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Photosynthesis

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Photosynthesis^[α] is a process that converts carbon dioxide into organic compounds, especially sugars, using the energy from sunlight. Photosynthesis occurs in plants, algae, and many species of Bacteria, but not in Archaea. Photosynthetic organisms are called *photoautotrophs*, since it allows them to create their own food. In plants, algae and cyanobacteria photosynthesis uses carbon dioxide and water, releasing oxygen as a waste product. Photosynthesis is vital for life on Earth. As well as maintaining the normal level of oxygen in the atmosphere, nearly all life either depends on it directly as a source of energy, or indirectly as the ultimate source of the energy in their food.[β] The amount of energy trapped by photosynthesis is immense, approximately 100 terawatts: which is about six times larger than the power consumption of human civilization. As well as energy, photosynthesis is also the source of the carbon in all the organic compounds within organisms' bodies. In all, photosynthetic organisms convert around 100,000,000,000 tonnes of carbon into biomass per year.

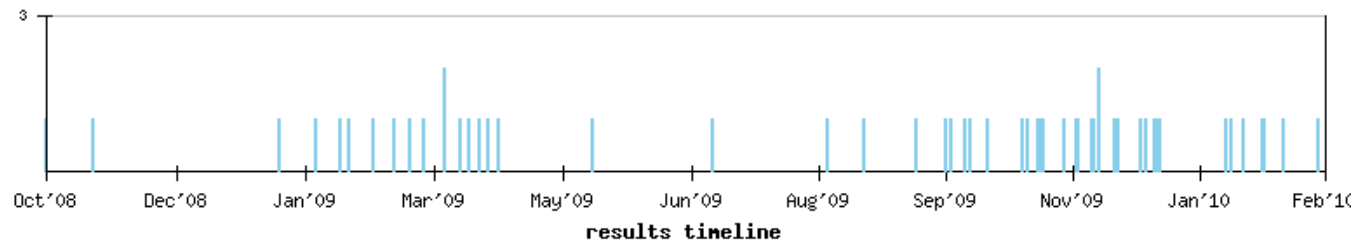
Although photosynthesis can occur in different ways in different species, some features are always the same. For example, the process always begins when energy from light is absorbed by proteins called photosynthetic reaction centers that contain chlorophylls. In plants, these proteins are held inside organelles called chloroplasts, while in bacteria they are embedded in the plasma membrane. Some of the light energy gathered by chlorophylls is stored in the form of adenosine triphosphate (ATP). The rest of the energy is used to remove electrons from a substance such as water. These electrons are then used in the reactions that turn carbon dioxide into organic compounds. In plants, algae and cyanobacteria this is done by a sequence of reactions called the Calvin cycle, but different sets of reactions are found in some bacteria, such as the reverse Krebs cycle in *Chlorobium*. Many photosynthetic organisms have adaptations that concentrate or store carbon dioxide. This helps reduce a wasteful process called photorespiration that can consume part of the sugar produced during photosynthesis.

Photosynthesis evolved early in the evolutionary history of life, when all forms of life on Earth were microorganisms and the atmosphere had much more carbon dioxide. The first photosynthetic organisms probably evolved about 3,500 million years ago, and used hydrogen or hydrogen sulfide as sources of electrons, rather than water. Cyanobacteria appeared later, around 3,000 million years ago, and changed the Earth forever when they began to oxygenate the atmosphere, beginning about 2,400 million years ago. This new atmosphere allowed the evolution of complex life such as protists. Eventually, about 550 million years ago, one of these protists formed a symbiotic relationship with a cyanobacterium, producing the ancestor of the plants and algae. The chloroplasts in modern plants are the descendants of these ancient symbiotic cyanobacteria.

For more information about **Photosynthesis**, read the full article at [Wikipedia](#).

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News tagged with *photosynthesis*

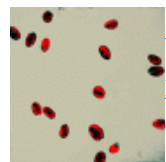


[Photons led astray: Experiment to investigate random motion of quantum particles developed](#)

[Physics](#) / [Quantum Physics](#)

Feb 16, 2010 | 4.6 / 5 (10) | 2 |

Life would sometimes be so much easier if we were quantum particles. For example, if we were trying to find our way out of a strange town allowing chance telling us which way to go at every intersection. As ...



[Scientists find quantum mechanics at work in photosynthesis](#)

[Physics](#) / [Quantum Physics](#)

Feb 03, 2010 | 4.8 / 5 (32) | 50 |

(PhysOrg.com) -- A team of University of Toronto chemists have made a major contribution to the emerging field of quantum biology, observing quantum mechanics at work in photosynthesis in marine algae.

