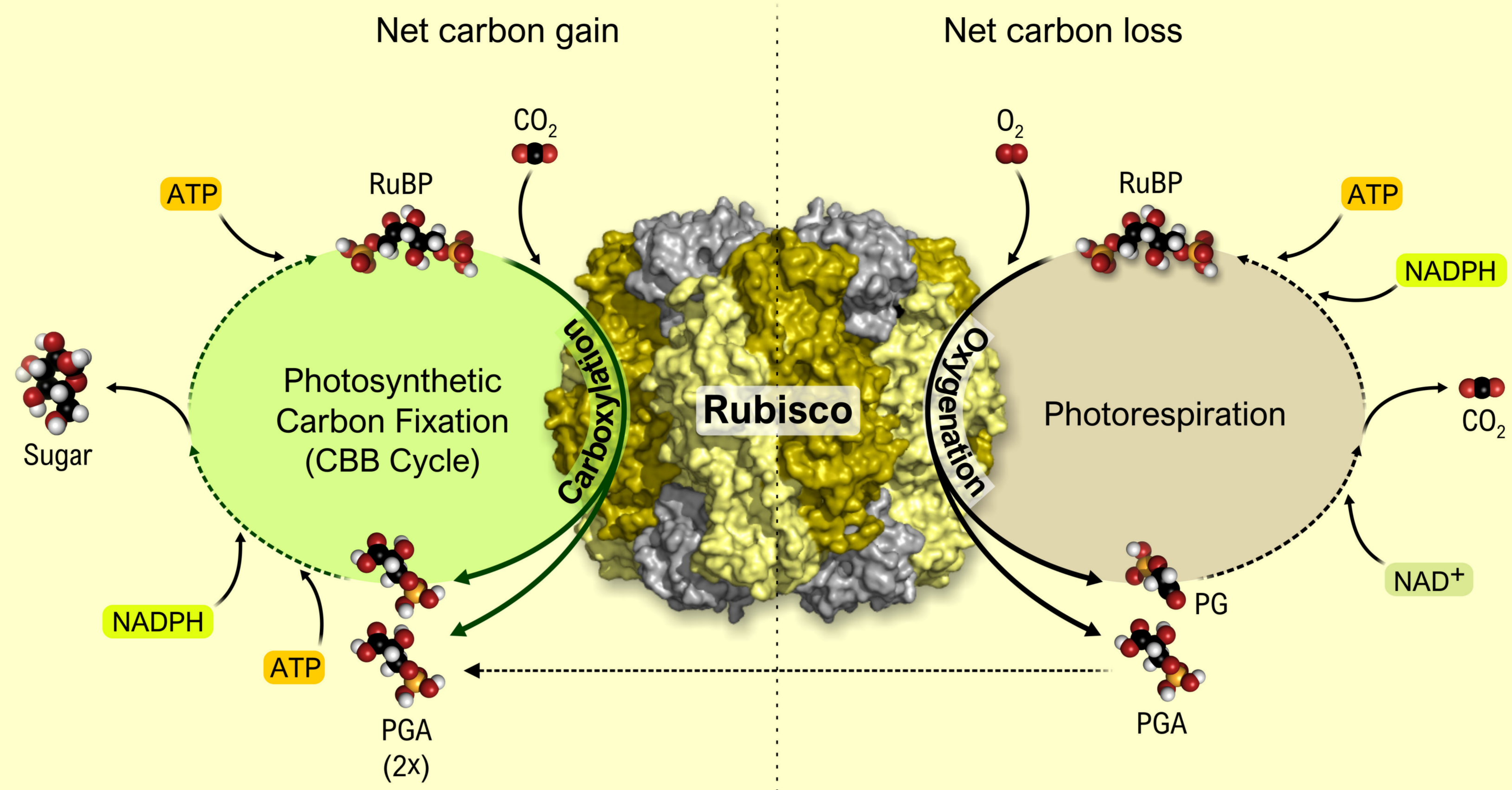
