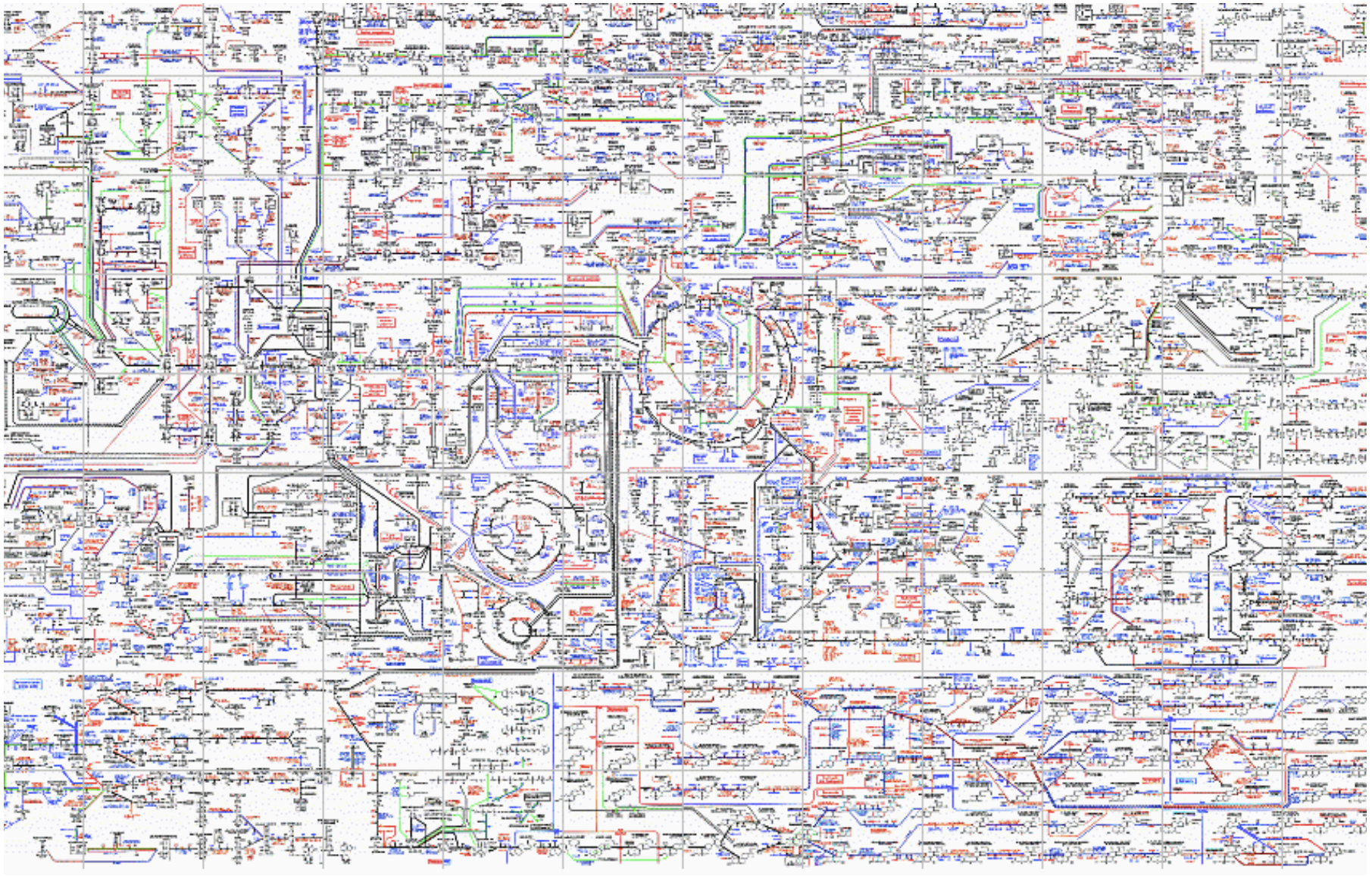
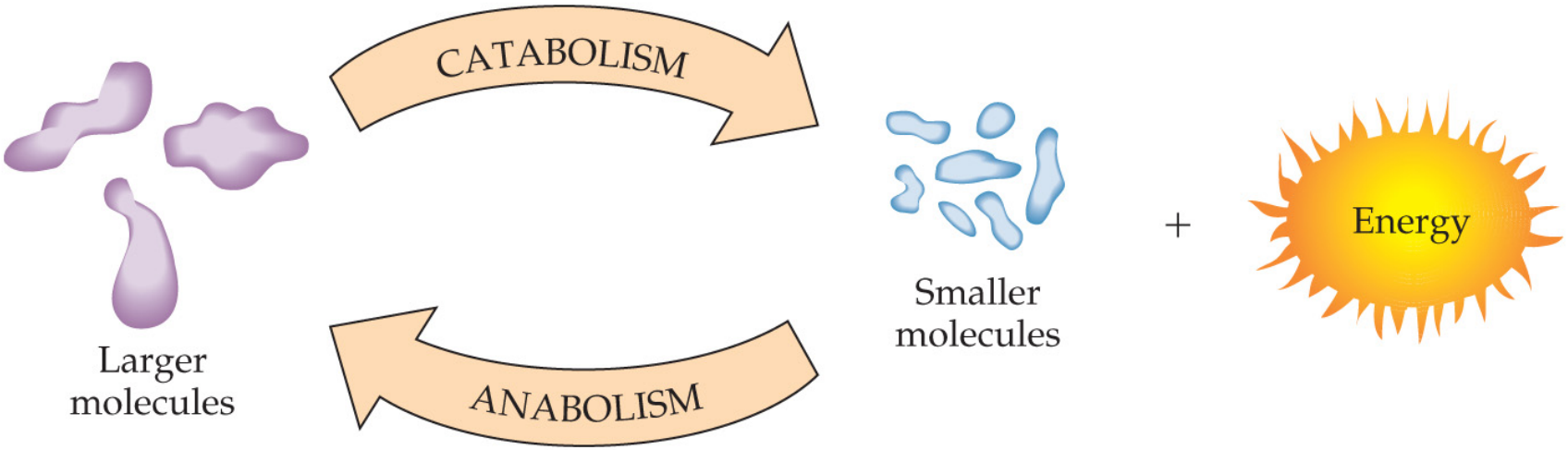
Chem 30B

