Figure 5.17: A summary of aerobic respiration in prokaryotes.

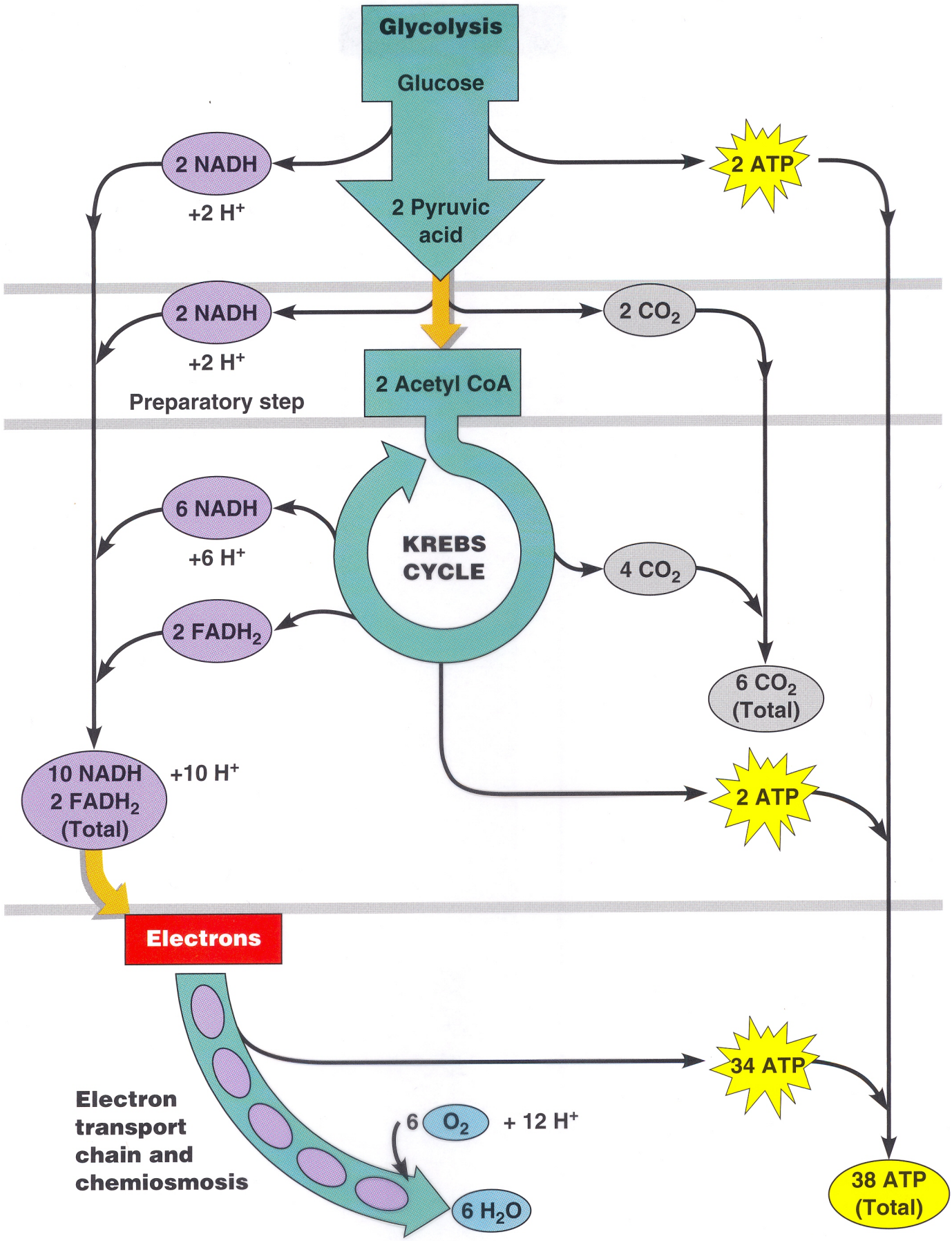
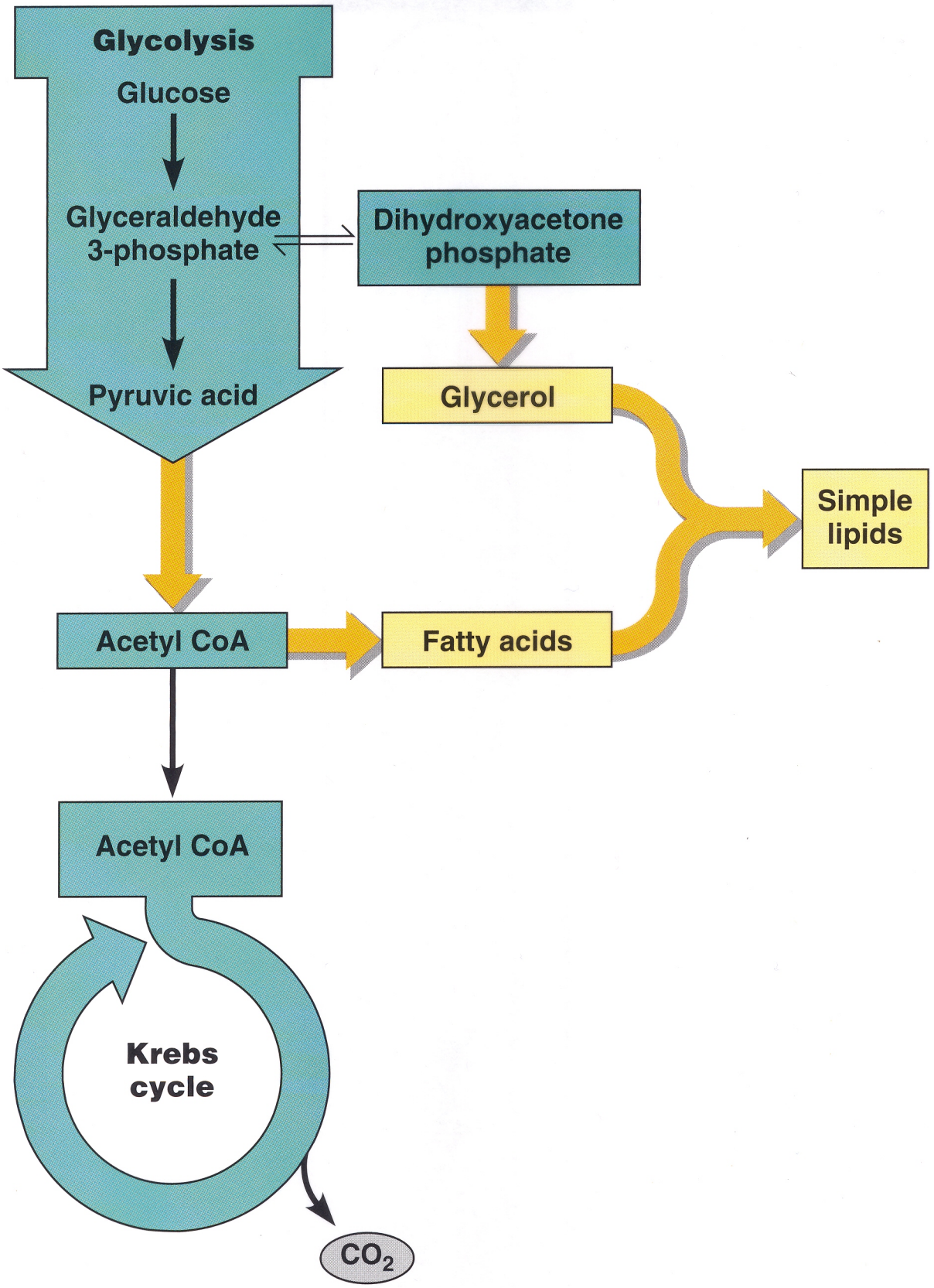


