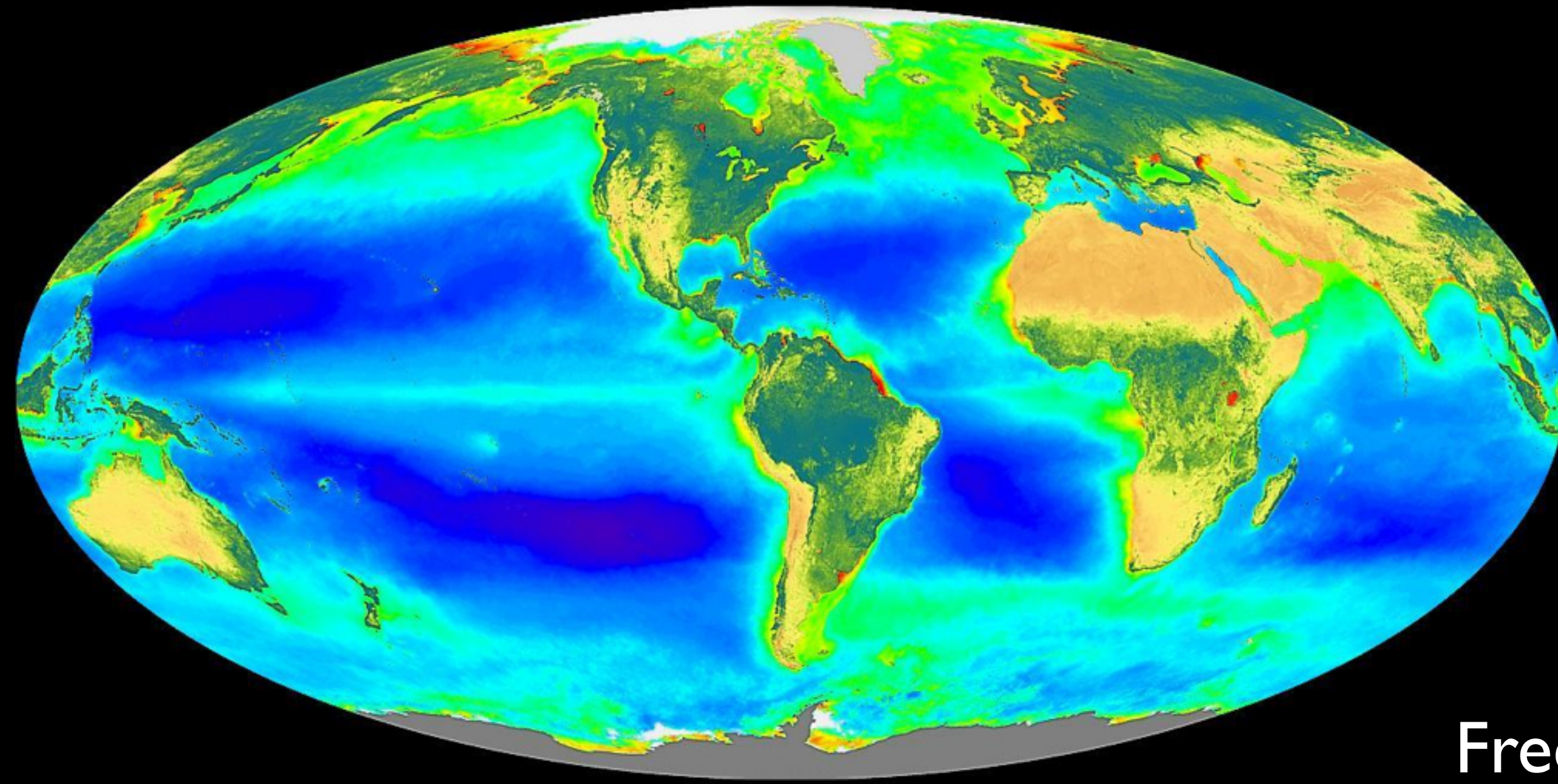


Biology Essentials - 013



>01 .02 .03 .05 .1 .2 .3 .5 1 2 3 5 10 15 20 30 50
Ocean: Chlorophyll *a* Concentration (mg/m³)

Maximum Minimum
Land: Normalized Difference Land Vegetation Index

Free Energy Capture and Storage

Free Energy

Autotrophs

ATP

Heterotrophs

Chemosynthesis

Photosynthesis

Cellular
Respiration

Fermentation

Light Reaction

Calvin Cycle

Evolution

Oxygen

Glycolysis

Krebs Cycle

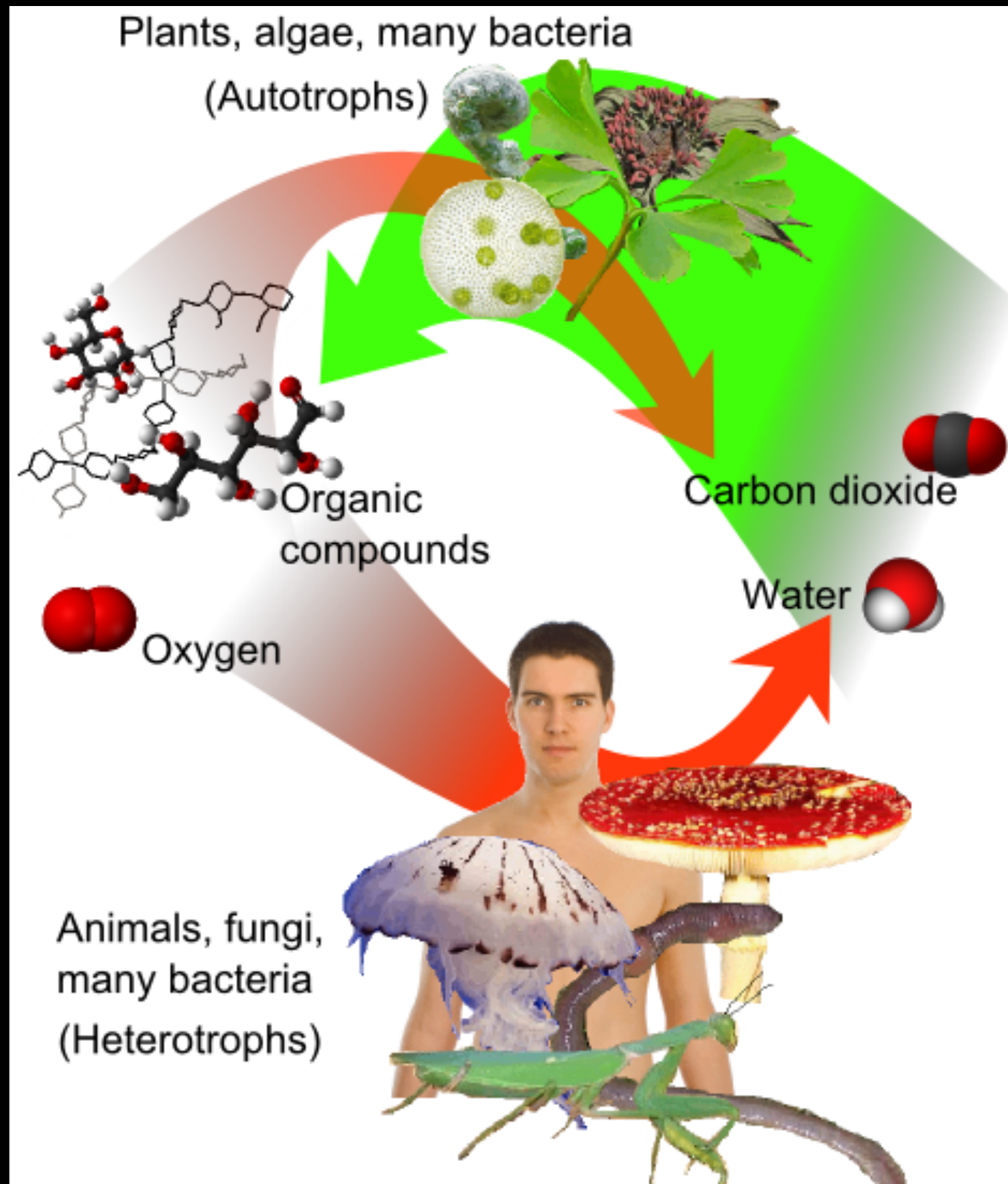
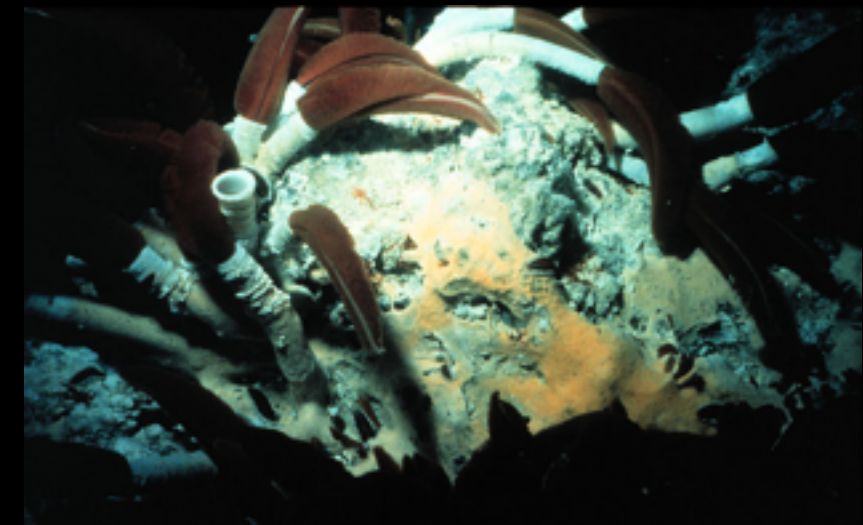
Electron Transport
Chain