Ch20/21: The Generation of Biochemical Energy

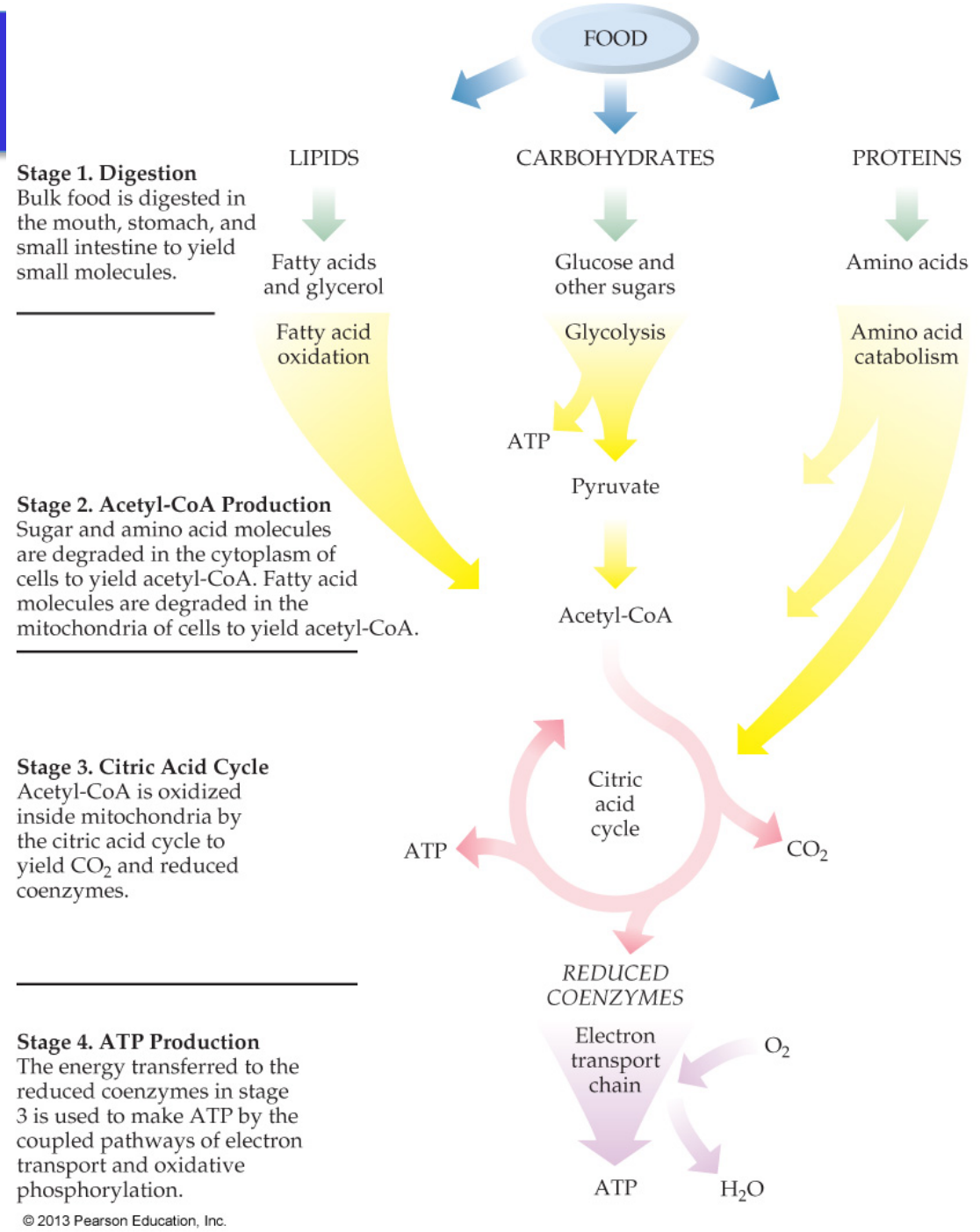
Metabolic Pathways



Catabolism and Anabolism



Overview of Catabolism