Figure 5.29: The biosynthesis of simple lipids.



The Pentose Phosphate Pathway

- also called hexose monophosphate pathway
- can operate at same time as glycolytic or Entner-Doudoroff pathways
- can operate aerobically or anaerobically
- an amphibolic pathway

oxidation steps

produce NADPH, which is needed for biosynthesis

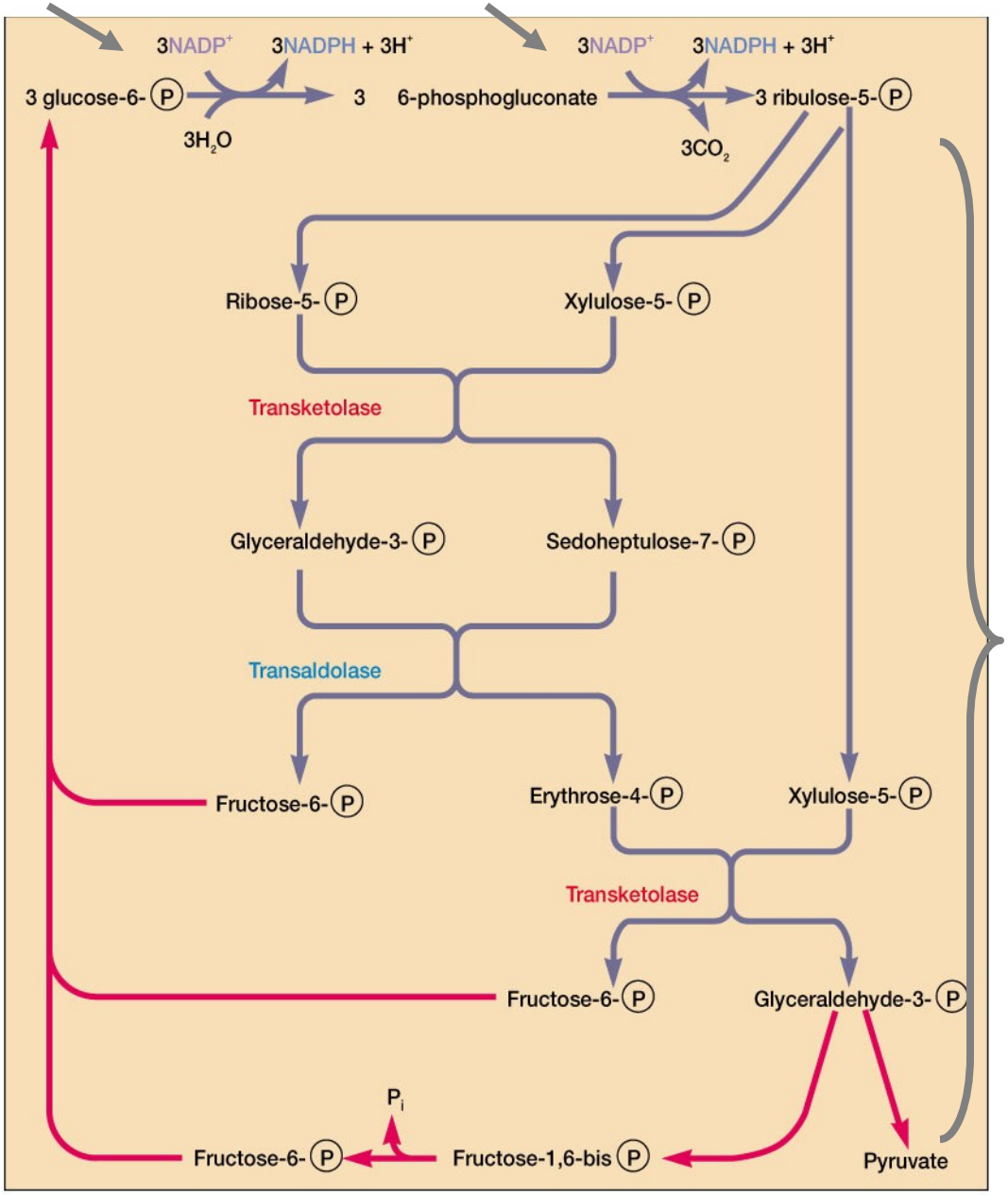


Figure 9.6

sugar trans-formation reactions

produce sugars needed for biosynthesis

sugars can also be further degraded

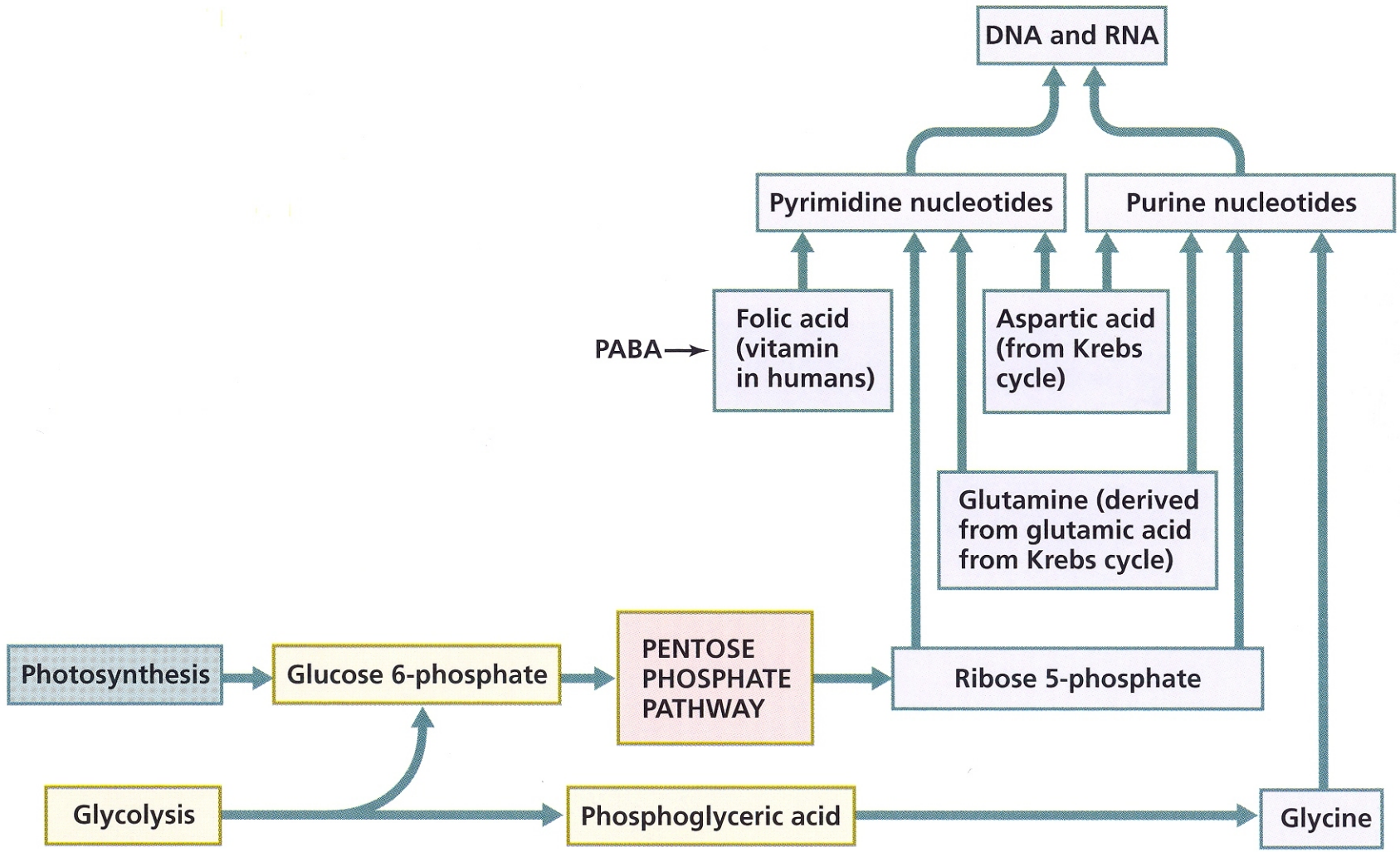
Summary of pentose phosphate pathway

$$\text{glucose-6-P} + 12NADP^{+} + 7H_2O$$

$$\downarrow$$