Autotrophs

Photosynthesis



Chemosynthesis

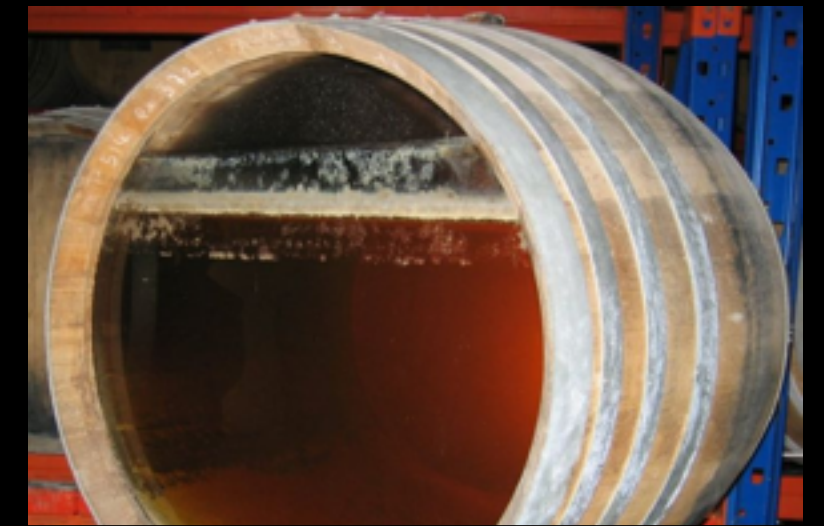


Heterotrophs

Cellular
Respiration

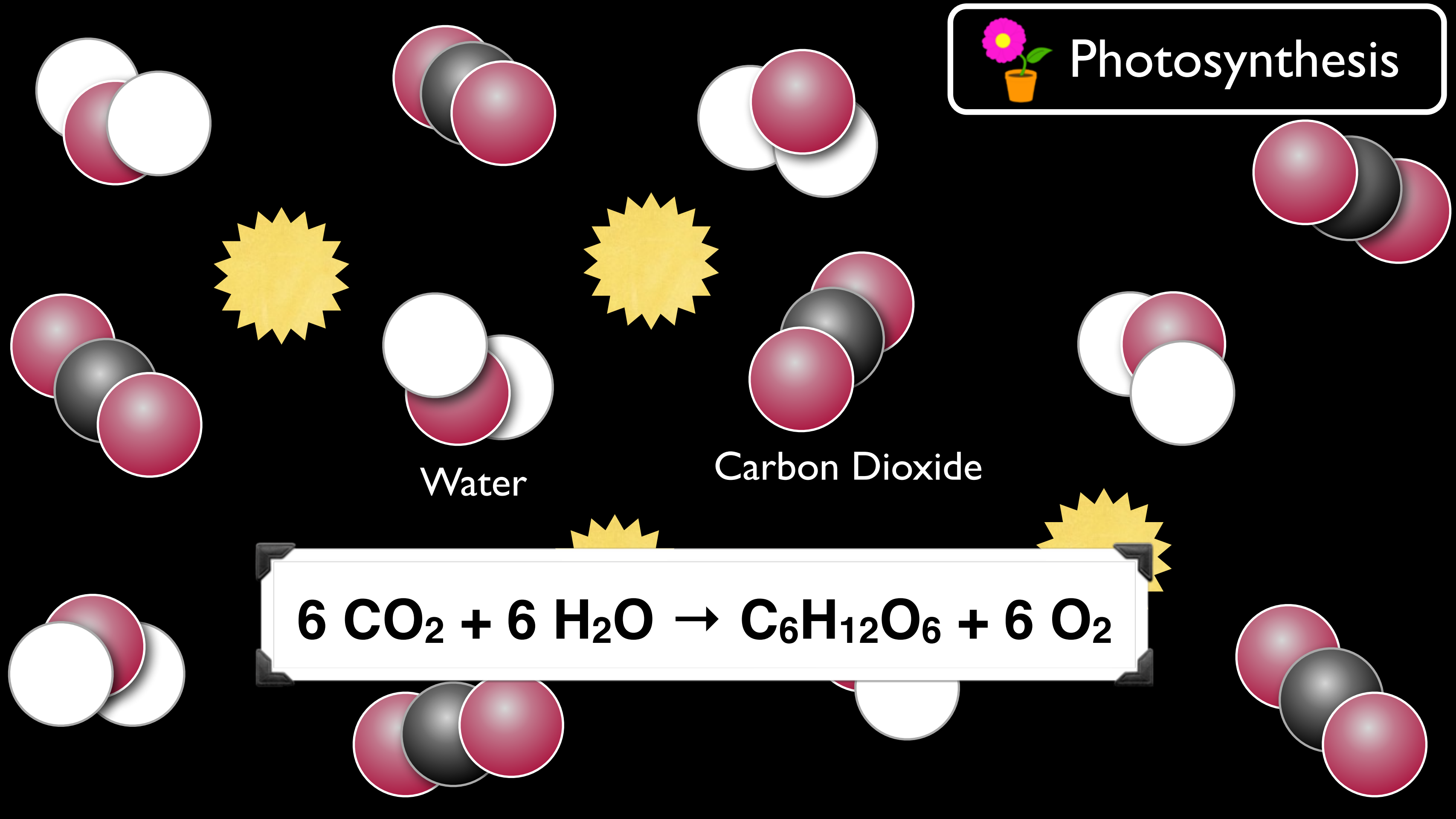


Fermentation



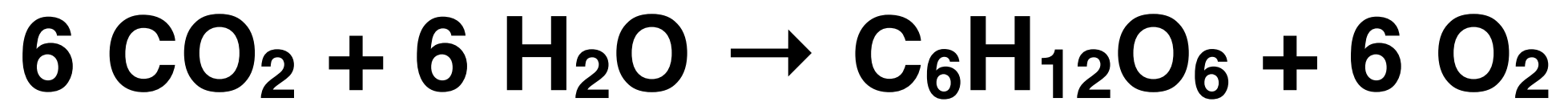


Photosynthesis



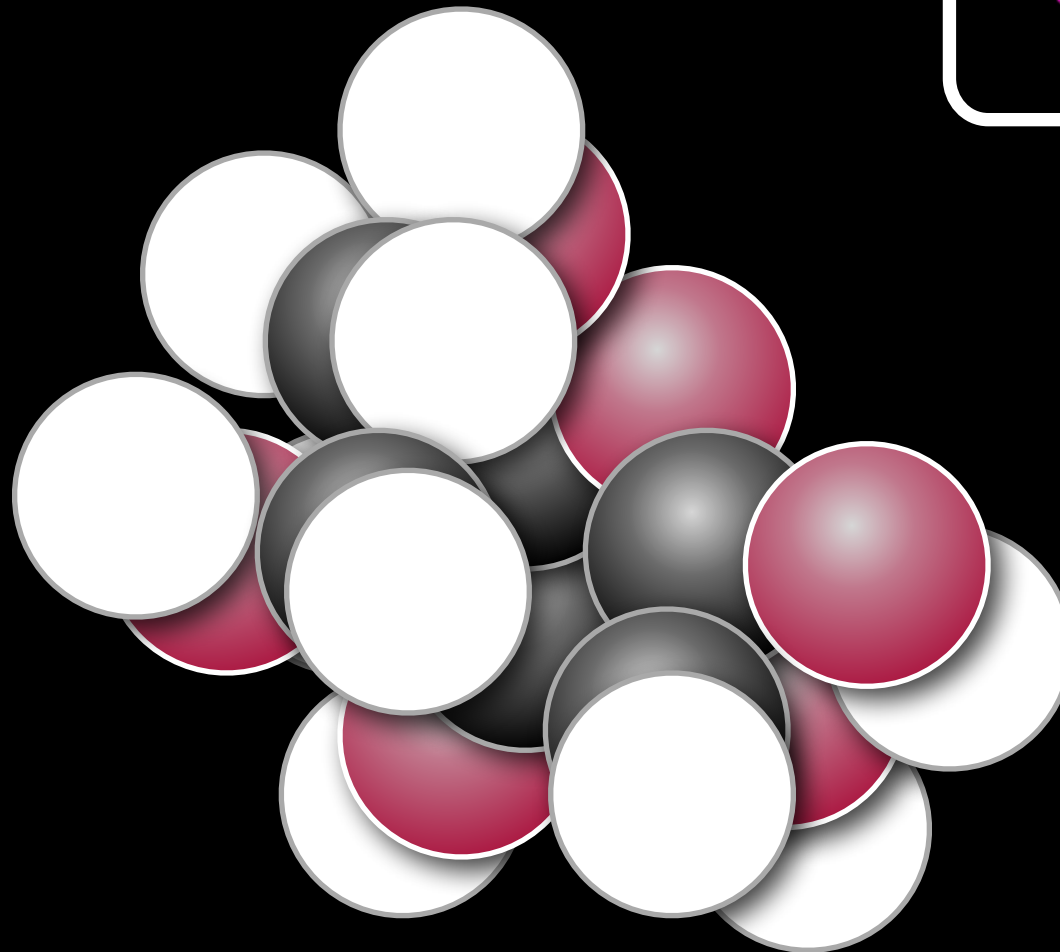
Water

Carbon Dioxide

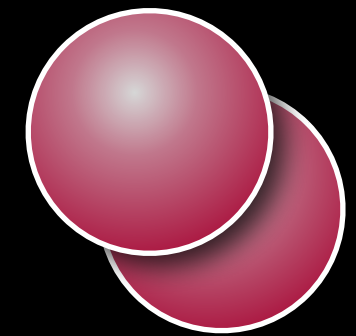




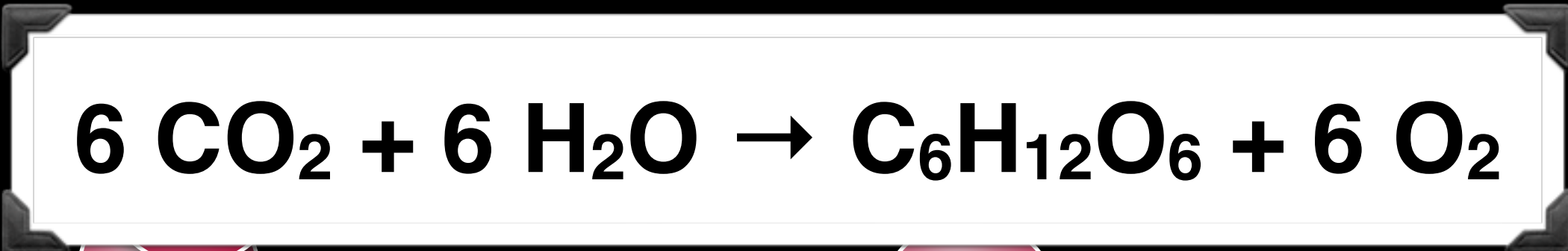
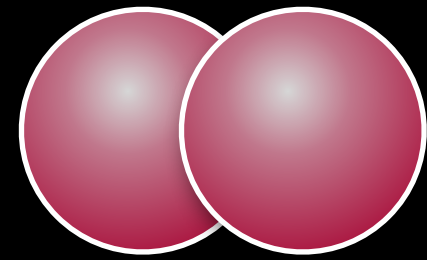
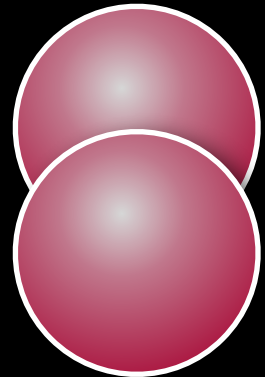
Photosynthesis