[Handout] Catabolism Flow Chart

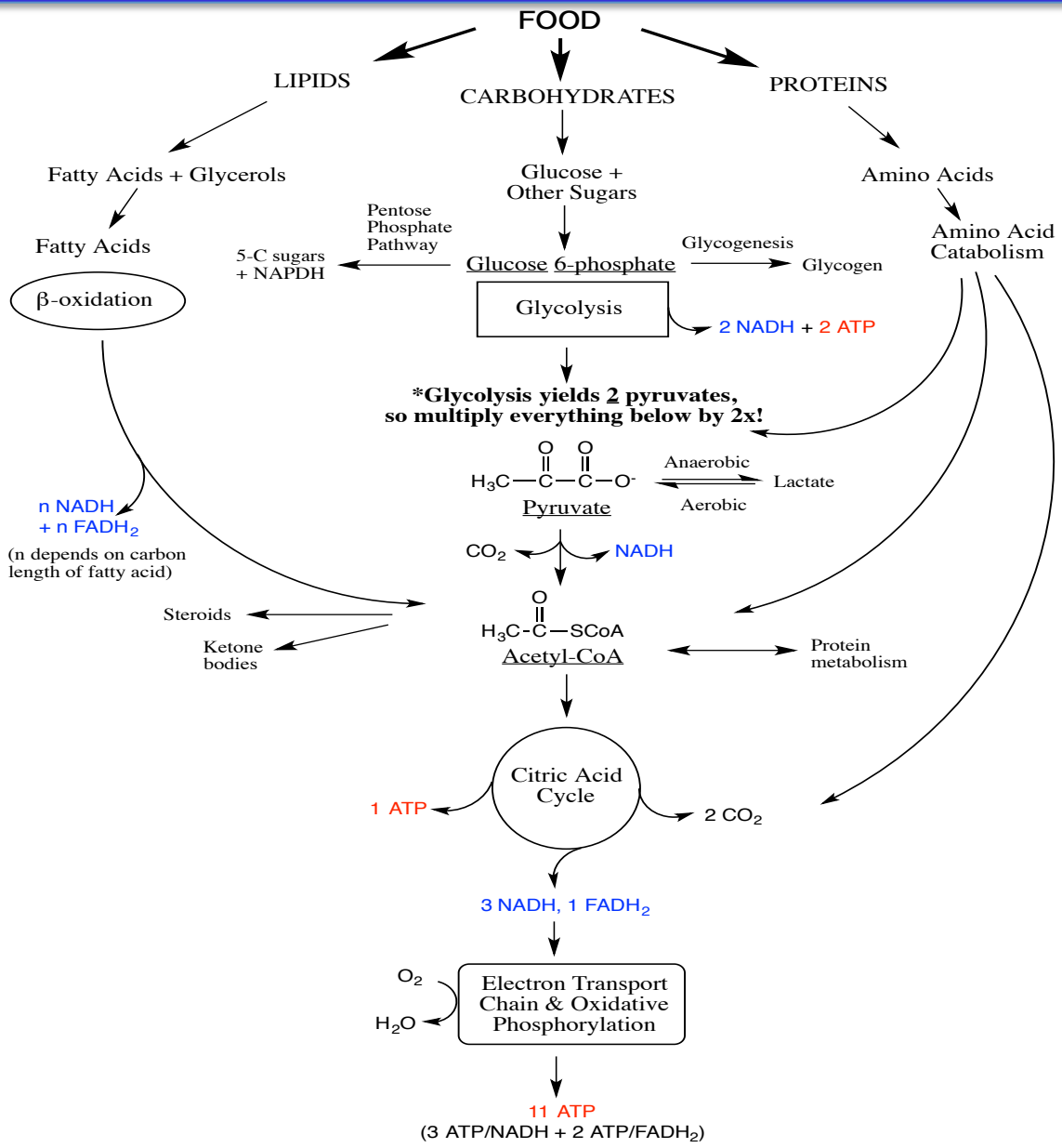
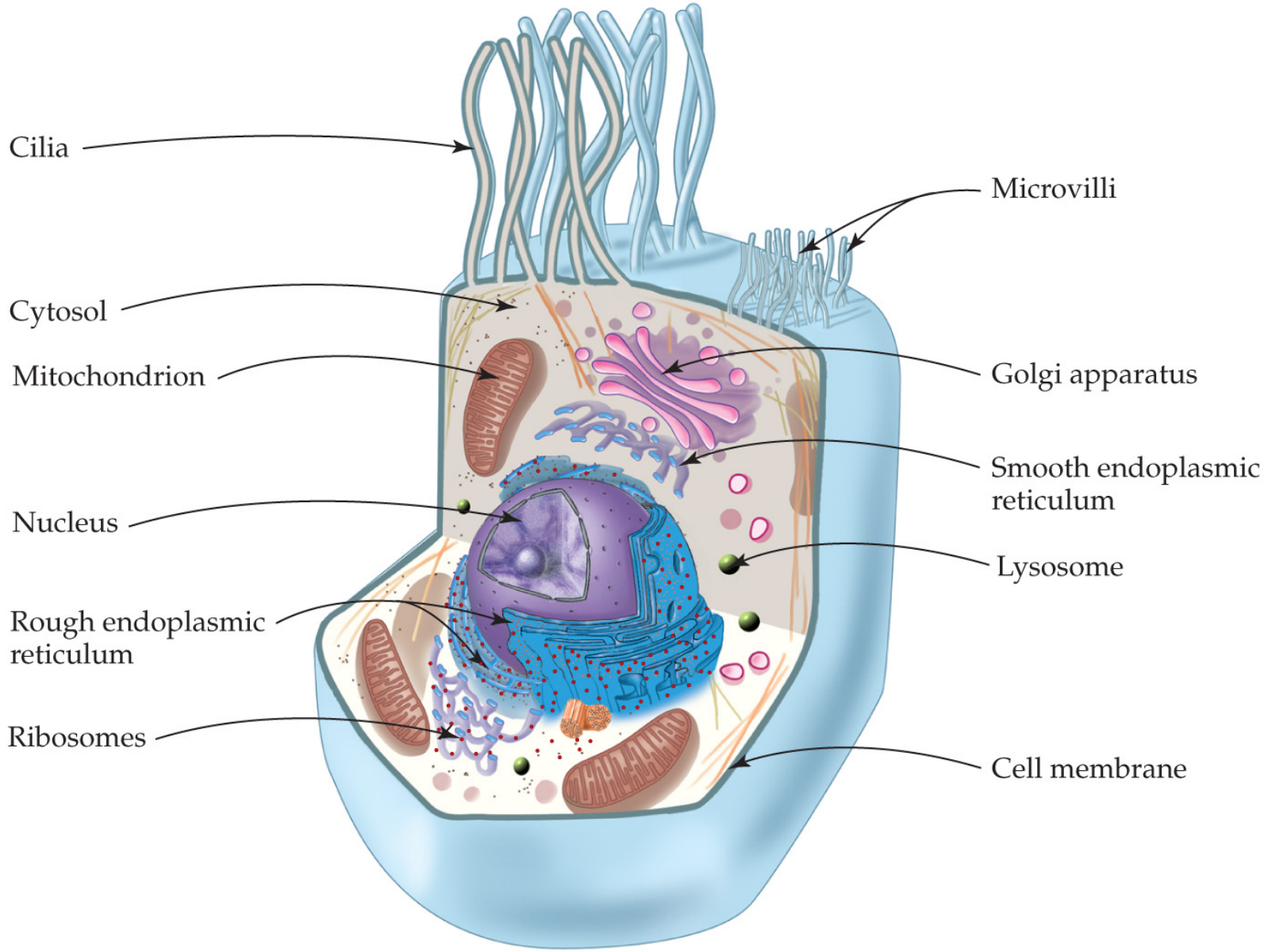
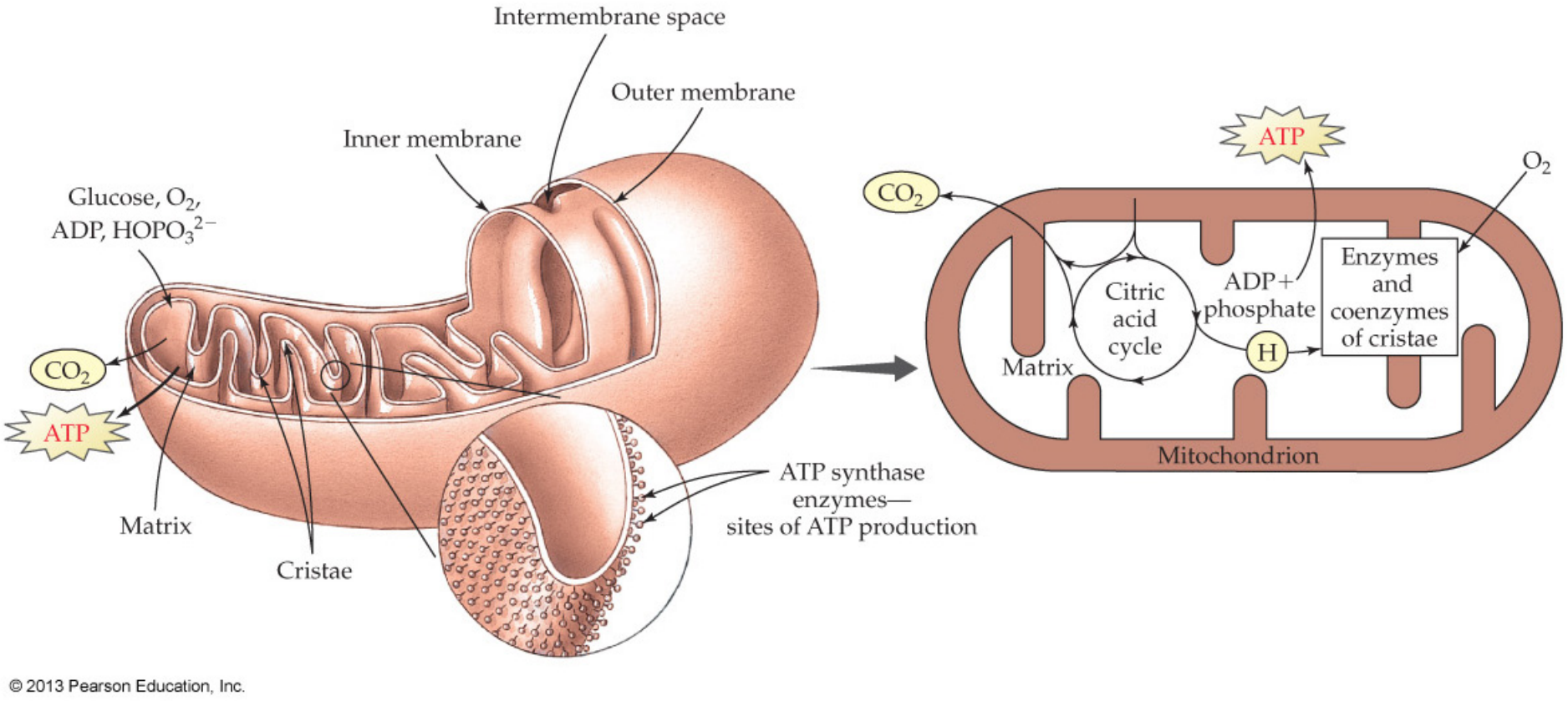