$$6CO_2 + 12NADPH + 12H^{+}\ P_i$$

Figure 5.33: Biosynthesis of nucleotides



The Entner-Doudoroff Pathway

- yield per glucose molecule:
  - 1 ATP
  - 1 NADPH
  - 1 NADH

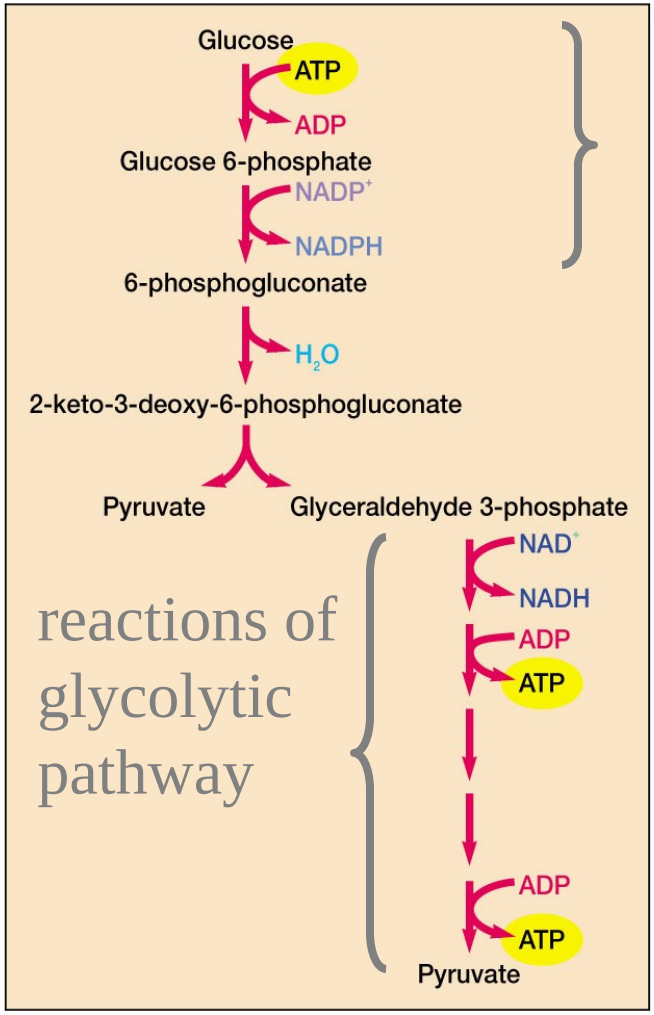


Figure 9.8

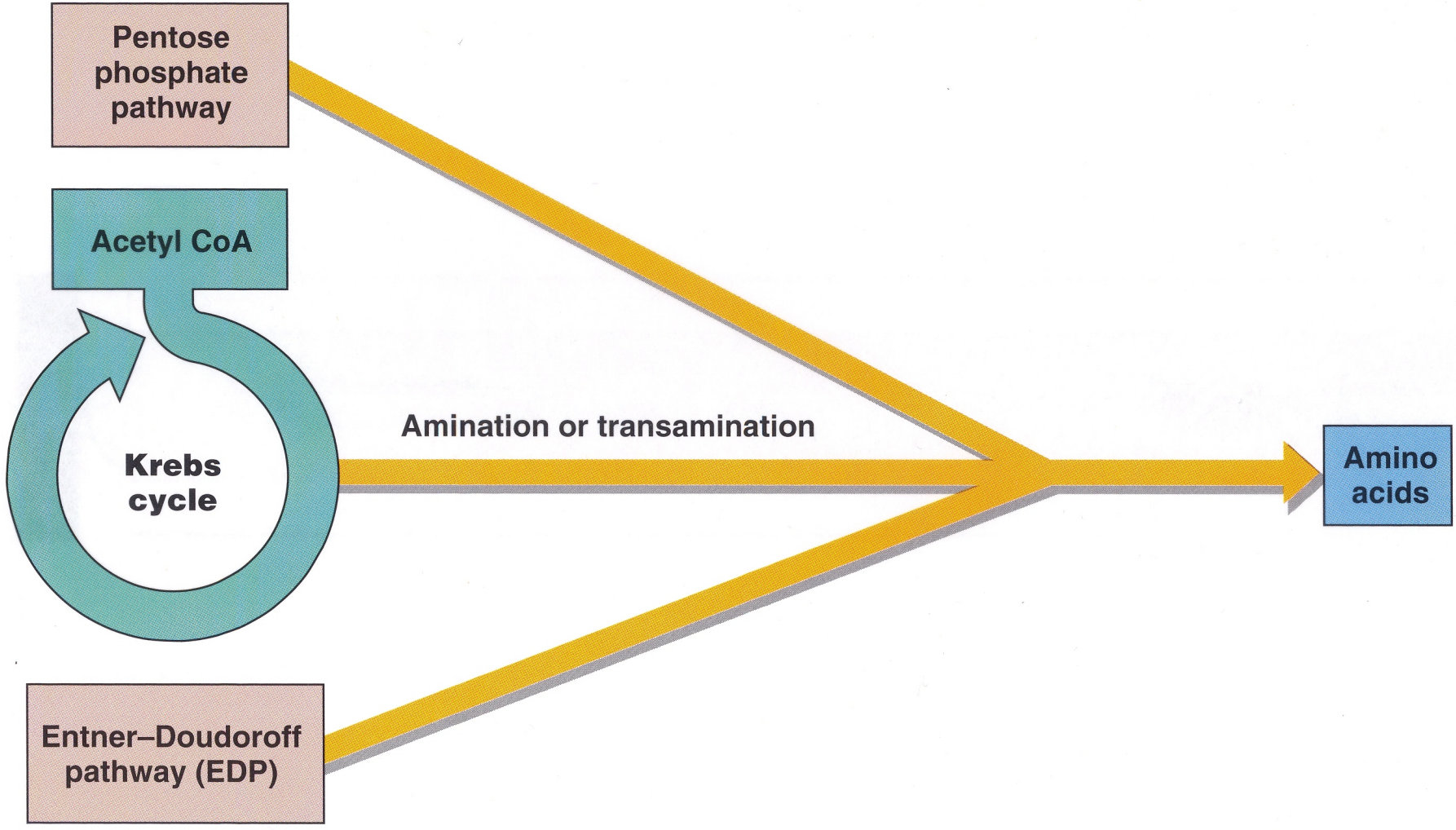
reactions of pentose phosphate Pathway

Examples:

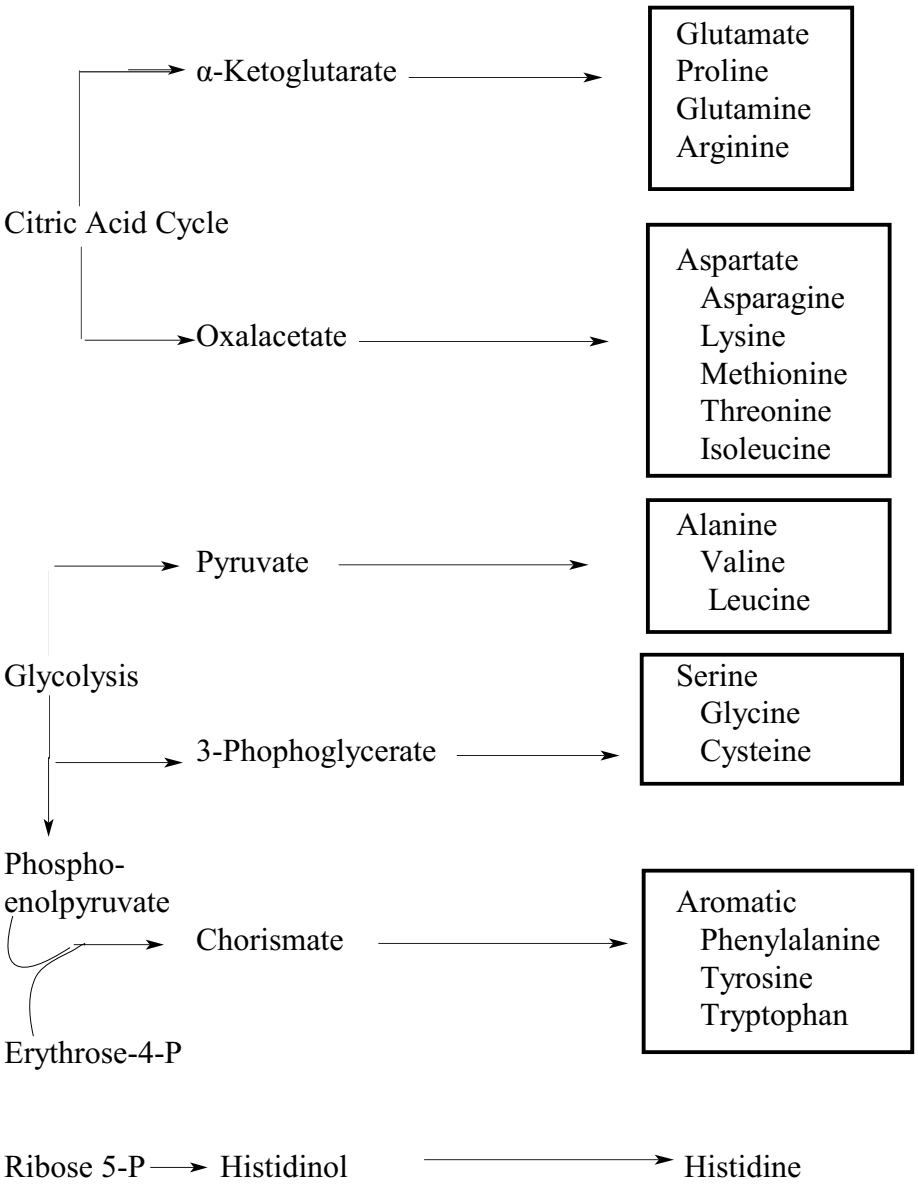
Pseudomonas aeruginosa

Enterococcus faecalis

Figure 5.30a: The biosynthesis of amino acids.