Glucose



Oxygen



$\Delta G = 686\text{kcal/mol}$

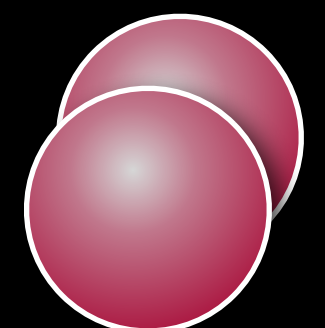
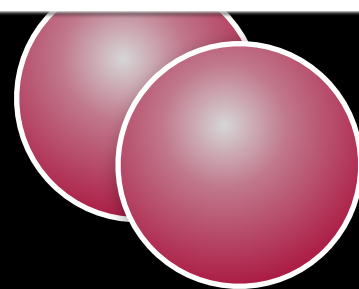
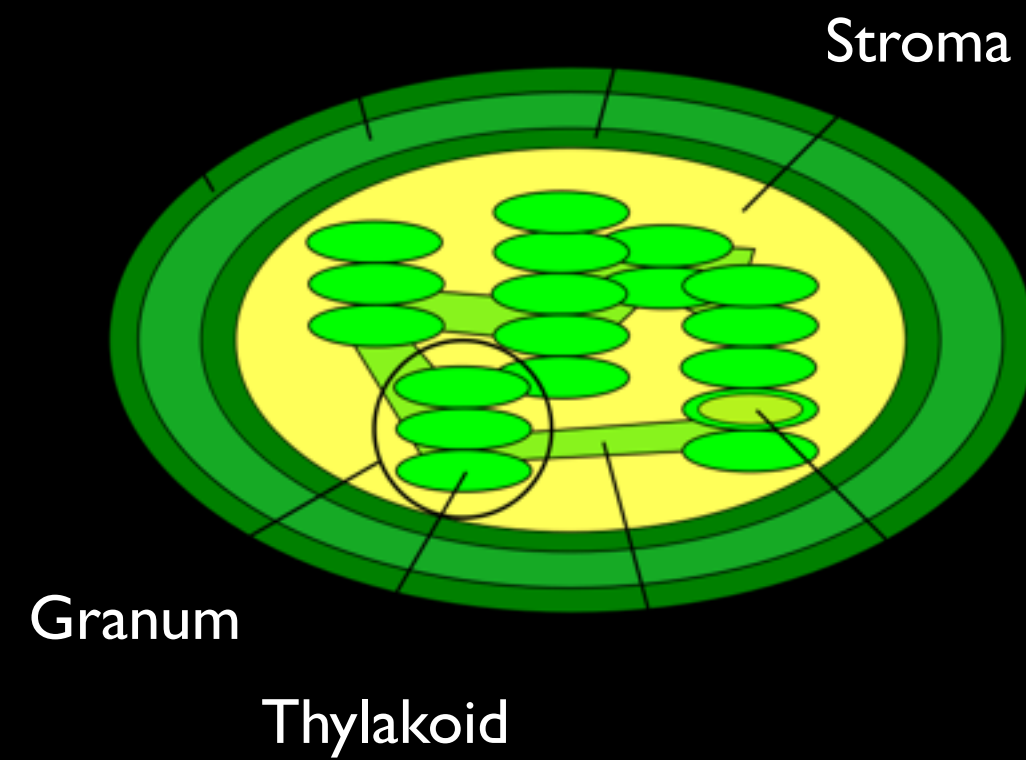