Diagram of a Eukaryotic Cell

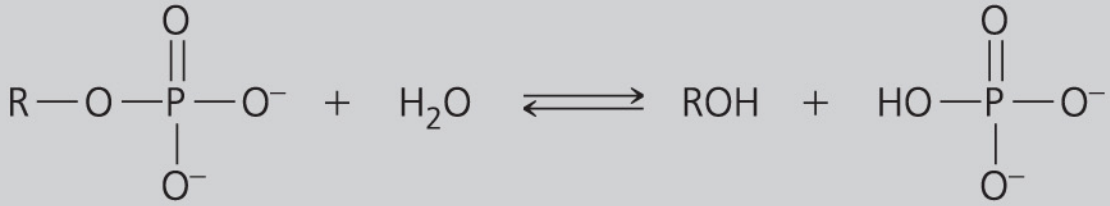


Mitochondrion



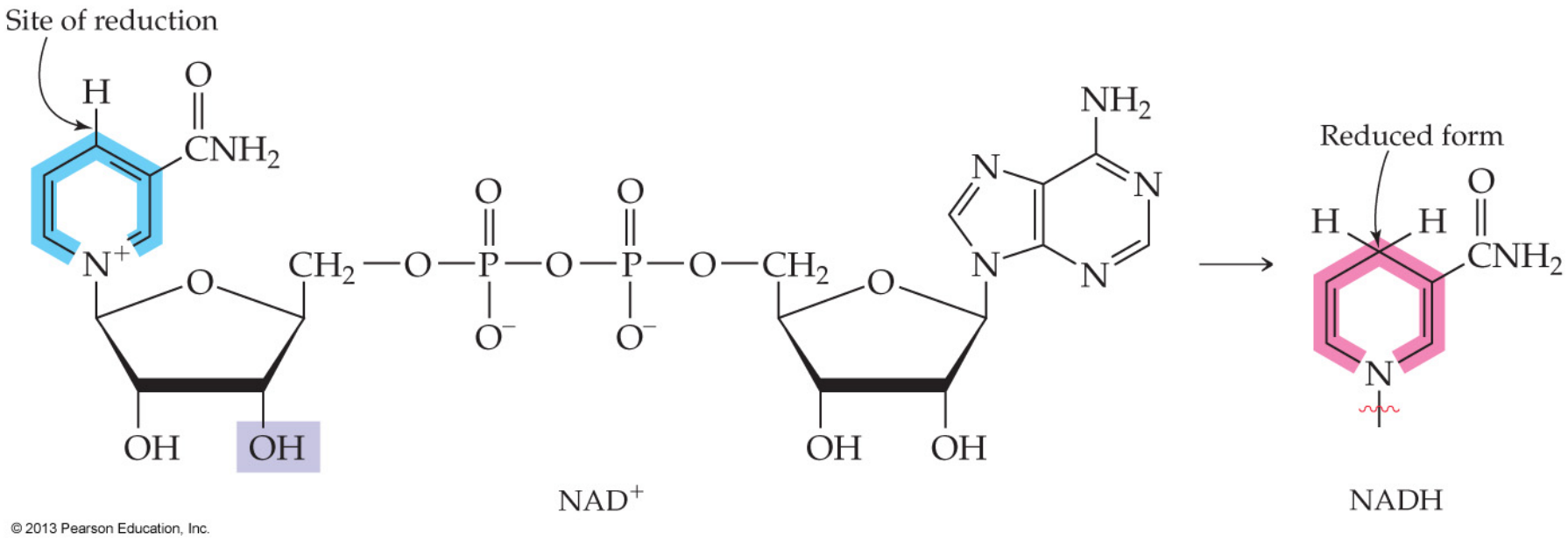
Free Energies of Hydrolysis

TABLE 20.1 Free Energies of Hydrolysis of Some Phosphates



Compound Name	Function	ΔG (kcal/mol)	ΔG (kJ/mol)
Phosphoenol pyruvate	Final intermediate in conversion of glucose to pyruvate (glycolysis)—Stage 2, Figure 20.5	−14.8	−61.9
1, 3-Bisphosphoglycerate	Another intermediate in glycolysis	−11.8	−49.4
Creatine phosphate	Energy storage in muscle cells	−10.3	−43.1
ATP (⟶ADP)	Principal energy carrier	−7.3	−30.5
Glucose 1-phosphate	First intermediate in breakdown of carbohydrates stored as starch or glycogen	−5.0	−20.9
Glucose 6-phosphate	First intermediate in glycolysis	−3.3	−13.8
Fructose 6-phosphate	Second intermediate in glycolysis	−3.3	−13.8

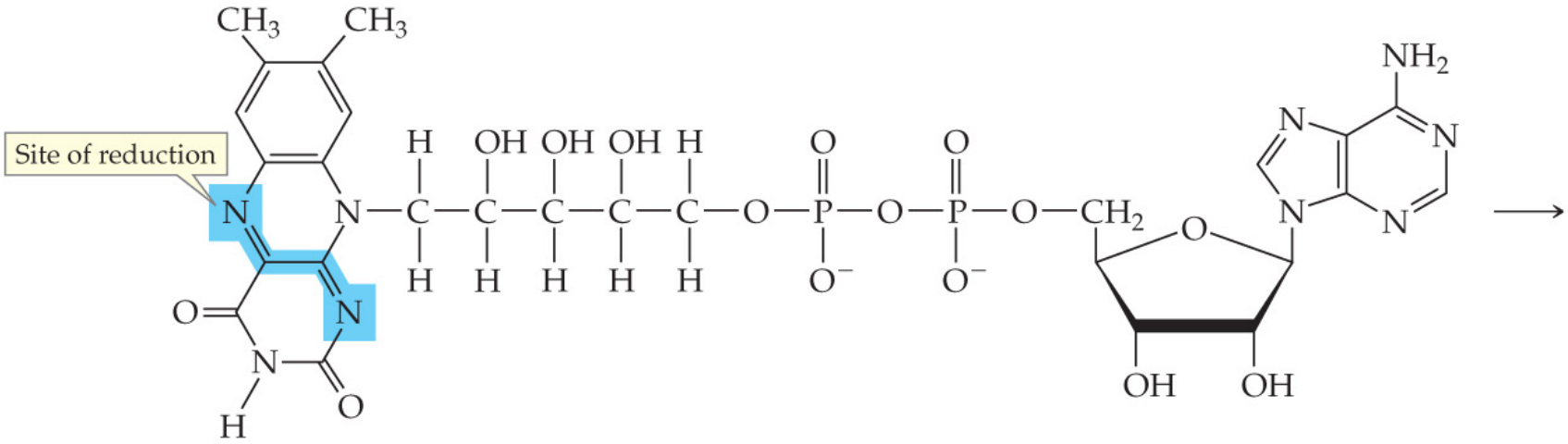
Nicotinamide Adenine Dinucleotide (NADH)



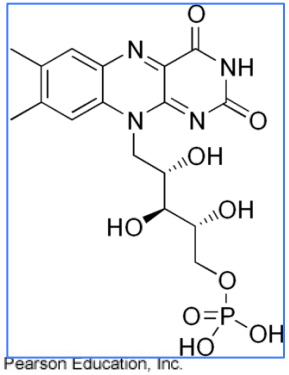
(NADPH if –OH is replaced by $-OPO_3^{2-}$)

(Often written as $NADH/H^+$)

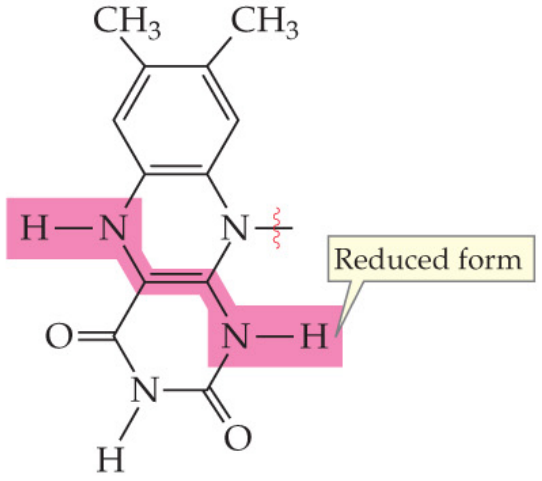
Flavin Adenine Dinucleotide ($FADH_2$)