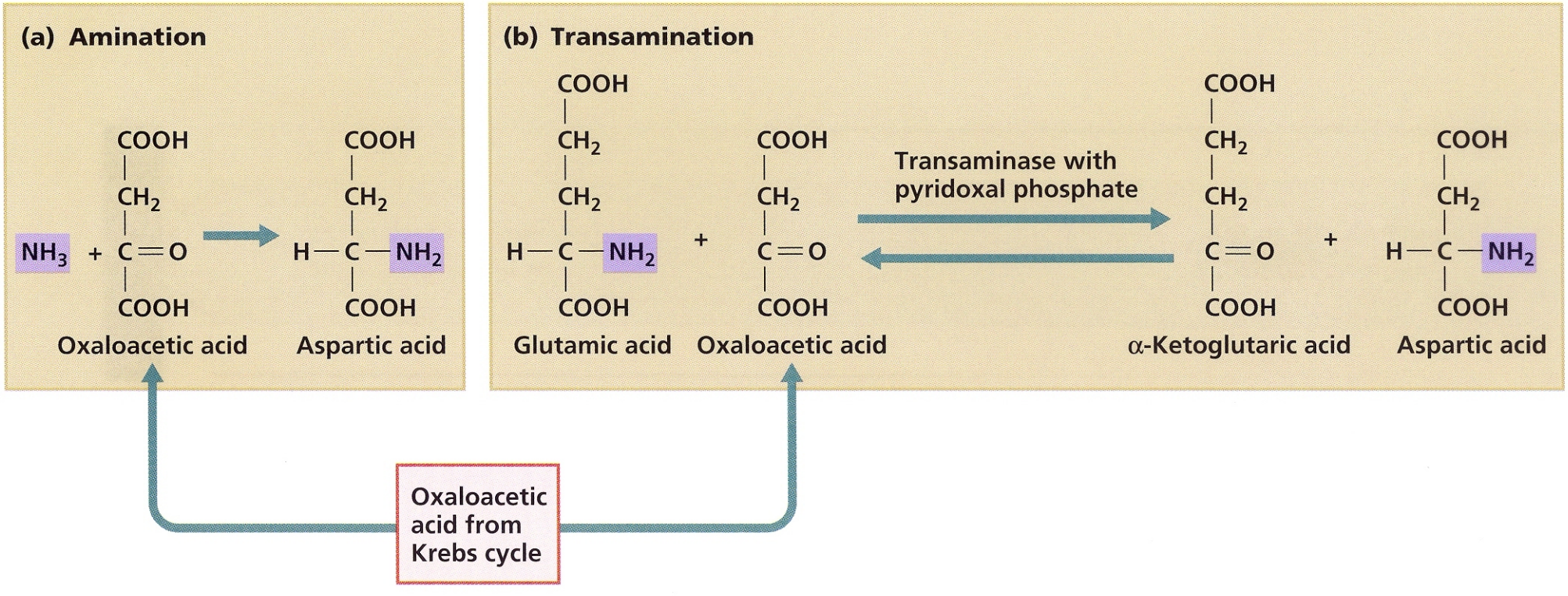


(a) Amino acid biosynthesis



Amino Acid Families. Note how the carbon skeletons for most amino acids are derived from either citric acid cycle or from glycolysis.

Figure 5.32: Synthesis of amino acids via amination and transamination



Fermentations

- oxidation of NADH produced by glycolysis
- pyruvate or derivative used as endogenous electron acceptor
- ATP formed by substrate-level phosphorylation

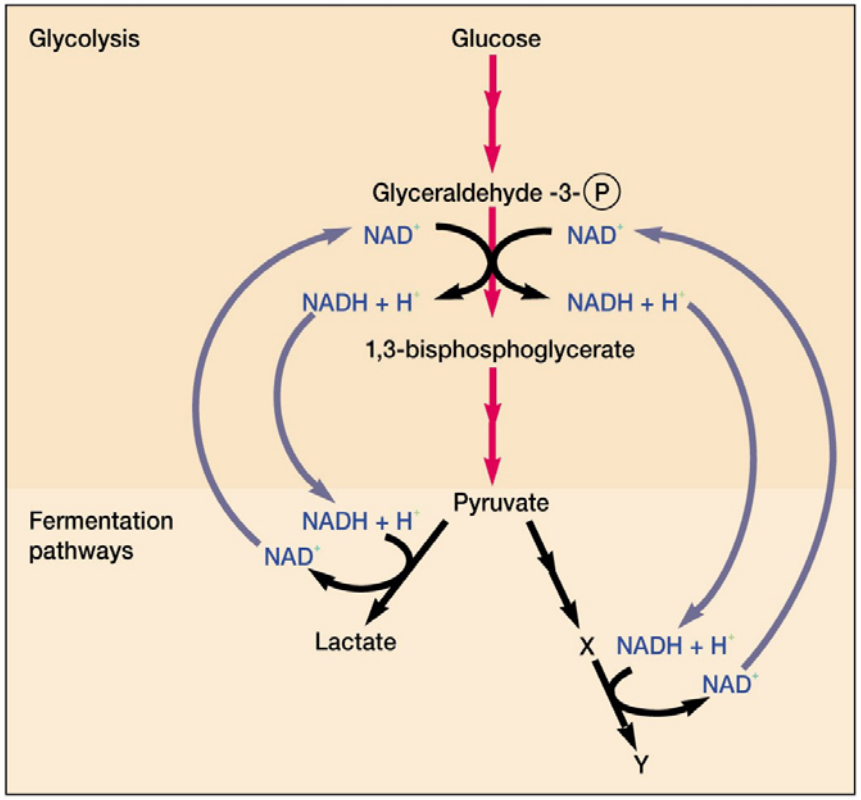


Figure 9.9

homolactic fermenters

heterolactic fermenters

food spoilage

yogurt, sauerkraut, pickles, etc.