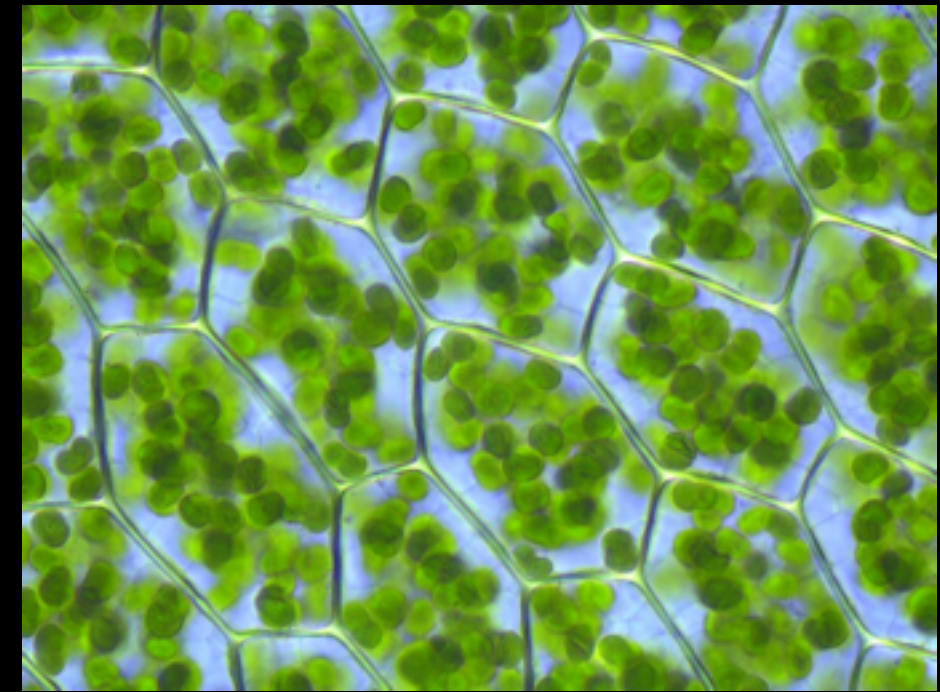
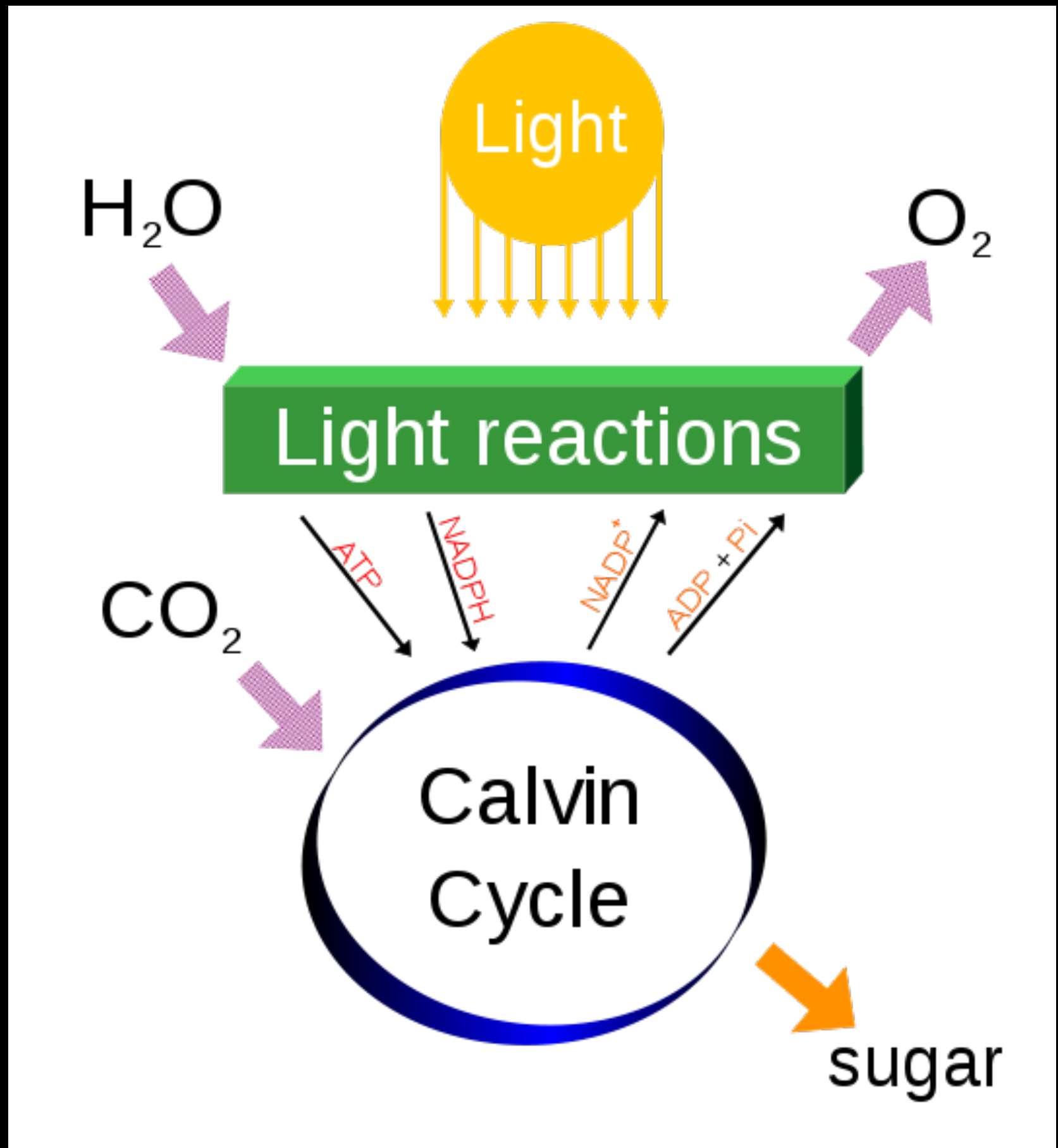
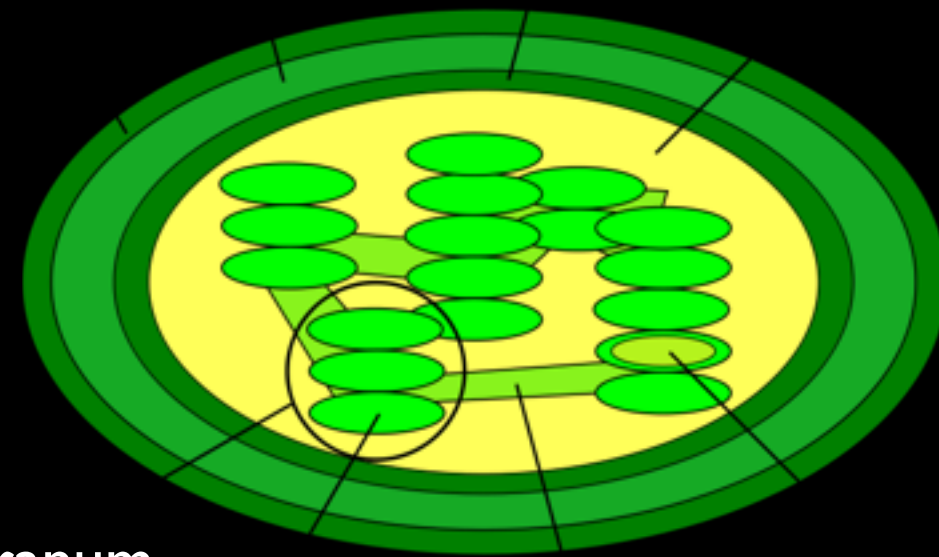
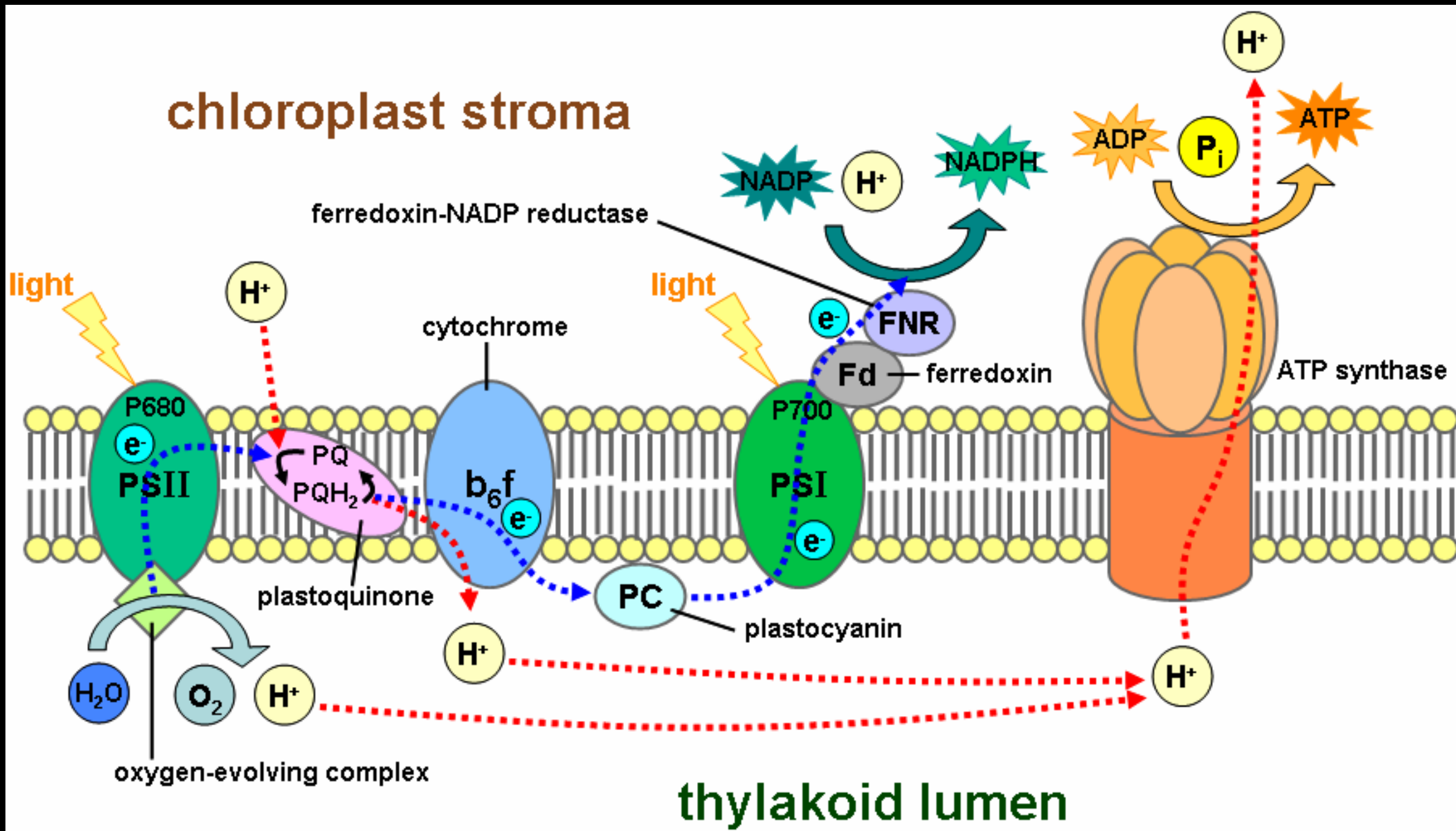