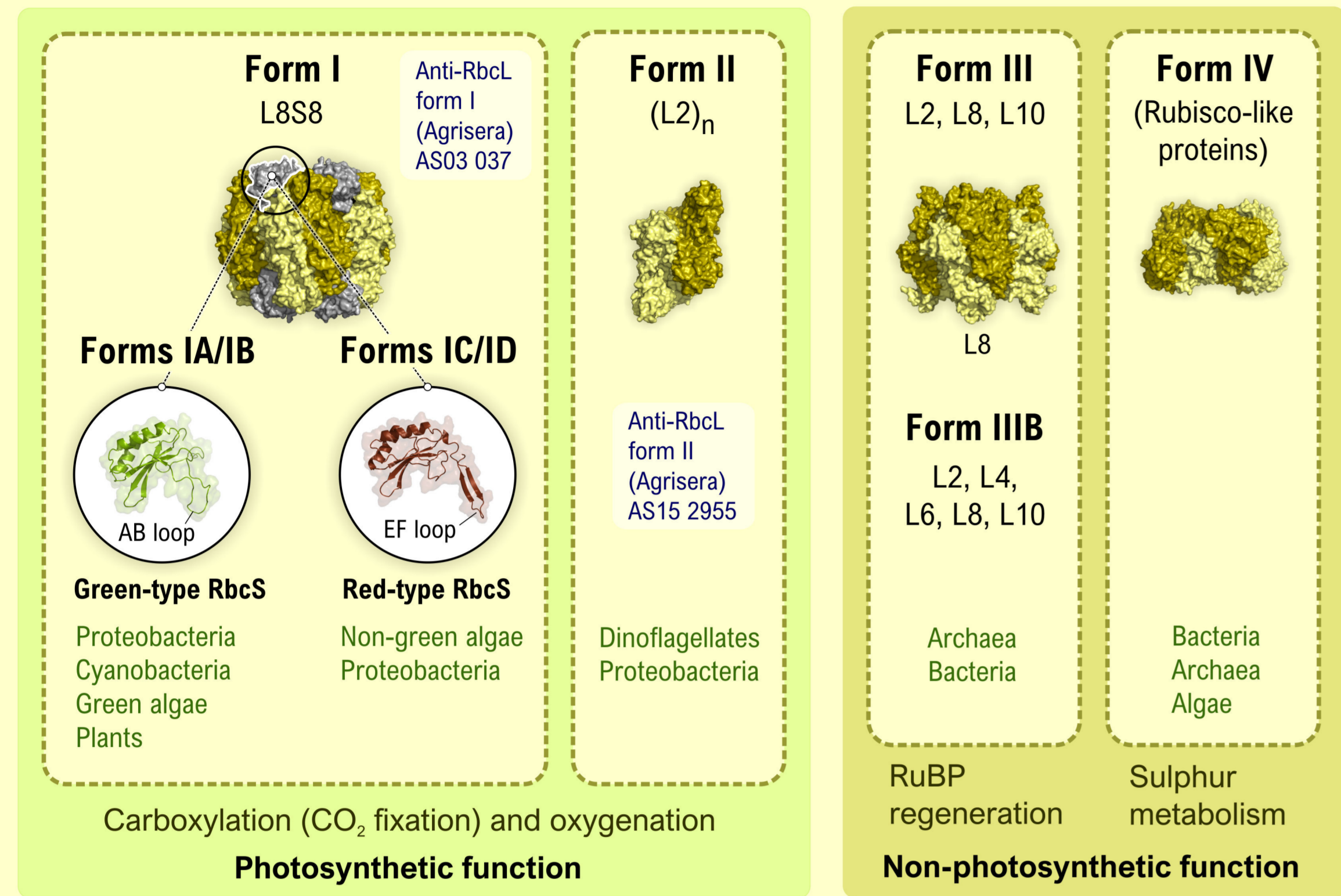