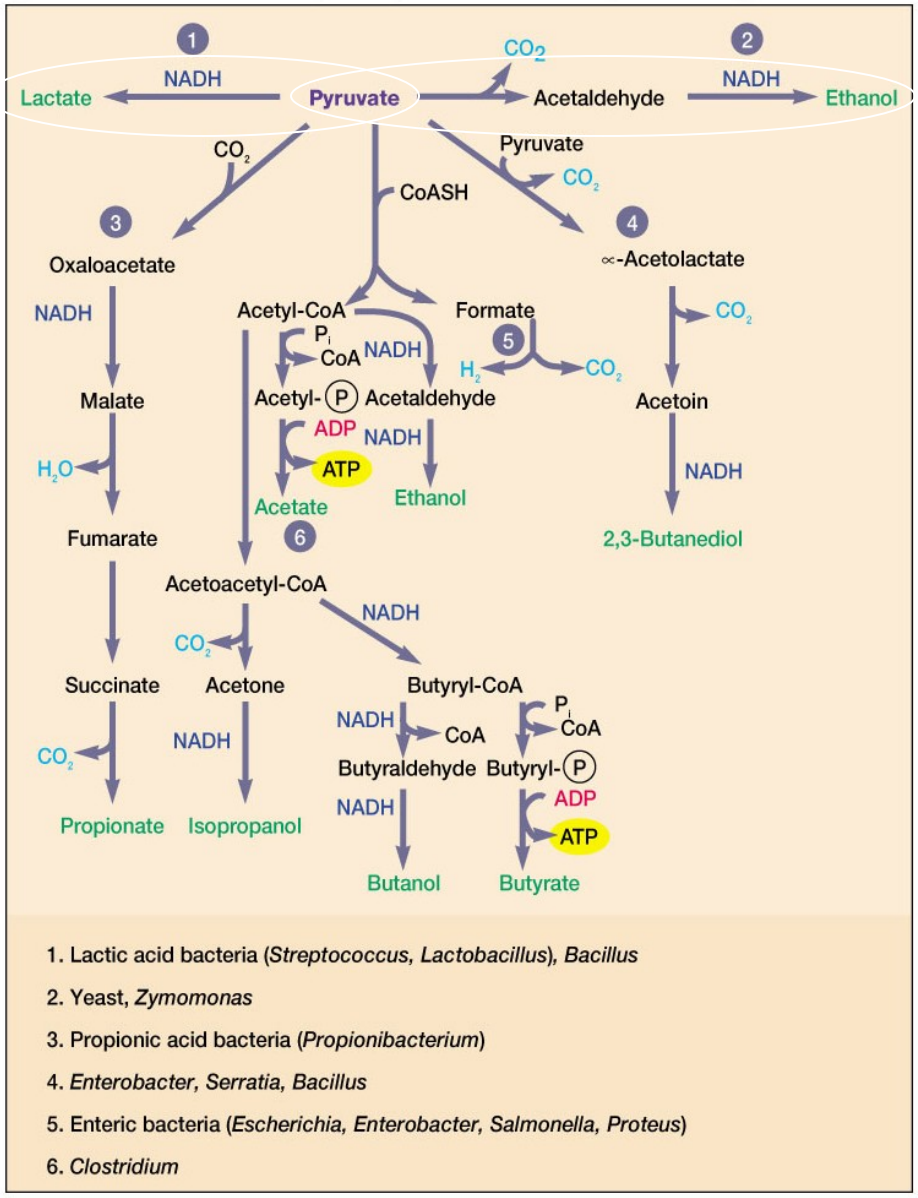


Figure 9.10

alcoholic fermentation

alcoholic beverages, bread, etc.

Figure 5.20: Lipid catabolism.