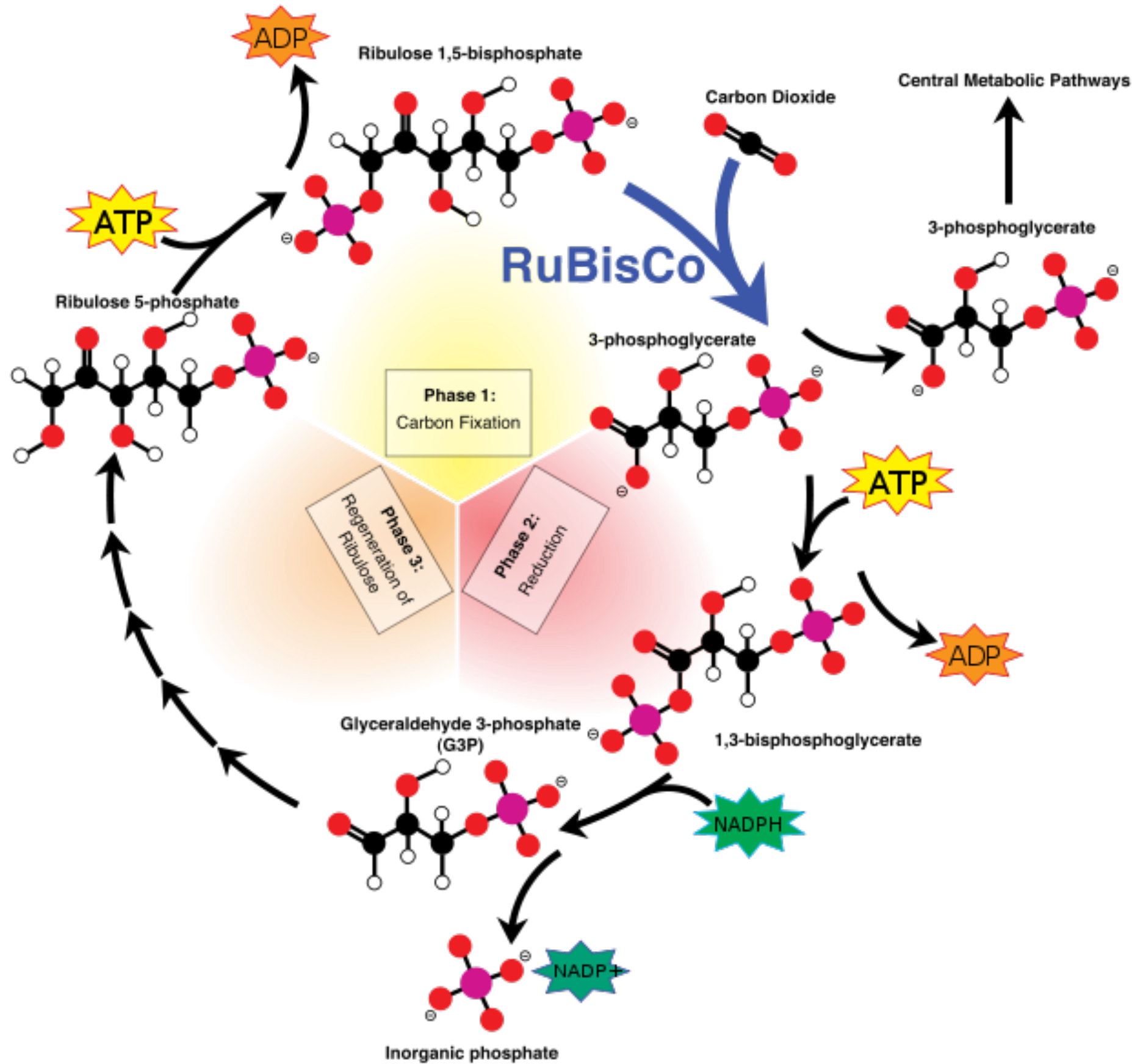
Photo- synthesis



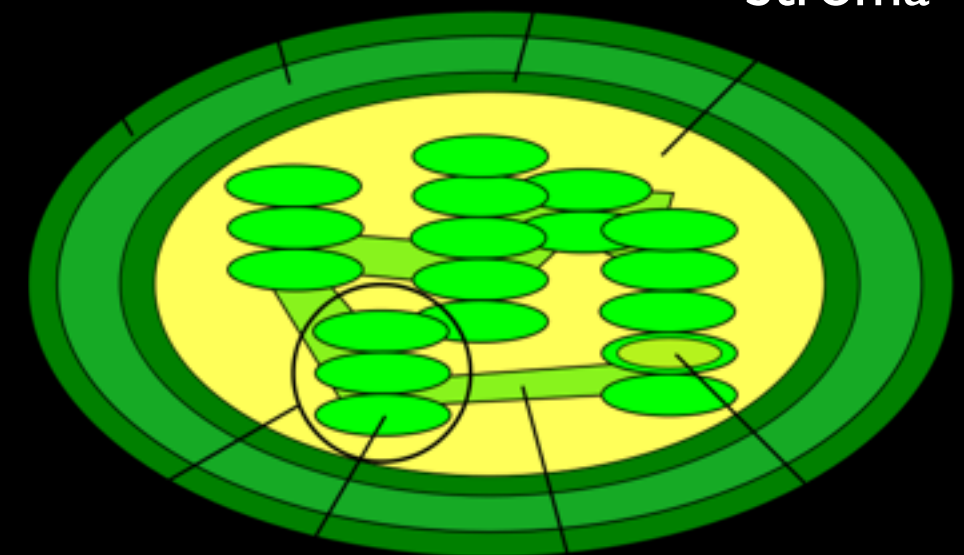


Light Reactions

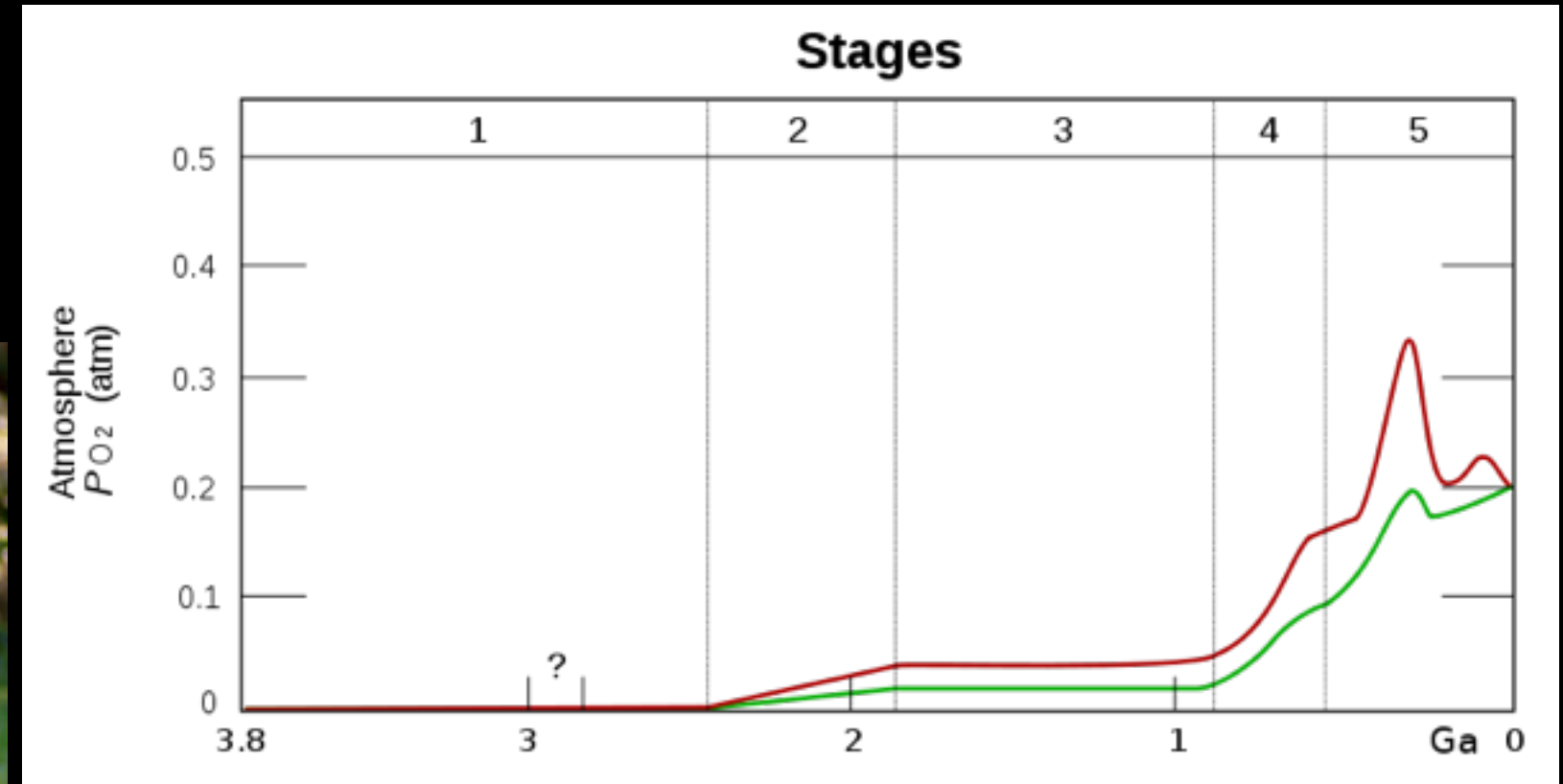
Calvin Cycle



Stroma

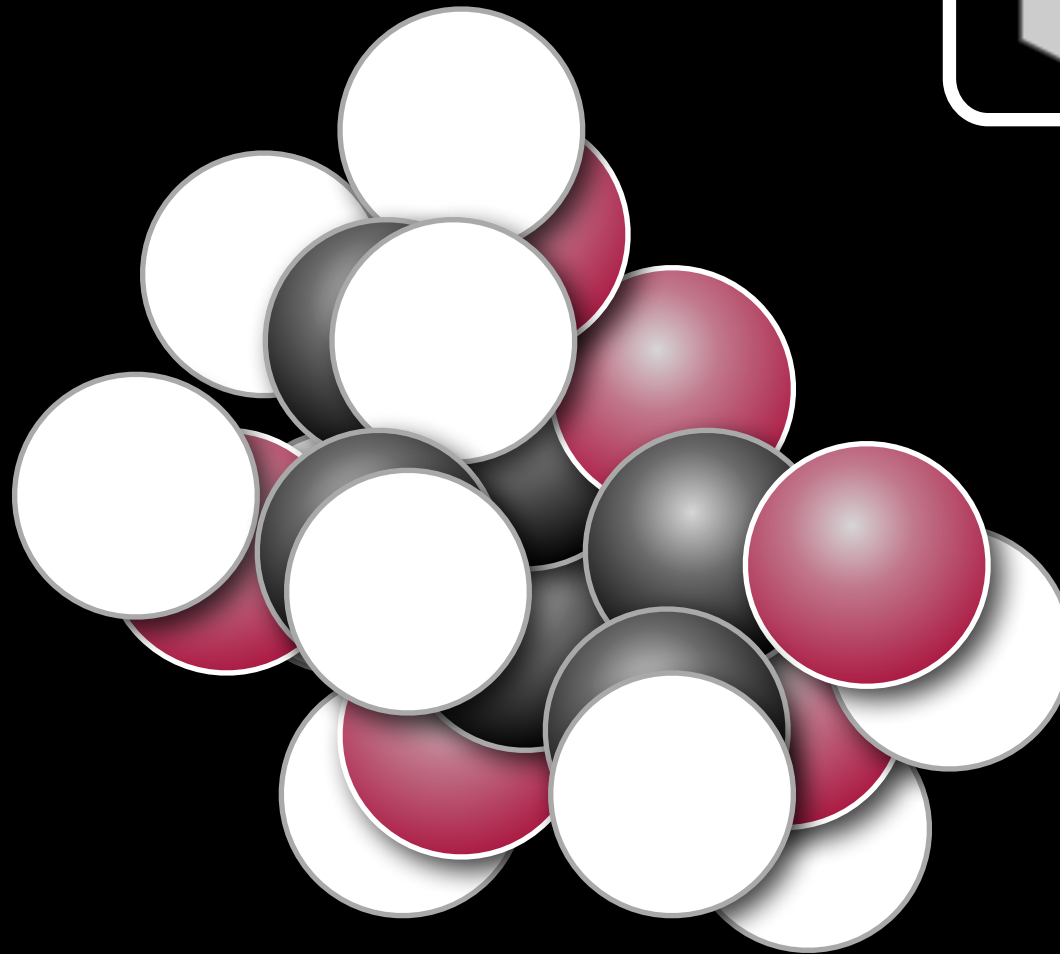


Evolution of Photosynthesis