[Green energy management: How plants cope with variable light conditions](#)

[Biology / Plants & Animals](#)

Jan 27, 2010 | not rated yet | 0

Plants use energy derived from sunlight to form sugars from carbon dioxide and water by the process of photosynthesis. Recent discoveries made by a research group at Ludwig-Maximilians-Universitaet in Munich, Germany, provide ...

[Green plant transport mystery solved](#)

[Biology / Cell & Microbiology](#)

Jan 26, 2010 | 4 / 5 (1) | 0

Contrary to prevailing wisdom, a new study from plant biologists at UC Davis shows that proteins of the Hsp70 family do indeed chaperone proteins across the membranes of chloroplasts, just as they do for other cellular structures.

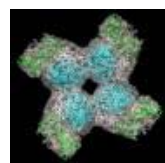


[Urban 'green' spaces may contribute to global warming, study finds](#)

[Space & Earth / Environment](#)

Jan 19, 2010 | 3.8 / 5 (12) | 12

Dispelling the notion that urban "green" spaces help counteract greenhouse gas emissions, new research has found - in Southern California at least - that total emissions might be lower if lawns did not exist.



[Chaperones for climate protection](#)

[Chemistry / Biochemistry](#)

Jan 14, 2010 | 3.5 / 5 (14) | 13

(PhysOrg.com) -- The World Climate Conference recently took place. Reports about carbon dioxide levels, rising temperatures and melting glaciers appear daily. Scientists from the Max Planck Institute (MPI) ...



[Green sea slug makes chlorophyll like a plant](#)

[Biology / Plants & Animals](#)

Jan 12, 2010 | 4.8 / 5 (45) | 10 |

(PhysOrg.com) -- Scientists from the University of South Florida in Tampa have found a green sea slug is able to synthesize chlorophyll like a plant, which makes it the first animal known to be capable of ...



[Scientists get to the root of ancient case of sour grapes](#)

[Biology / Biotechnology](#)

Dec 18, 2009 | 5 / 5 (5) | 0

(PhysOrg.com) -- Scientists in Cambridge have discovered that a lowly grape variety grown by peasants - but despised

by noblemen - during the Middle Ages was the mother of many of today's greatest grape varieties, ...

[Soil Microorganisms? Role Cited as a Missing Factor in Climate Change Equation](#)

[Space & Earth](#) / [Environment](#)

Dec 17, 2009 | 2.9 / 5 (9) | 1

(PhysOrg.com) -- Those seeking to understand and predict climate change can now use an additional tool to calculate carbon dioxide exchanges on land, according to a scientific journal article co-authored by a University of ...



[Toward home-brewed electricity with 'personalized solar energy'](#)

[Technology](#) / [Energy](#)

Dec 16, 2009 | 4.3 / 5 (6) | 1

New scientific discoveries are moving society toward the era of "personalized solar energy," in which the focus of electricity production shifts from huge central generating stations to individuals in their ...

[Newly identified enzymes help plants sense elevated CO2 and could lead to water-wise crops](#)

[Biology](#) / [Cell & Microbiology](#)

Dec 13, 2009 | 5 / 5 (3) | 0

Biologists have identified plant enzymes that may help to engineer plants that take advantage of elevated carbon dioxide to use water more efficiently. The finding could help to engineer crops that take advantage of rising ...

['Extreme' genes shed light on origins of photosynthesis](#)

[Biology](#) / [Cell & Microbiology](#)

Dec 11, 2009 | 5 / 5 (3) | 1

(PhysOrg.com) -- While most school children understand that green plants photosynthesize, absorb carbon dioxide and produce oxygen, few people consider the profound global-scale effects that photosynthesis has had on Earth. ...



[Researchers Identify Key Molecules in Photosynthesis](#)

[Chemistry](#) / [Biochemistry](#)

Dec 02, 2009 | 5 / 5 (9) | 0

(PhysOrg.com) -- Chemistry professor Harry Frank led an international group of researchers that identified the molecules in algae which direct the organisms to convert sunlight into oxygen. The findings may ...

[How did flowering plants evolve to dominate Earth?](#)

[Biology](#) / [Evolution](#)

Dec 01, 2009 | 4.4 / 5 (10) | 1

To Charles Darwin it was an 'abominable mystery' and it is a question which has continued to vex evolutionists to this day: when did flowering plants evolve and how did they come to dominate plant life on earth? Today a study ...



[Rare woodland plant uses 'cryptic coloration' to hide from predators](#)

[Biology](#) / [Plants & Animals](#)

Nov 25, 2009 | 4.5 / 5 (4) | 0

It is well known that some animal species use camouflage to hide from predators. Individuals that are able to blend in to their surroundings and avoid being eaten are able to survive longer, reproduce, and ...

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