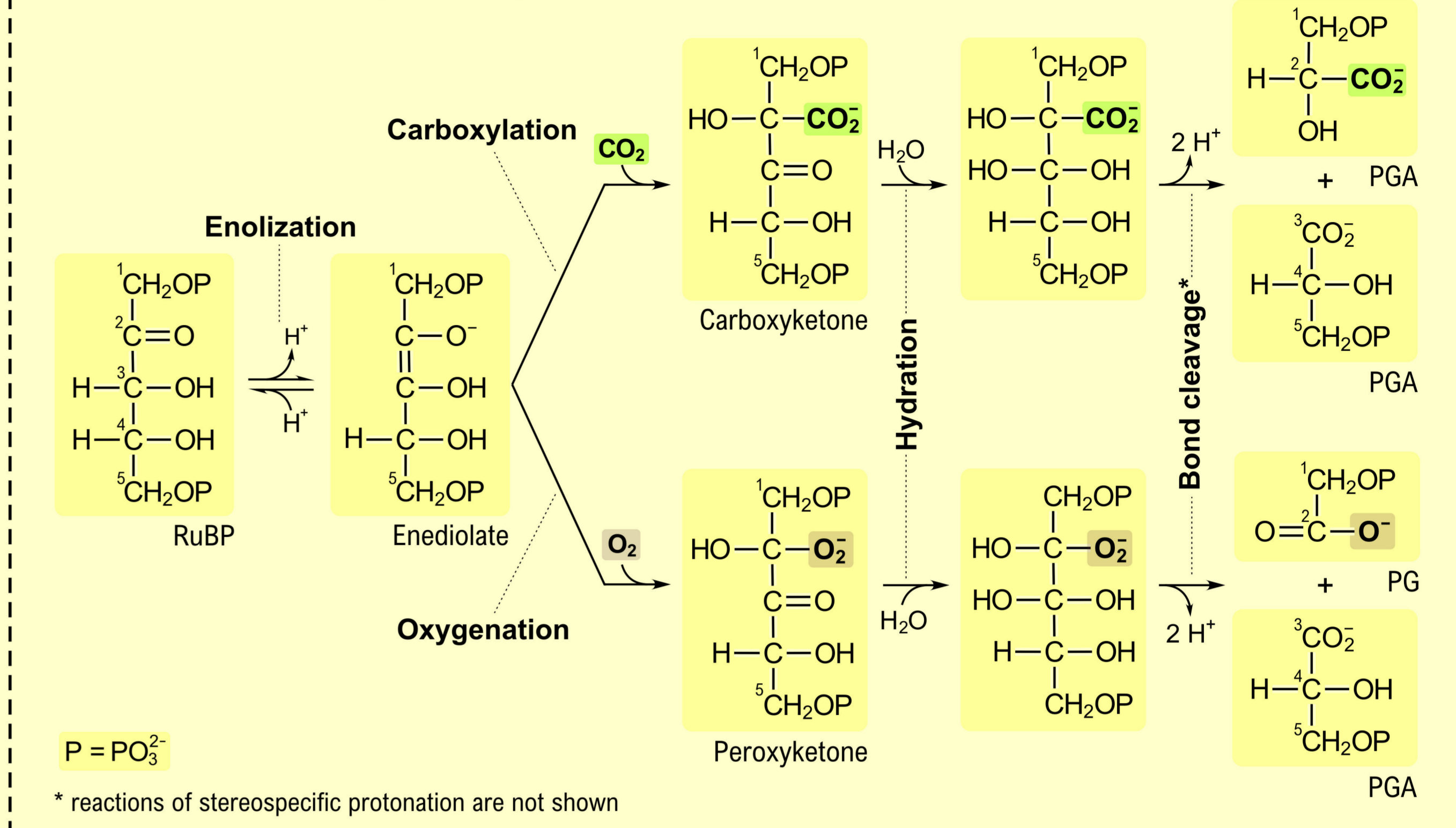