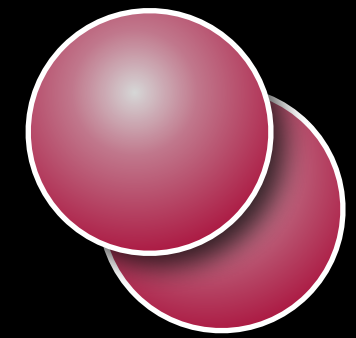




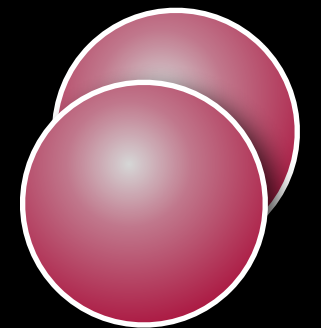
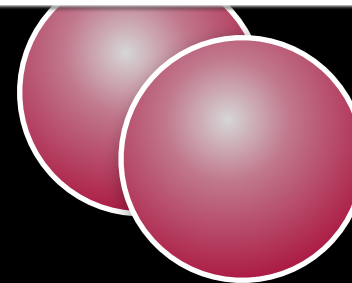
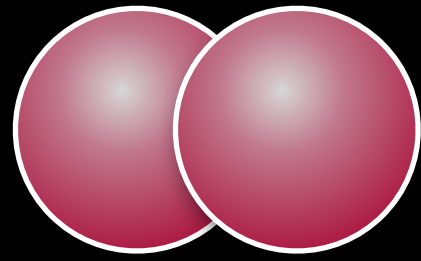
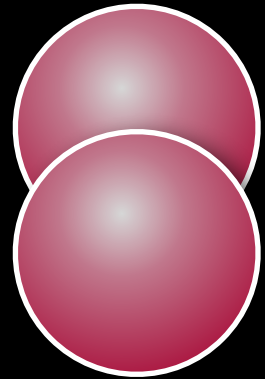
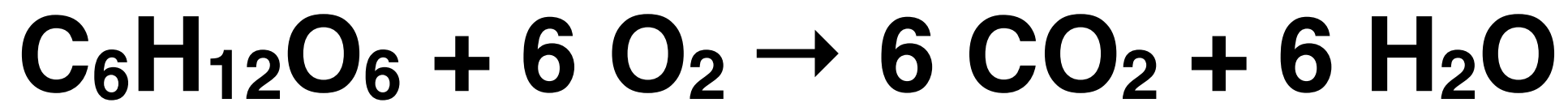
Respiration