FAD

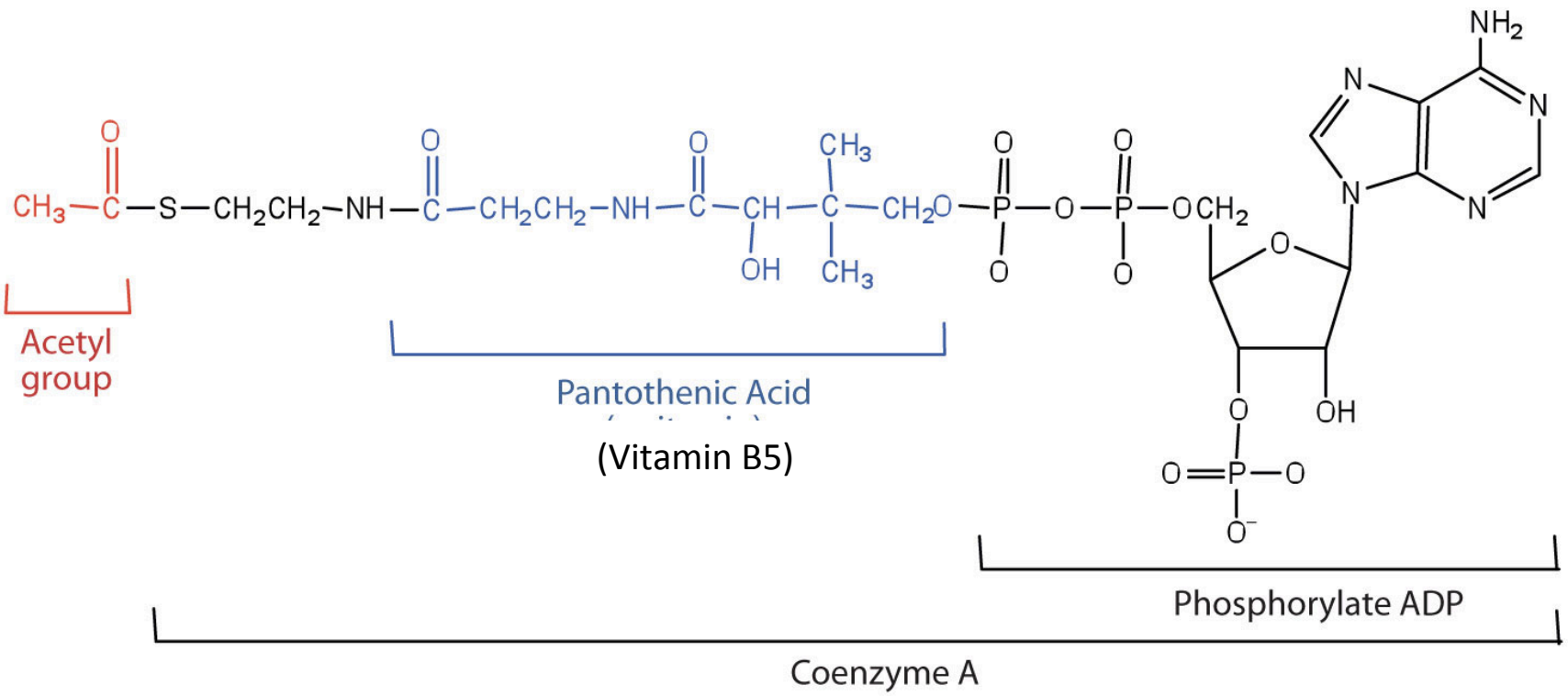


(FMN)

