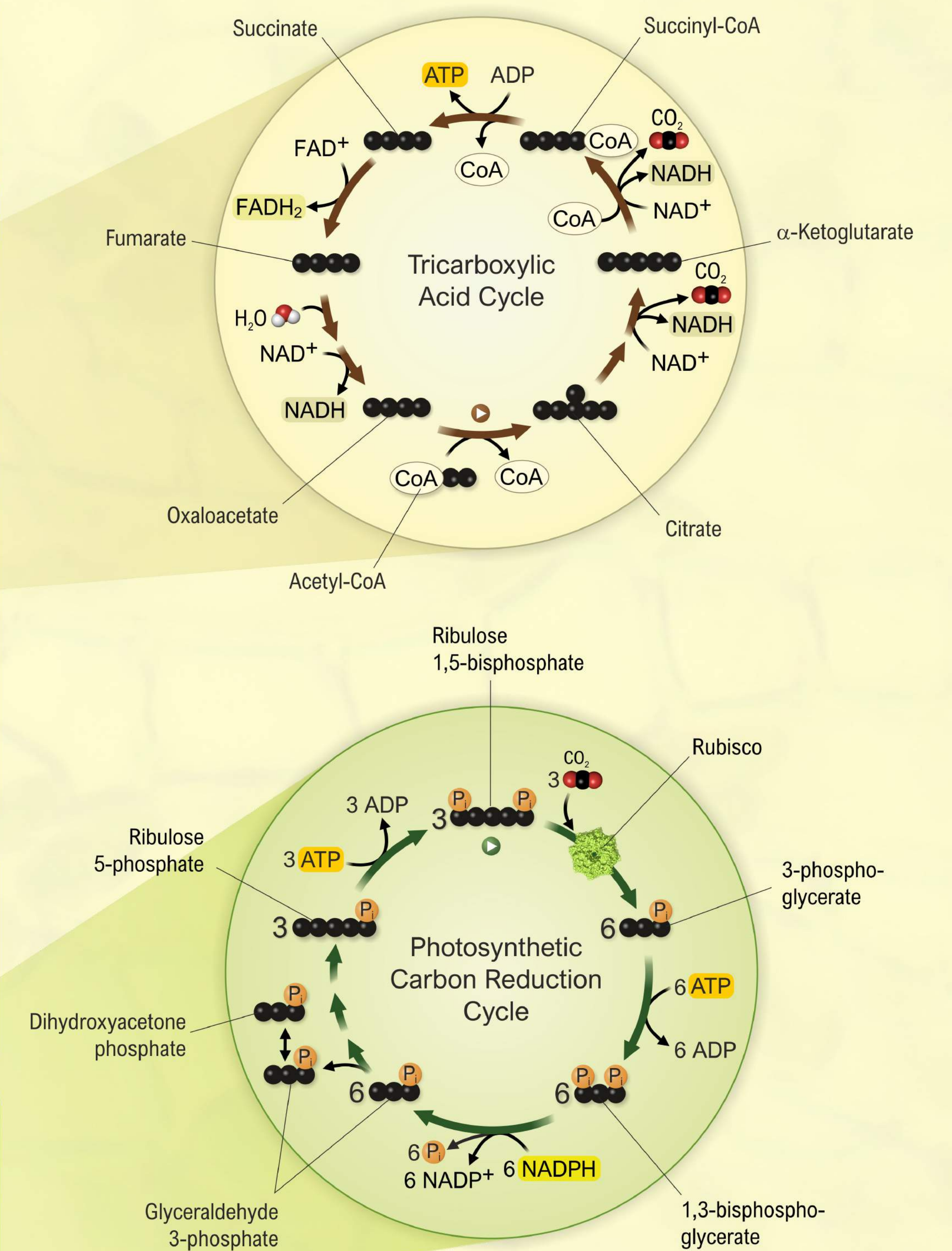
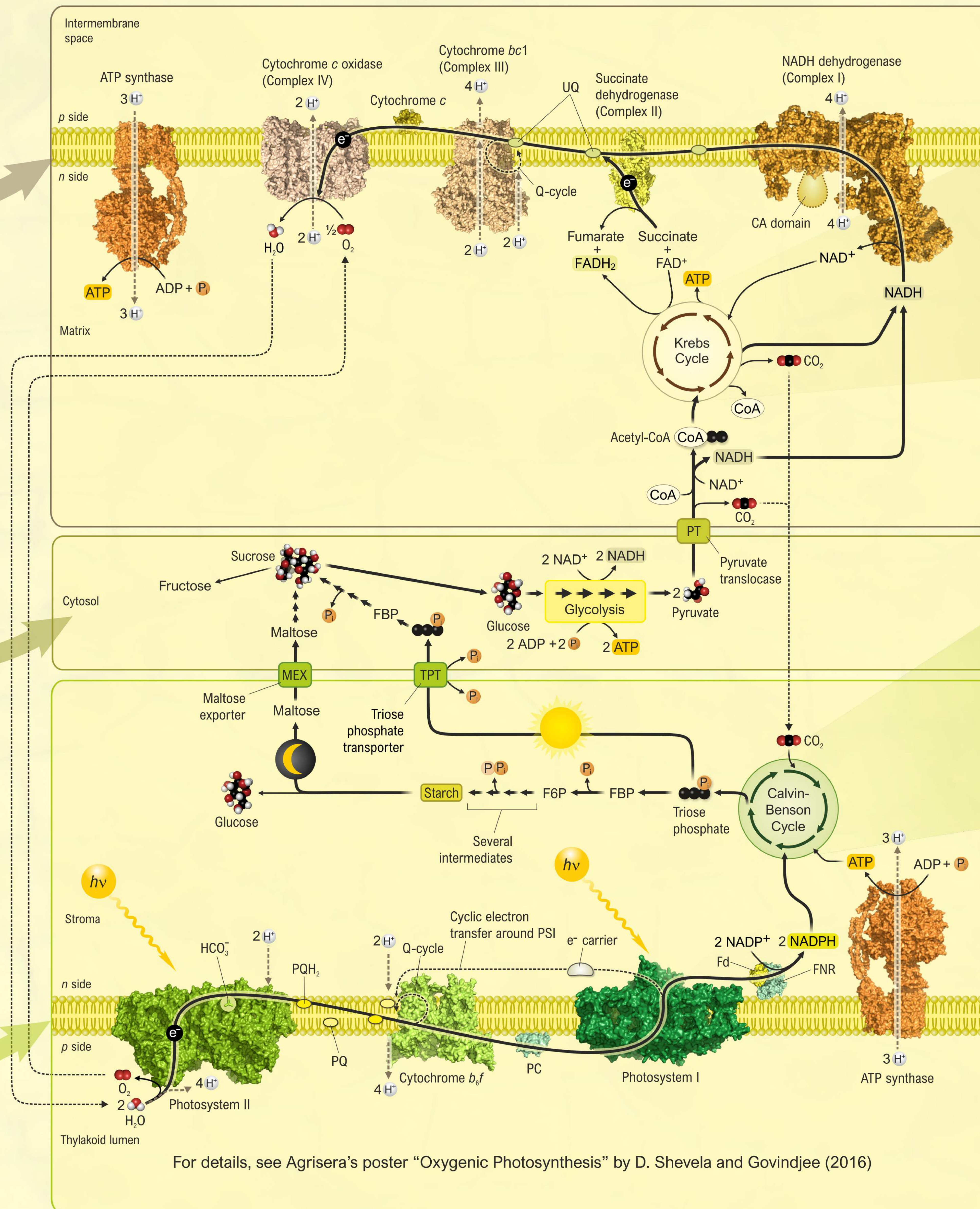