Rubisco: An Enzyme of Global Importance

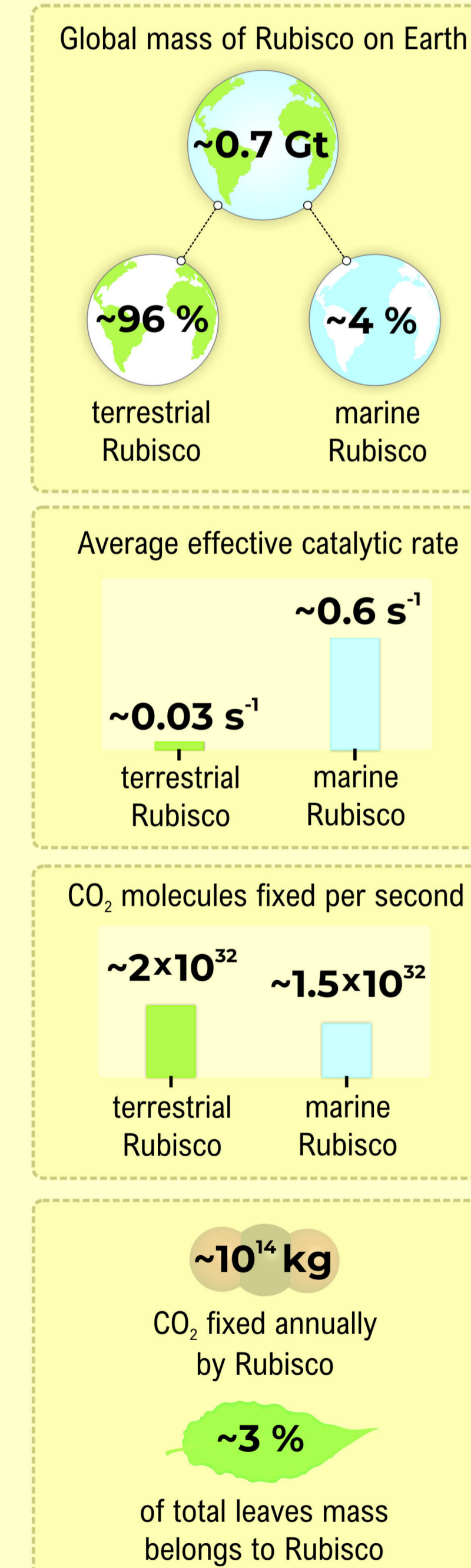
Molecular forms and their function



Reactions catalysed by active Rubisco