Glucose

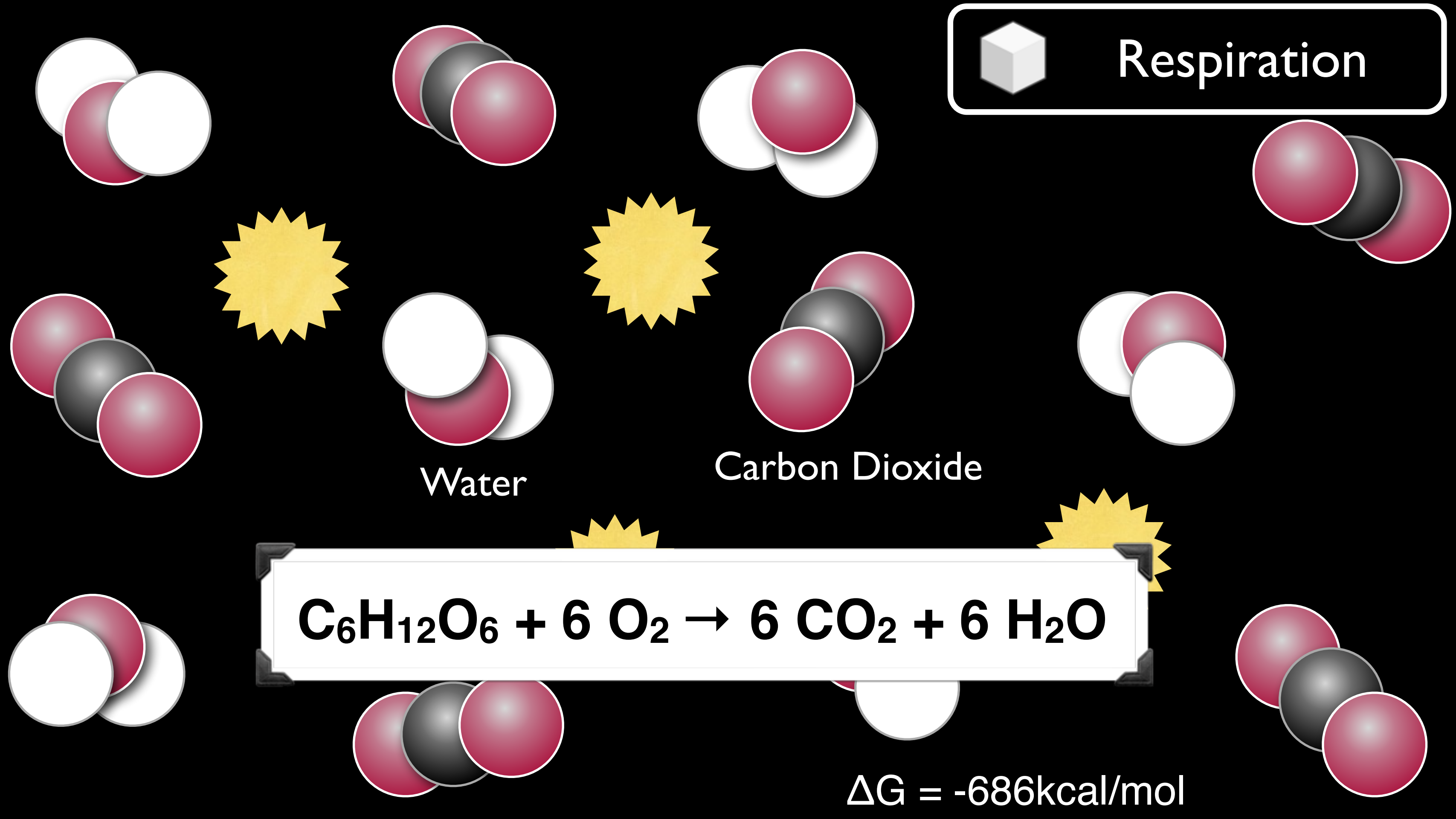


Oxygen

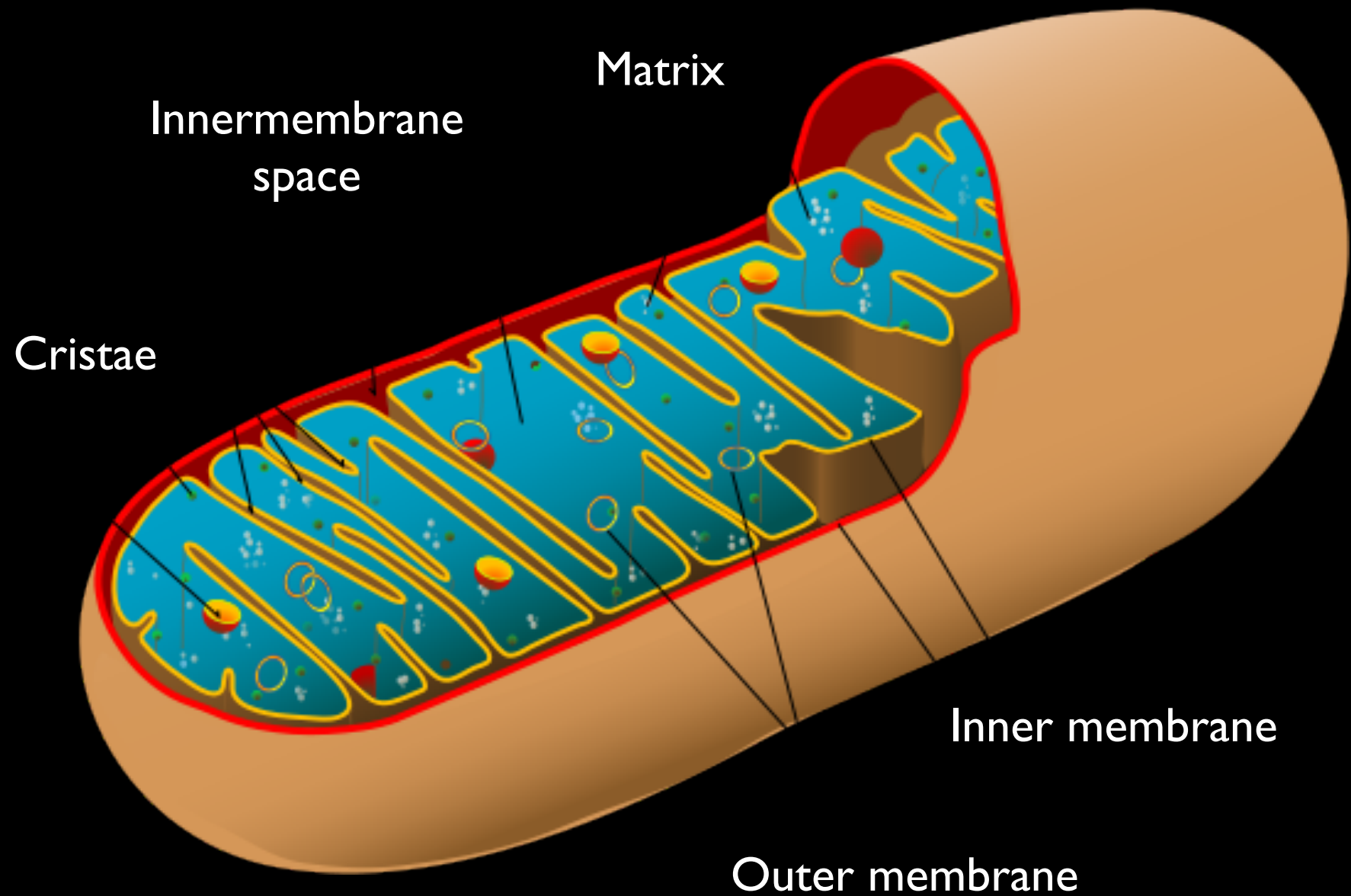




Respiration

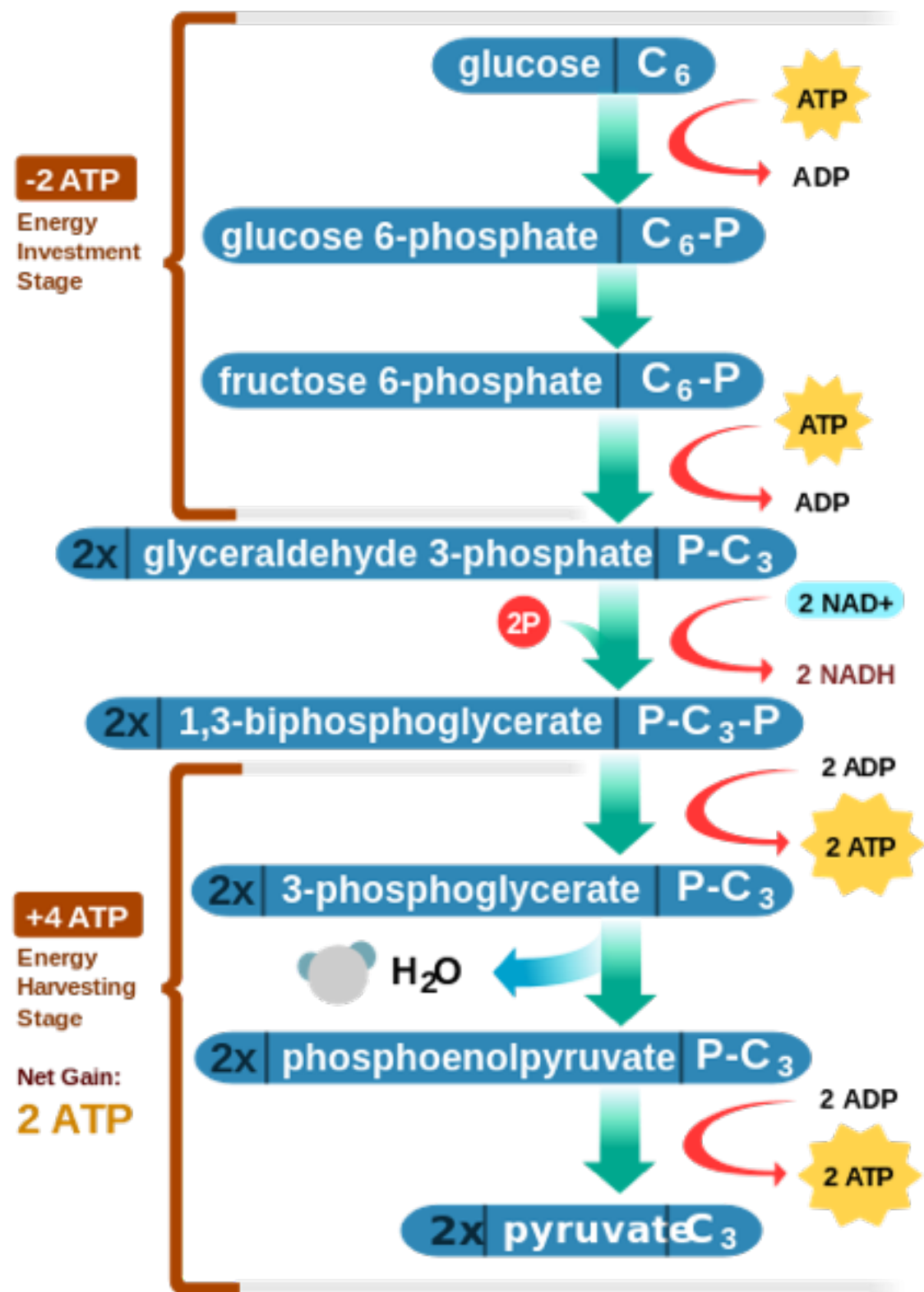


Cellular Respiration

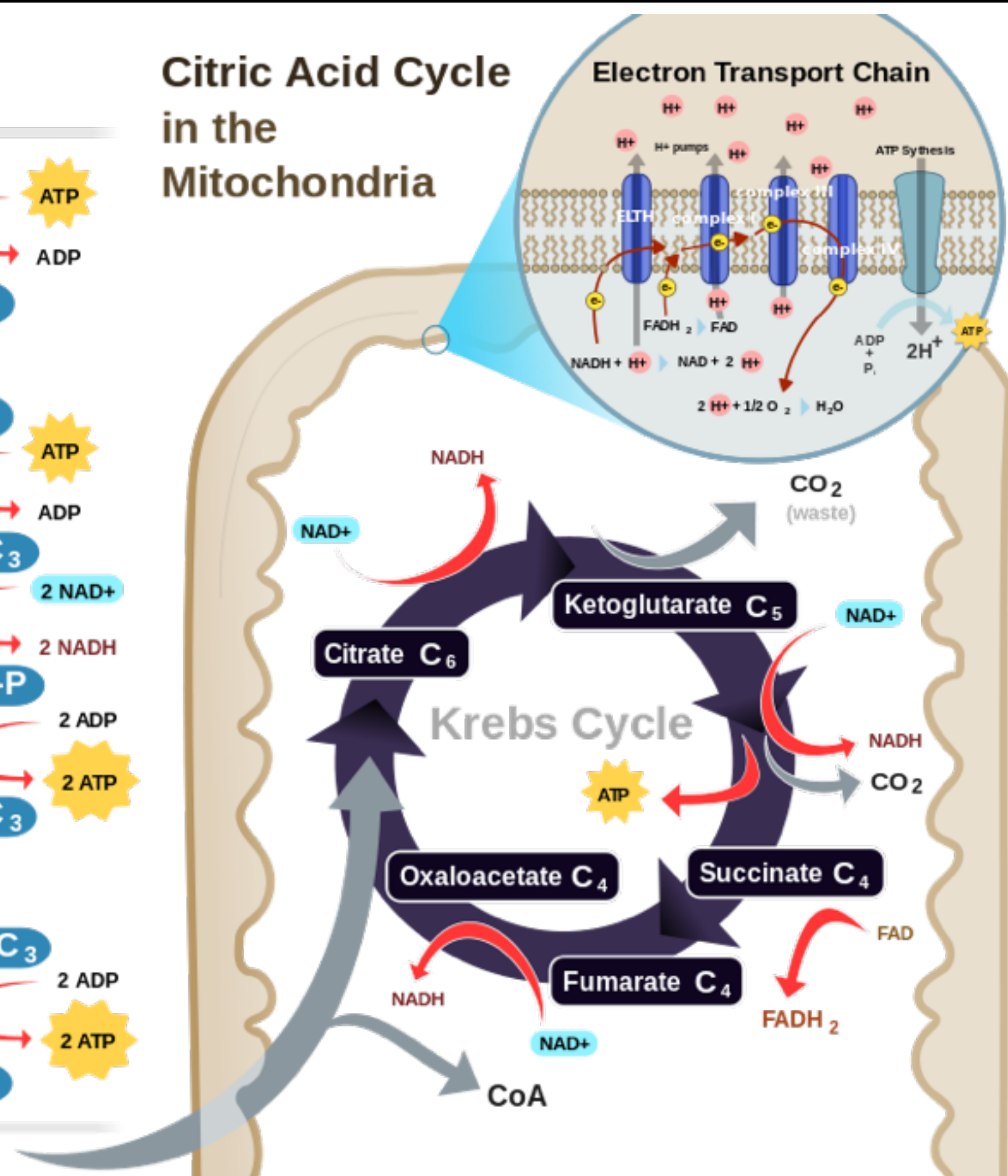


Mitochondrion

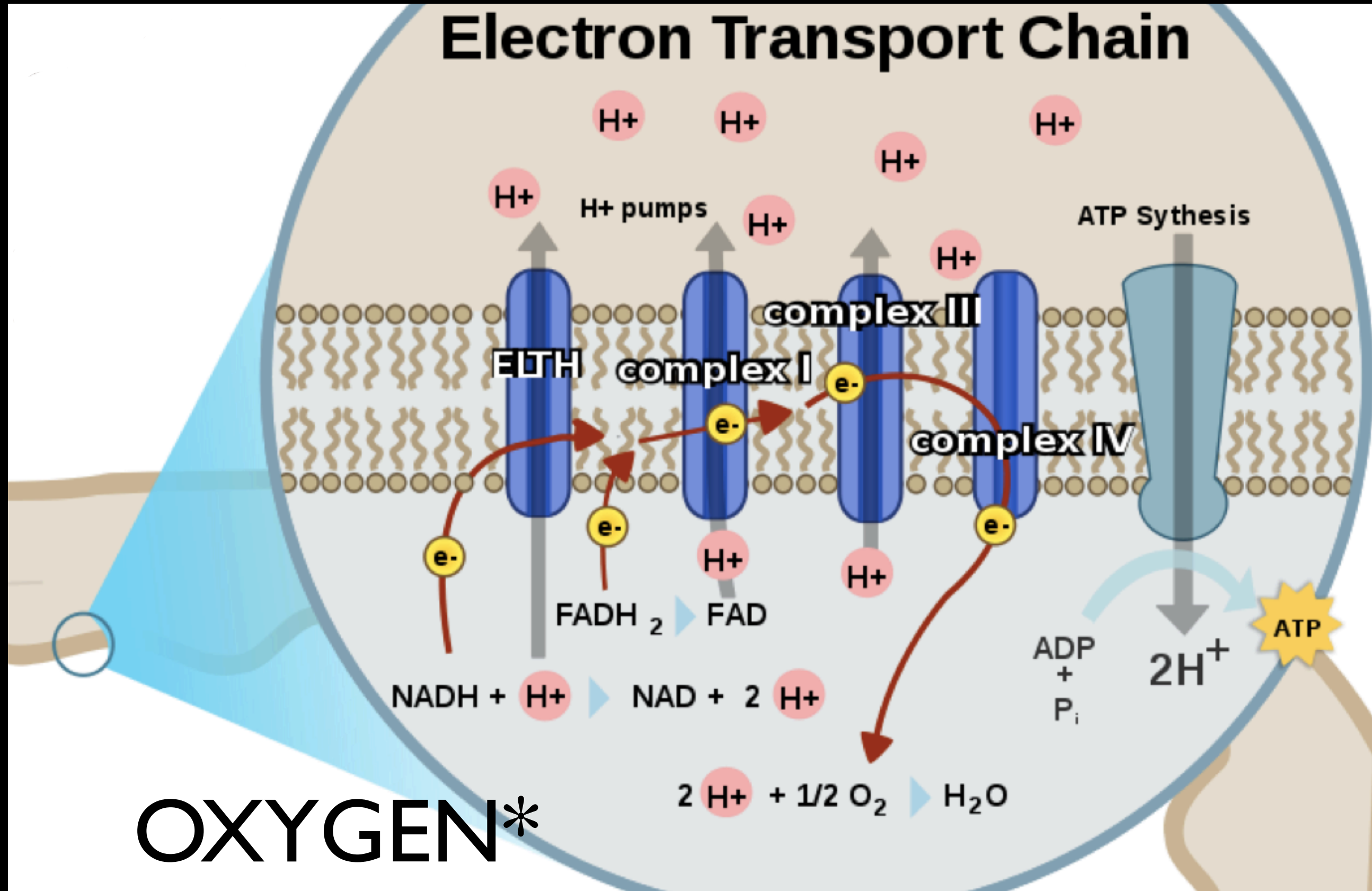
Glycolysis in the Cytoplasm



Citric Acid Cycle in the Mitochondria



Electron Transport Chain



Acknowledgements

“File:Auto-and Heterotrophs.png.” *Wikipedia, the Free Encyclopedia*. Accessed November 11, 2013. http://en.wikipedia.org/wiki/File:Auto-and_heterotrophs.png.

“File:Black-band Ironstone (aka).jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 11, 2013. [http://en.wikipedia.org/wiki/File:Black-band_ironstone_\(aka\).jpg](http://en.wikipedia.org/wiki/File:Black-band_ironstone_(aka).jpg).

“File:Calvin-cycle4.svg.” *Wikipedia, the Free Encyclopedia*. Accessed November 11, 2013. <http://en.wikipedia.org/wiki/File:Calvin-cycle4.svg>.

“File:CellRespiration.svg.” *Wikipedia, the Free Encyclopedia*. Accessed November 11, 2013. <http://en.wikipedia.org/wiki/File:CellRespiration.svg>.

“File:FLOR-ValdiviaJerez59.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 11, 2013. <http://en.wikipedia.org/wiki/File:FLOR-ValdiviaJerez59.jpg>.

“File:Melvin Calvin.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 11, 2013. http://en.wikipedia.org/wiki/File:Melvin_Calvin.jpg.

“File:Nur04505.jpg.” *Wikipedia, the Free Encyclopedia*. Accessed November 11, 2013. <http://en.wikipedia.org/wiki/File:Nur04505.jpg>.

“File:Oxygenation-atm-2.svg.” *Simple English Wikipedia, the Free Encyclopedia*. Accessed November 11, 2013. <http://simple.wikipedia.org/wiki/File:Oxygenation-atm-2.svg>.

“File:Plagiomnium Affine Laminazellen.jpeg.” *Wikipedia, the Free Encyclopedia*. Accessed November 11, 2013. http://en.wikipedia.org/wiki/File:Plagiomnium_affine_laminazellen.jpeg.

