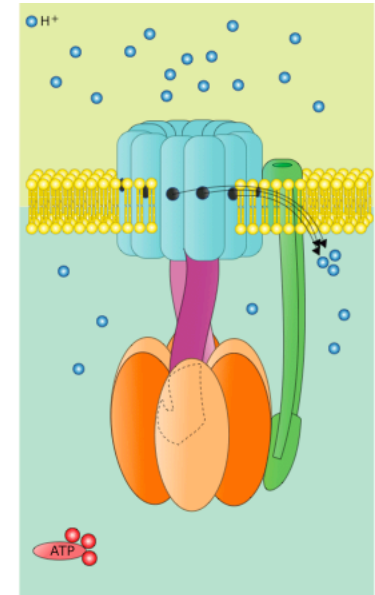
Jesus causes hydrogen ions (H^+) to flow through ATP synthase.



As hydrogen ions pass through the molecule, a portion of it rotates.



In the end, high-energy ATP is produced.



This extremely complex protein molecule (constructed of thousands of atoms) is actually the world's smallest motor!

Instead of electricity, which is a current of negatively charged electrons, ATP synthase is powered by positively charged hydrogen ions or protons. Hydrogen ions pass through the center of the protein, like wind through a wind turbine. As they do, a portion of the ATP synthase molecule spins counterclockwise. It has been discovered that this molecular motor rotates up to 9,000 times per minute (9,000 RPM) or 150 times each second!

One ATP molecule is produced for every four protons that pass through ATP synthase. And unlike manmade motors, which typically operate at 75% efficiency, this

divinely-created, molecule-sized motor is nearly 100% efficient.

The ATP that energizes life is produced by ATP synthase in two places: chloroplasts—the tiny sacs found in the cells of all green plants, and mitochondria—similar tiny sacs found in the cells of both plants and animals.

Green plants take sunlight and convert it into organic molecules, typically starch and sugar. During photosynthesis, ATP is produced in chloroplasts when chlorophyll is activated by light. It is the stored energy within ATP that God uses to make sugar from water and carbon dioxide.

Mitochondria also produce high-energy ATP molecules, but in a process opposite to what happens in chloroplasts.