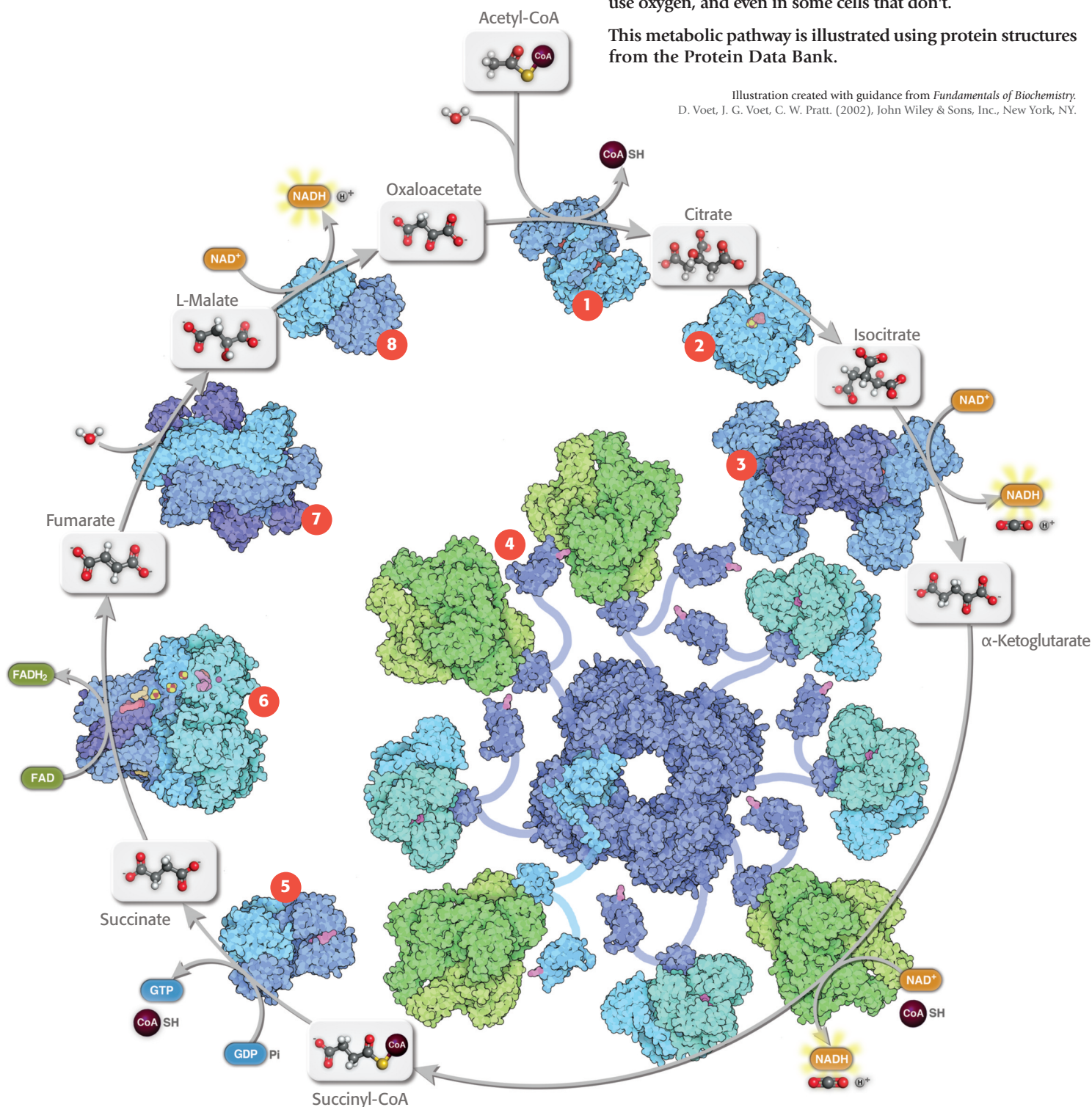


The Structures of the Citric Acid Cycle

Also known as the Krebs cycle or the tricarboxylic acid cycle, the *citric acid cycle* is at the center of cellular metabolism. It plays a starring role in both the process of energy production and biosynthesis. The cycle finishes the sugar-breaking job started in glycolysis and fuels the production of ATP in the process. It is also a central hub in biosynthetic reactions, providing intermediates that are used to build amino acids and other molecules. Citric acid cycle enzymes are found in all cells that use oxygen, and even in some cells that don't.

This metabolic pathway is illustrated using protein structures from the Protein Data Bank.

Illustration created with guidance from *Fundamentals of Biochemistry*.
D. Voet, J. G. Voet, C. W. Pratt. (2002), John Wiley & Sons, Inc., New York, NY.