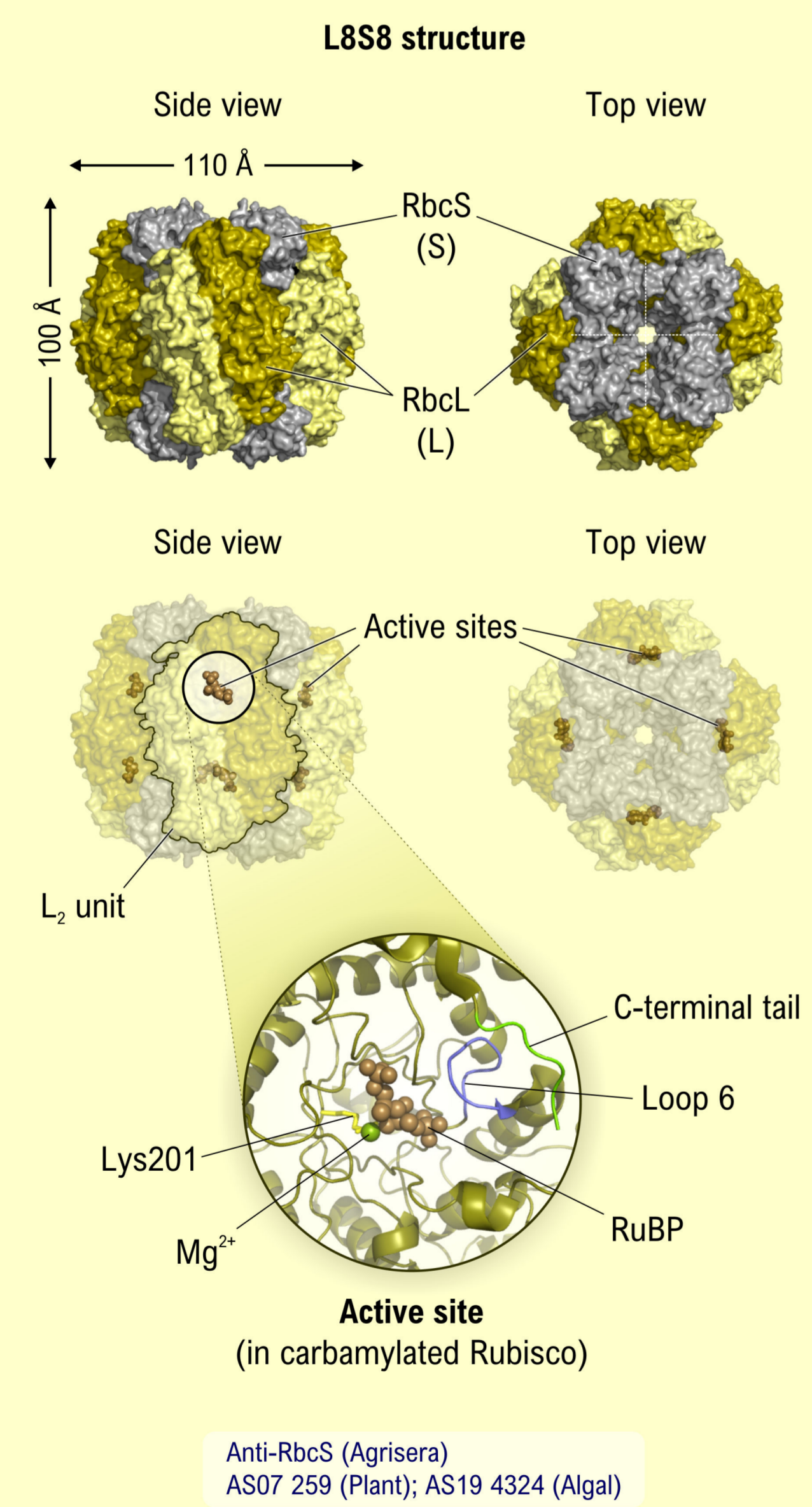


Some facts about Rubisco

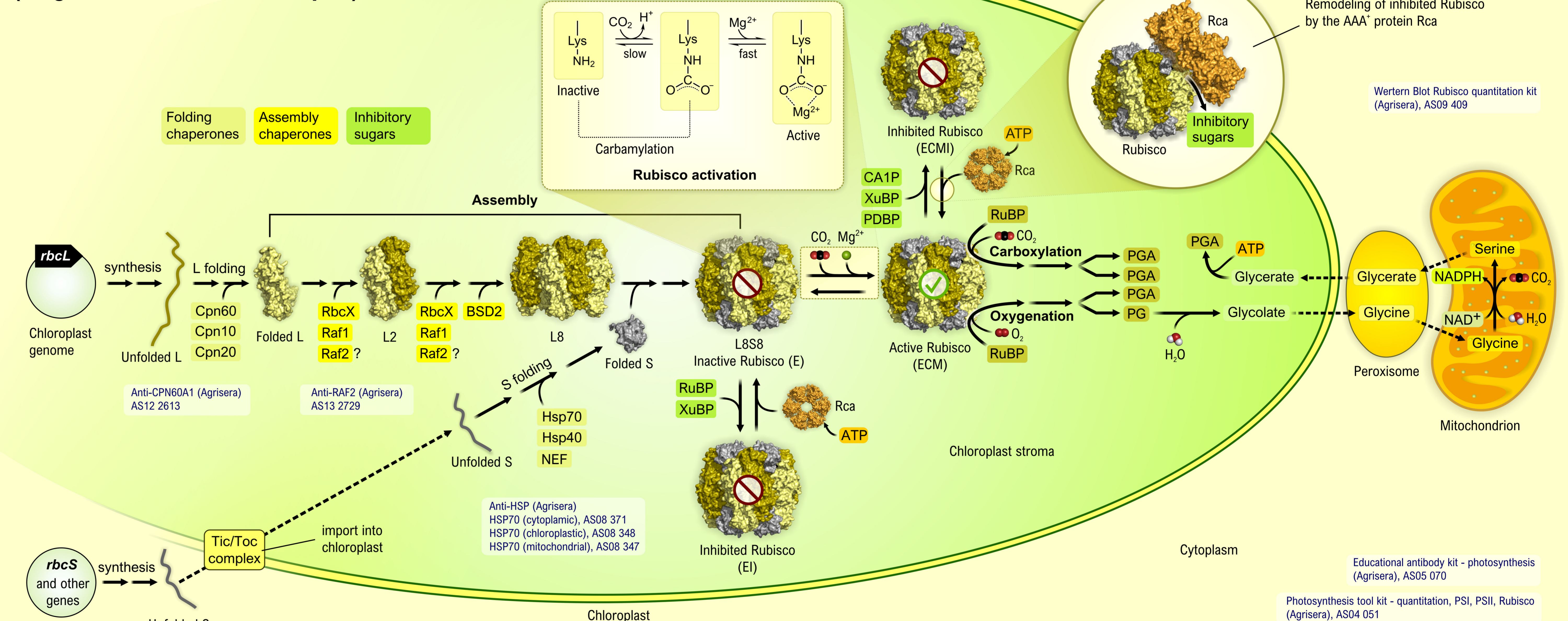


Structure of Rubisco (form I)