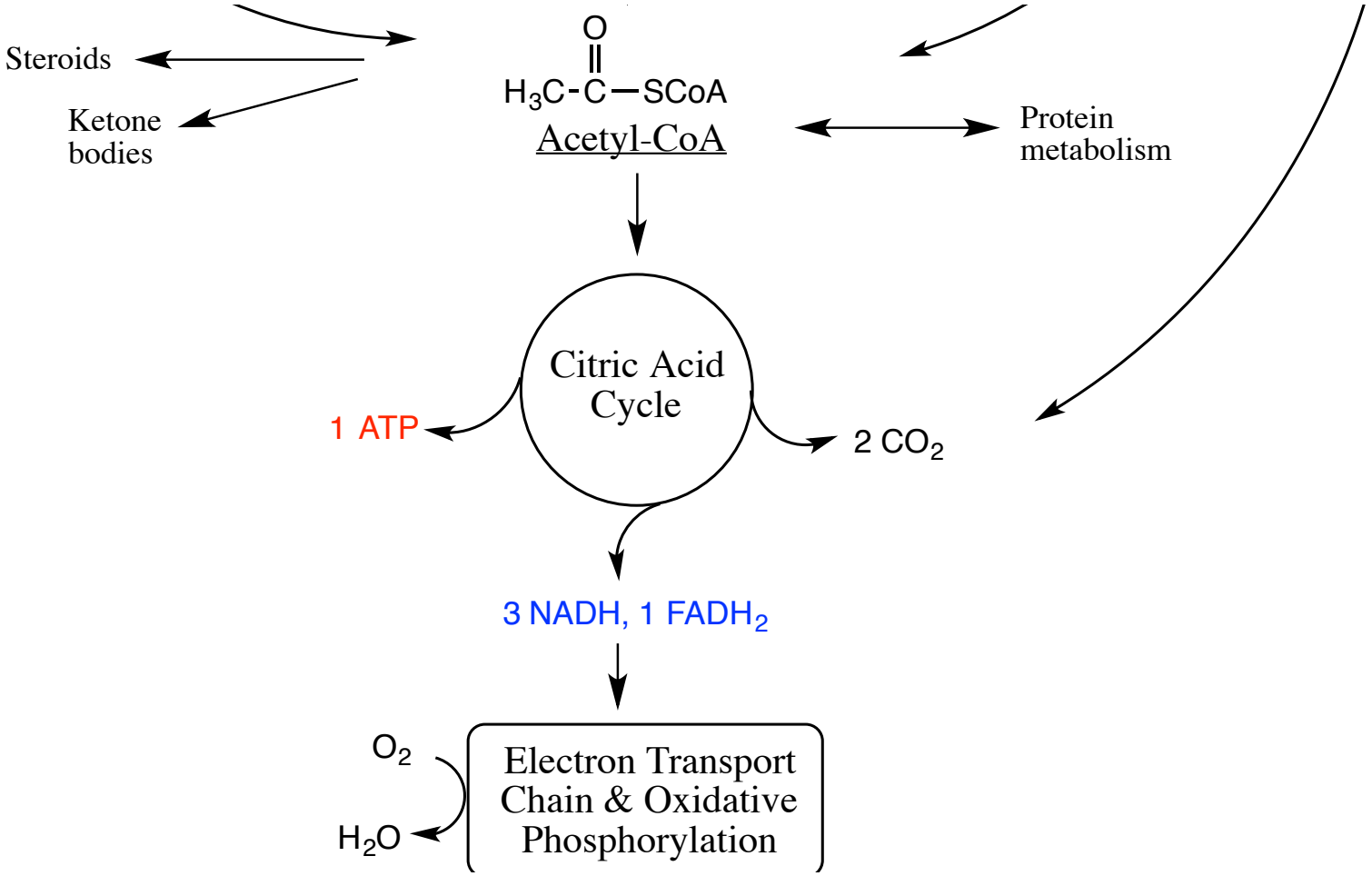


$FADH_2$

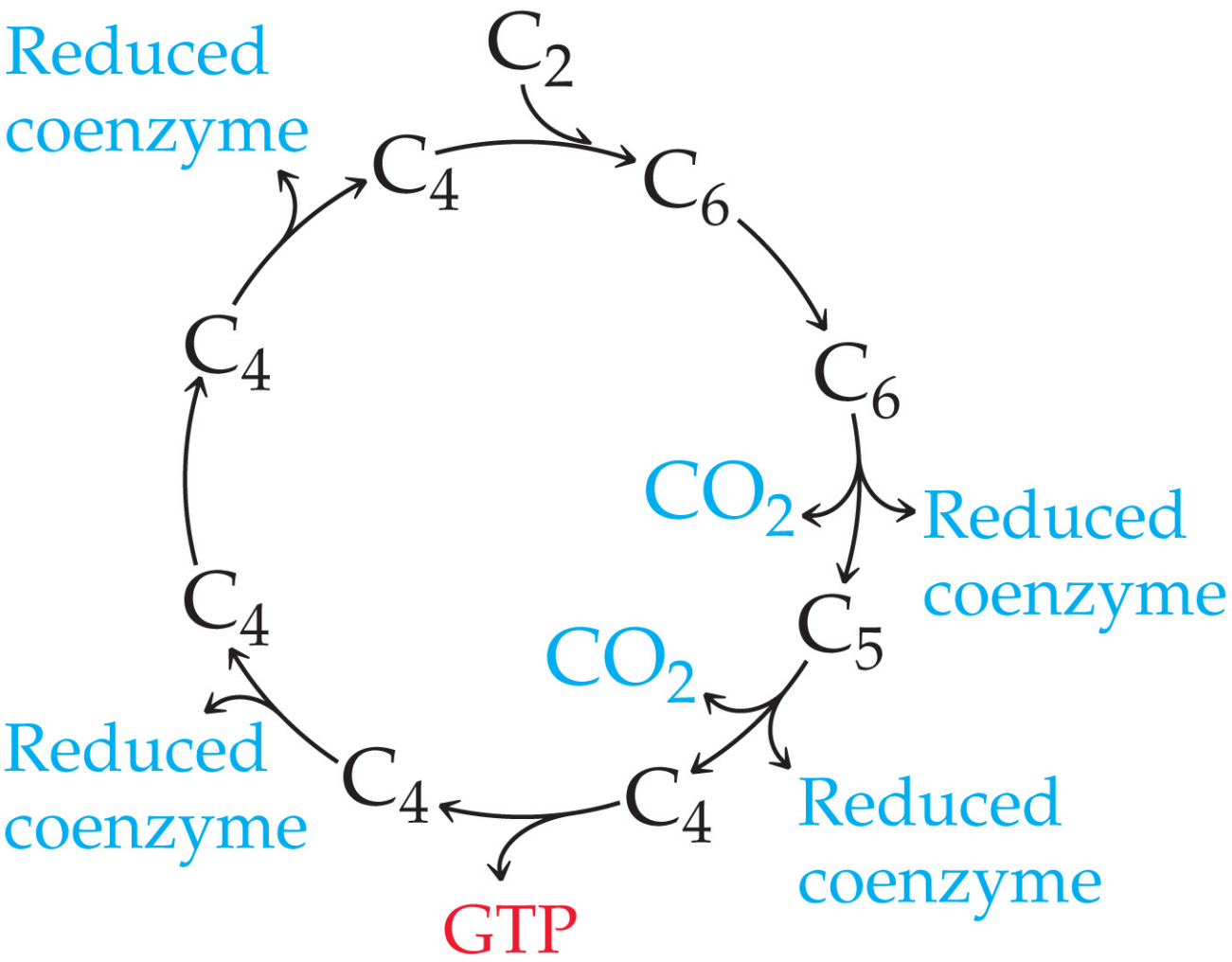
Acetyl-CoA


Acetyl group
Pantothenic Acid
(Vitamin B5)
Phosphorylate ADP
Coenzyme A

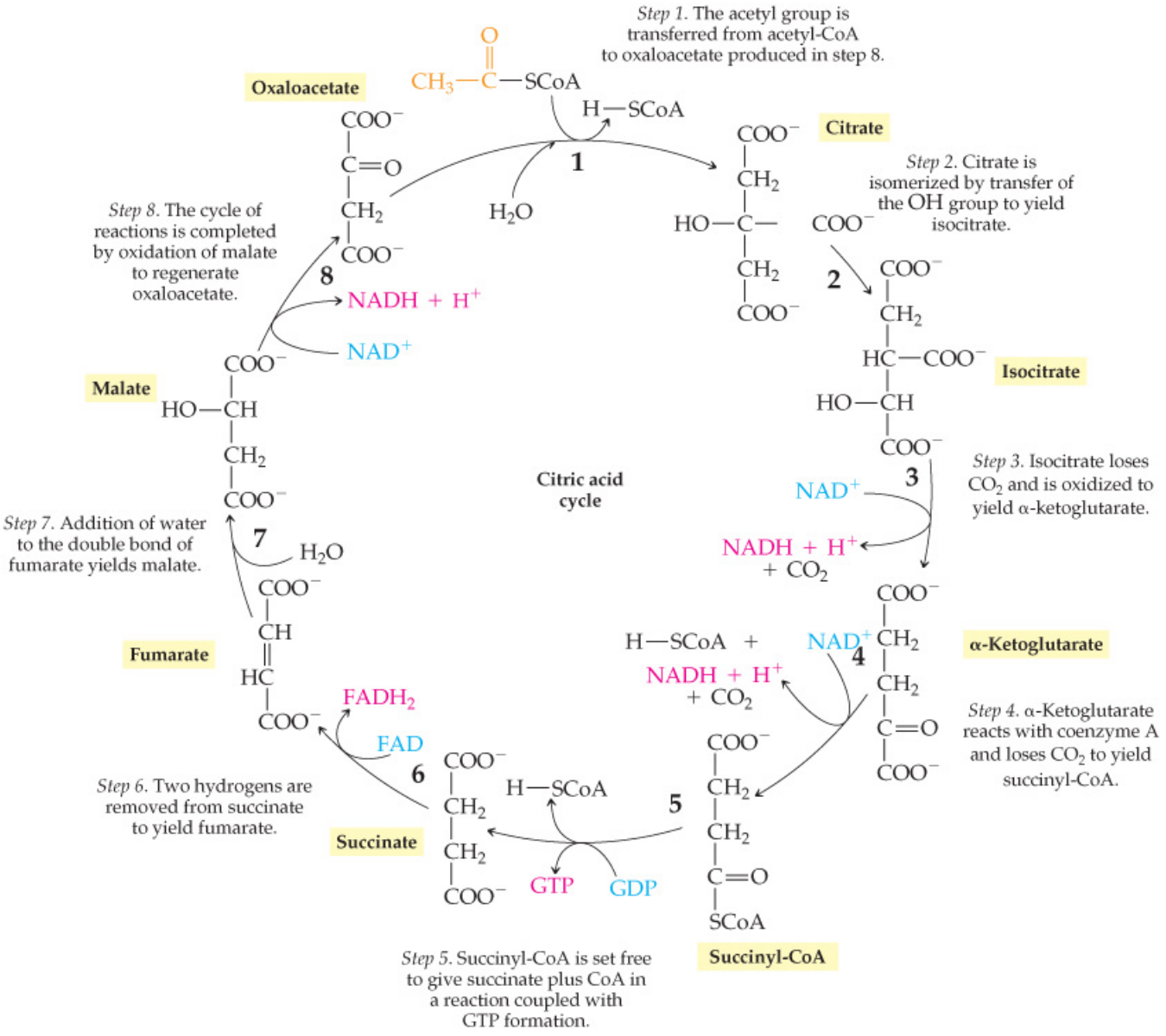
Citric Acid Cycle



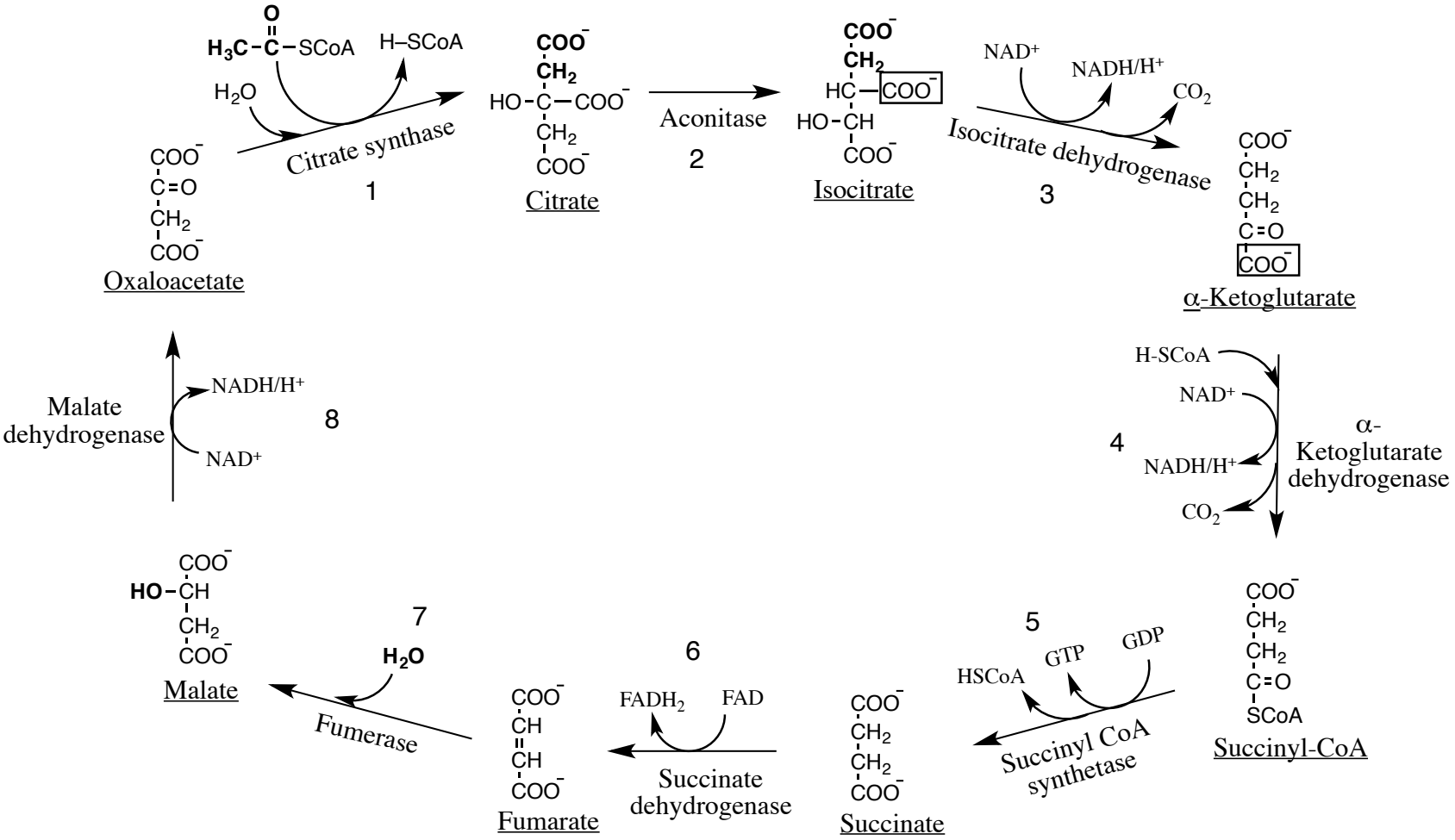
Citric Acid Cycle, in more detail