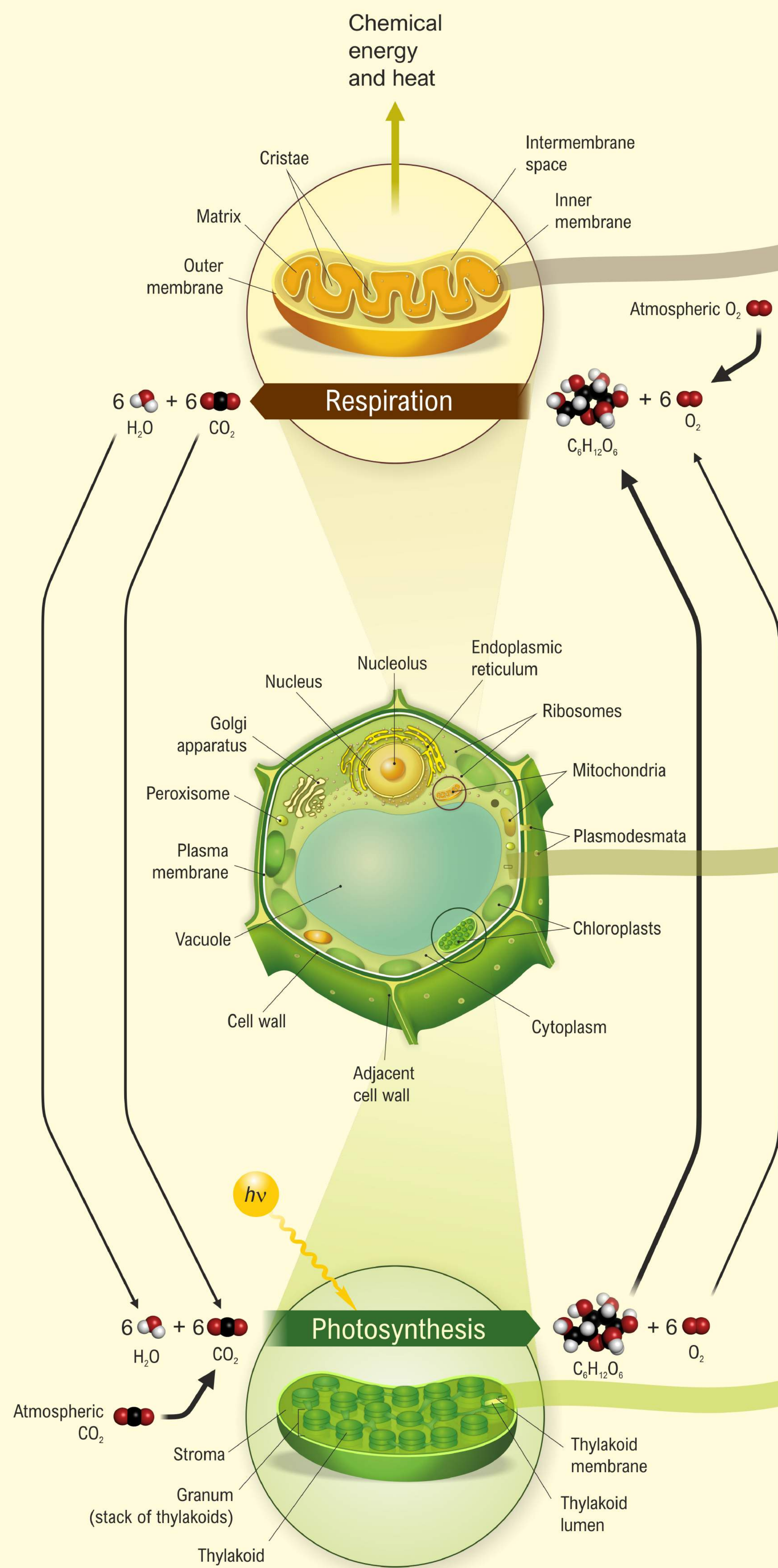