(most common in plants, cyanobacteria, and green algae)



How does Rubisco work in plants and green algae? (biogenesis and metabolic repair)



Rubisco Poster: Structure and function of the enzyme Rubisco (ribulose-1,5-bisphosphate carboxylase/oxygenase; EC 4.1.1.39). For further information, see references [1-9]. Send questions and comments to Govindjee (gov@illinois.edu) and/or to Dmitry Shevela (dmitry@sheveladesign.se). **Abbreviations:** ATP, adenosine triphosphate; BSD2, bundle sheath defective-2; CA1P, 2'-carboxy-D-arabinitol-1-phosphate; CBB cycle, Calvin-Benson-Bassham cycle; NAD⁺, nicotinamide adenine dinucleotide (oxidized form); NADPH, nicotinamide adenine dinucleotide phosphate (reduced form); NEF, nucleotide exchange factor; PG, 2-phosphoglycerate; PDBP, D-glycero-2,3-pentodiulose-1,5-bisphosphate; PGA, 3-phosphoglycerate; Raf, Rubisco accumulation factor; Rca, Rubisco activase; RuBP, ribulose-1,5-bisphosphate; XuBP, D-xylulose-1,5-bisphosphate. **Note:** We used coordinates from the PDB entries 1bxn, 1rcx, 2cwx, 2qyg, 3zw6, 4rub, and 5rub to obtain the structures, presented here. **Acknowledgement:** We thank Lars Olof Björn for valuable comments and corrections, and Joanna Porankiewicz-Asplund for the background picture. We are highly grateful to Agrisera for being a sponsor of the poster design, printing, and free distribution at conferences around the world. **References:** [1] A. R. Portis Jr, M. A. J. Parry (2007) Discoveries in Rubisco (Ribulose 1,5-bisphosphate carboxylase/oxygenase): a historical perspective, *Photosynth. Res.* 94, 121-143; [2] I. Andersson (2008) Catalysis and regulation in Rubisco, *J. Exp. Bot.* 59, 1555-1568; [3] A. Bracher, S. M. Whitney, F. U. Hartl, M. Hayer-Hartl (2017) Biogenesis and metabolic maintenance of Rubisco, *Annu. Rev. Plant Biol.* 68, 29-60; [4] I. Andersson, A. Backlund (2008) Structure and function of Rubisco, *Plant Physiol. Biochem.* 46, 275-291; [5] R. H. Wilson, M. Hayer-Hartl (2018) Complex chaperone dependence of Rubisco biogenesis, *Biochemistry* 57, 3210-3216; [6] R. Trösch, T. Mühlhaus, M. Schroda, F. Willmund (2015) ATP-dependent molecular chaperones in plastids - More complex than expected, *Biochim. Biophys. Acta* 1847, 872-888; [7] Y. M. Bar-On, R. Milo (2019) The global mass and average rate of Rubisco, *Proc. Natl. Acad. Sci. U.S.A.* 116, 4738-4743; [8] J.Y. Bhat, G. Milicic, G. Theulin-Pardo, A. Bracher, A. Maxwell, S. Ciniawsky, O. Mueller-Cajar, J. R. Engen, F. U. Hartl, P. Wendler, M. Hayer-Hartl (2017) Mechanism of enzyme repair by the AAA⁺ chaperone Rubisco activase, *Mol. Cell* 67, 744-756; [9] W. L. Ogren (2003) Affixing the O to Rubisco: discovering the source of photorespiratory glycolate and its regulation, *Photosynth. Res.* 76, 53-63.

Poster 4 (Rubisco, 2020)

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