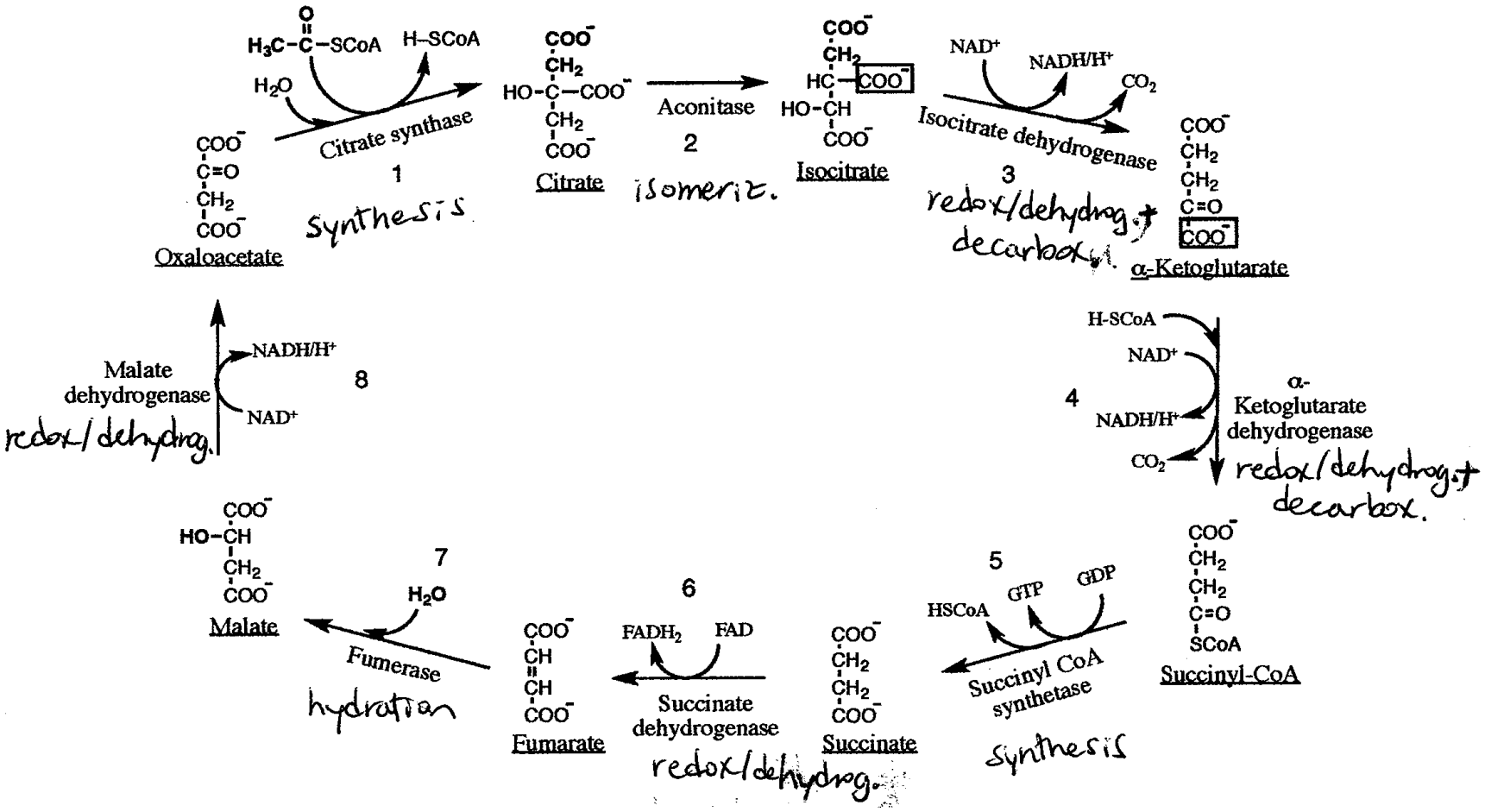
Citric Acid Cycle, even more detail



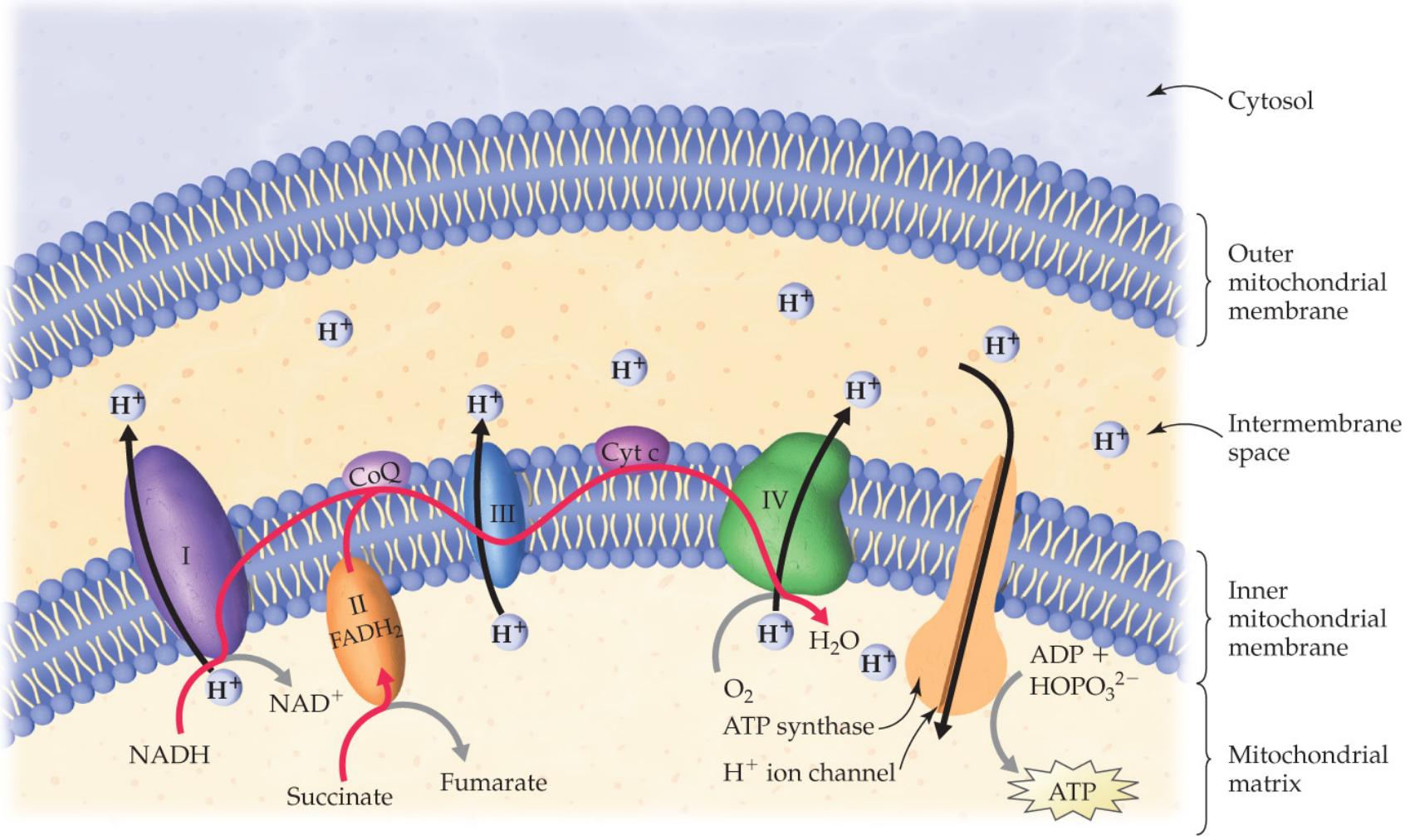
[Handout] Citric Acid Cycle



Chemistry of Citric Acid Cycle

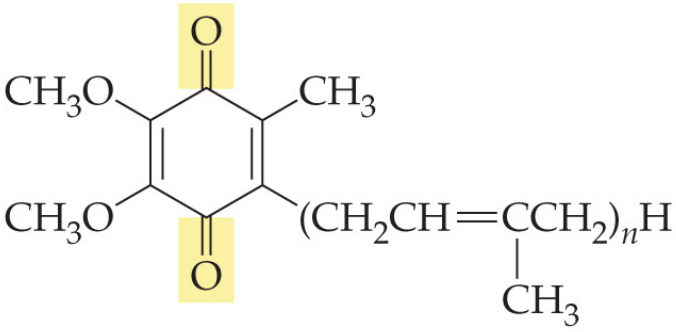


Electron Transport Chain and ATP Synthase

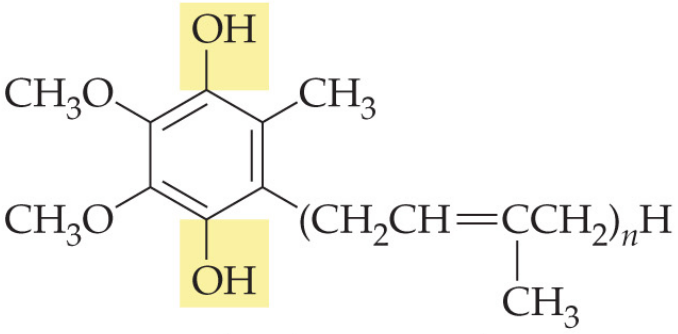