Best wishes for your research

Govindjee

# Plant Cell: Photosynthesis and Respiration



**Photosynthesis and Respiration**  
Simplified representation of interconnections between photosynthesis and cellular respiration in plants. For further information, see chapters in books [1-3]. Send questions and comments to Govindjee (gov@uillinois.edu) or to Dmitry Shevela (dmitry@sheveladesign.se).

**Abbreviations**  
ADP, adenosine diphosphate; ATP, adenosine triphosphate; CA, carbonic anhydrase; FAD/FADH<sub>2</sub>, flavin adenine dinucleotide (oxidized/reduced forms); FBP, fructose-1,6-bisphosphate; F6P, fructose-6-phosphate; Fd, ferredoxin; FNR, ferredoxin-NADP oxidoreductase; PQ, mobile plastoquinone; PQH<sub>2</sub>, reduced form of plastoquinone; PC, plastocyanin, a mobile copper protein; NAD<sup>+</sup>/NADH, nicotinamide adenine dinucleotide (oxidized/reduced forms); NADP<sup>+</sup>/NADPH, nicotinamide adenine dinucleotide phosphate (oxidized/reduced forms), UQ - ubiquinone pool.

**Notes**  
Note that the above representation of photosynthetic and respiratory electron transfer chain complexes is not meant to imply that these complexes are necessarily in 1:1 ratio. Although 3 different cyclic electron pathways, around Photosystem I, are known to exist, we show here only one of them, which involves one or more proteins. Also note that the Calvin-Benson cycle, shown here, is for C3 plants (e.g., rice); however, C4 plants (e.g., maize) have a different pathway [2,3]. Further, only "classical" oxidoreductase complexes of the respiratory electron transport chain in mitochondria are shown in the diagram. Alternative oxidases and alternative NAD(P)H dehydrogenases, which also contribute to the respiratory electron transport chain in plants are not shown here [1]. Complexes were generated using coordinates from the following PDB entries: 6b8h, 2b10, 5b1a, 1v1f, 1bgy, 3w5u, 4wz7, 1ag6, 5l8r, 3wu2, 1aus, and 1nek.

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**References**  
[1] G. Tcherkez, J. Ghashghaie, Eds. (2017) Plant Respiration: Metabolic Fluxes and Carbon Balance, Springer.  
[2] R.E. Blankenship (2014) Molecular Mechanisms of Photosynthesis, 2nd Edition, Wiley/Blackwell.  
[3] D. Shevela, L.O. Björn, Govindjee (2018) Photosynthesis: Solar Energy for Life. World Scientific.

**Symbols:** CoA - Coenzyme A • - Carbon atom (C) P - Inorganic phosphate (P) PP - Pyrophosphate (PP) ☀ - Day 🌙 - Night

Poster 3 (Plant cell: Photosynthesis and Respiration, 2019)

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