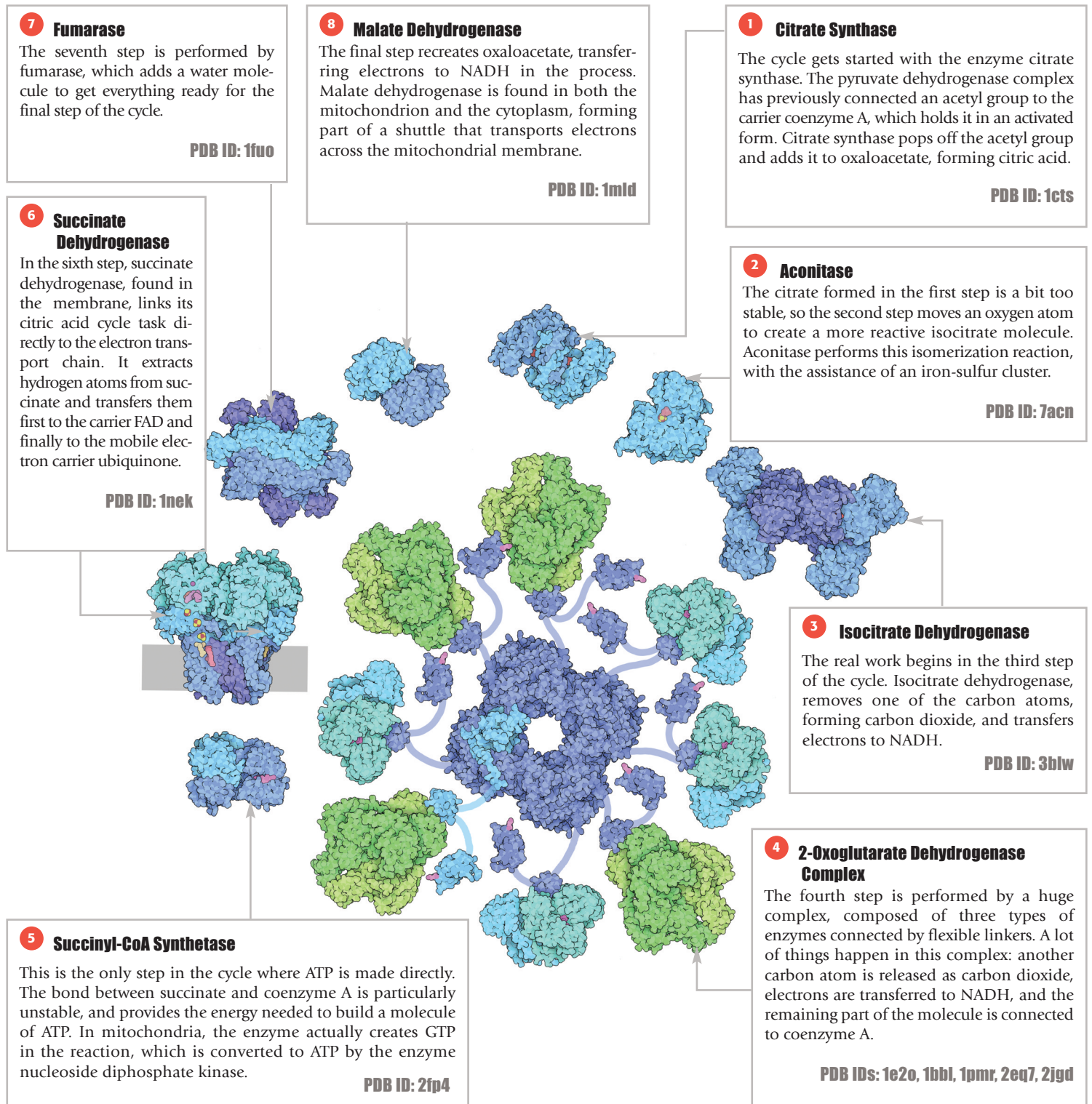
Eight Reactions

The eight reactions of the citric acid cycle use the small molecule *oxaloacetate* as a catalyst. The cycle starts by addition of an acetyl group to oxaloacetate, then, over the course of eight steps, the acetyl group is completely broken apart, finally restoring the oxaloacetate molecule for another round.

Powerhouse of Energy

The citric acid cycle provides electrons that fuel the process of oxidative phosphorylation—our major source of ATP and energy. As the acetyl group is broken down, electrons are stored in the carrier NADH and delivered to the large protein complexes that generate the proton gradient that powers ATP synthase.

The Enzymes of the Krebs Cycle



The structures shown here, taken from several different organisms, are described further in the October 2012 *Molecule of the Month* (doi:10.2210/rcsb_pdb/mom_2012_10). Visit www.rcsb.org/pdb-101 for more.