The Mobile Components of Electron Transport Chain

Coenzyme Q

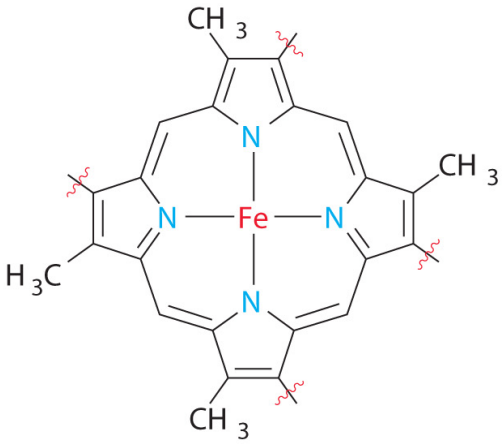


Oxidized coenzyme Q

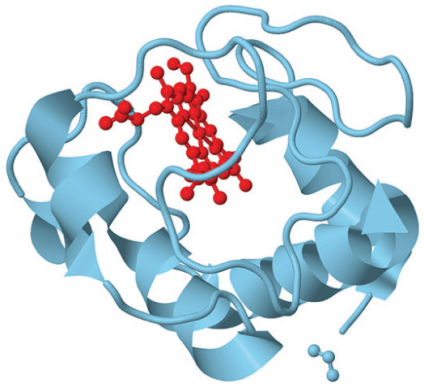


Reduced coenzyme Q

Cytochrome C (with heme cofactor)



(a) A heme group



(b) A representative cytochr ome pr otein

Energy Diagram for Electron Transport Chain