“File:Seawifs Global Biosphere.jpg.” *Wikipedia, the Free Encyclopedia*, October 28, 2013. http://en.wikipedia.org/w/index.php?title=File:Seawifs_global_biosphere.jpg&oldid=522581035.

“File:Simple Photosynthesis Overview.svg.” *Wikipedia, the Free Encyclopedia*. Accessed November 11, 2013. http://en.wikipedia.org/wiki/File:Simple_photosynthesis_overview.svg.

“File:Thylakoid Membrane.png.” *Wikipedia, the Free Encyclopedia*. Accessed November 11, 2013. http://en.wikipedia.org/wiki/File:Thylakoid_membrane.png.

LadyofHats, Mariana Ruiz Villarreal. *English: A Diagram Showing a Mitochondrion of the Eukaryotic Cell. Mitochondria Are Organelles Surrounded by Membranes, Distributed in the Cytosol of Most Eukaryotic Cells. Its Main Function Is the Conversion of Potential Energy of Pyruvate Molecules into ATP.*, May 2, 2006. the diagram i made myself using adobe illustrator. as a source for the information i used the diagrams found here:[1], [2], [3], [4], [5], [6] and [7]. [http://commons.wikimedia.org/wiki/File:Animal_mitochondrion_diagram_en_\(edit\).svg](http://commons.wikimedia.org/wiki/File:Animal_mitochondrion_diagram_en_(edit).svg).

Porse, Sten. *Denmark. Acer Campestre*, September 16, 2002. Own work. <http://commons.wikimedia.org/wiki/File:Acer-campestre.JPG>.

self-made. *English: A Vectorised Version of File:Chloroplast-new.jpg. A Diagram Showing the Simple Structure of a Chloroplast*, October 7, 2009. [File:Chloroplast_diagram.svg](http://commons.wikimedia.org/wiki/File:Chloroplast_diagram.svg). http://commons.wikimedia.org/wiki/File:Chloroplast_diagram_bs_plain.svg.

Wegmann. *English: Cheetah in the Hluhluwe-Umfolozi Game Reserve, South Africa at Sunset*, [object HTMLTableCellElement]. Own work. http://commons.wikimedia.org/wiki/File:Cheetah_Umfolozi_SouthAfrica_MWegmann.jpg.



www.bozemanscience.com