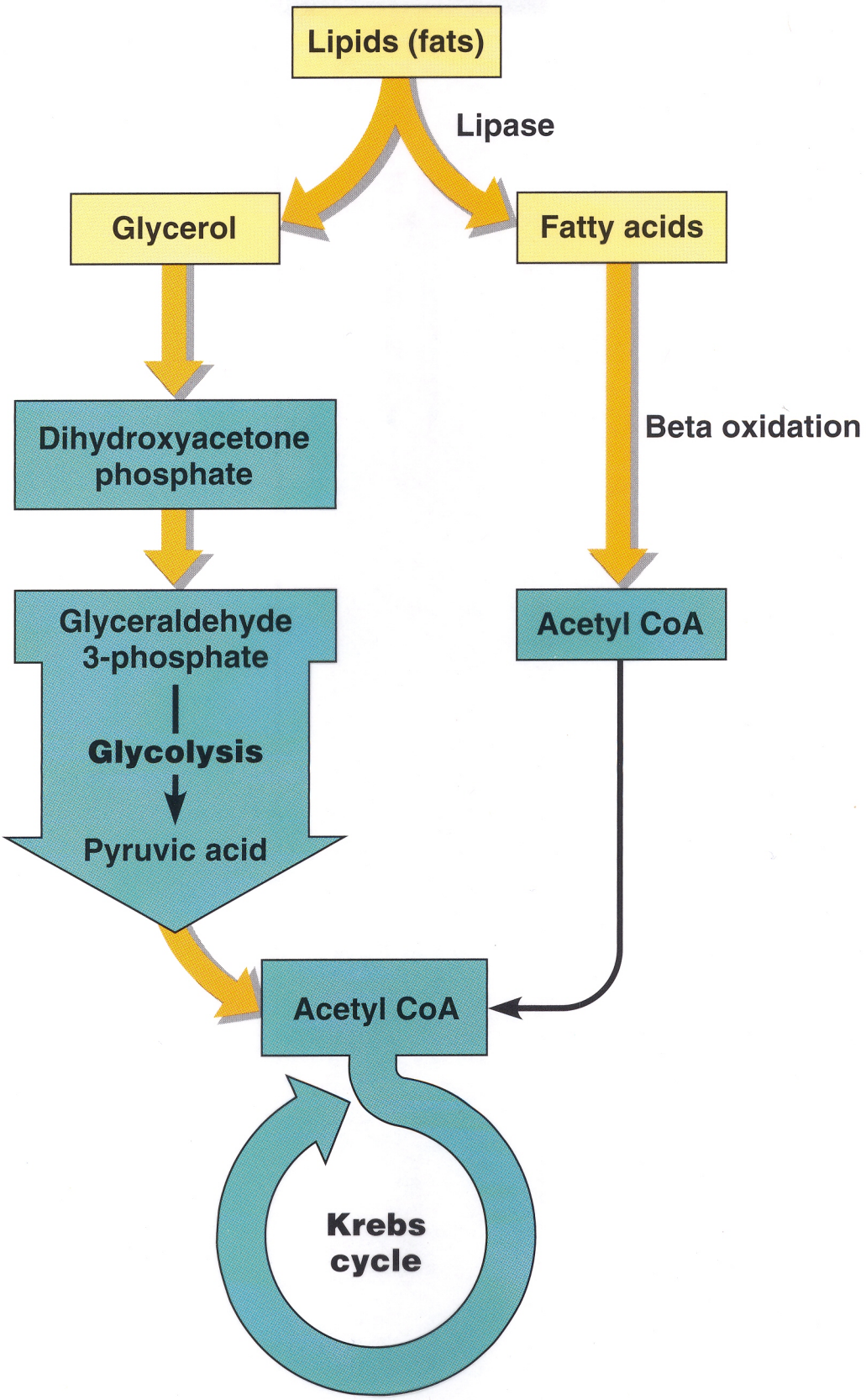


Figure 5.25: Protein catabolism in microbes

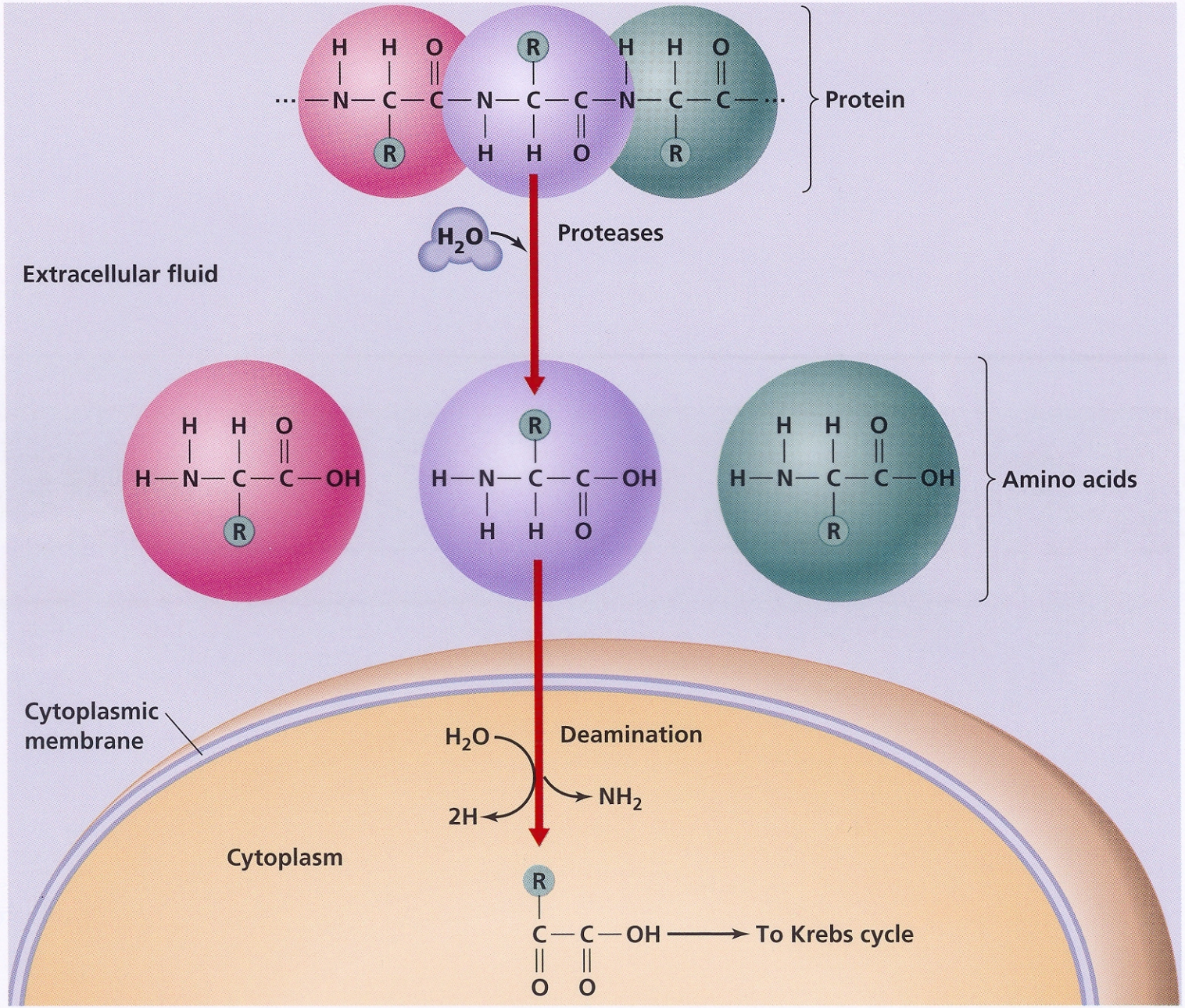


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Figure 5.21: Catabolism of various organic food molecules.

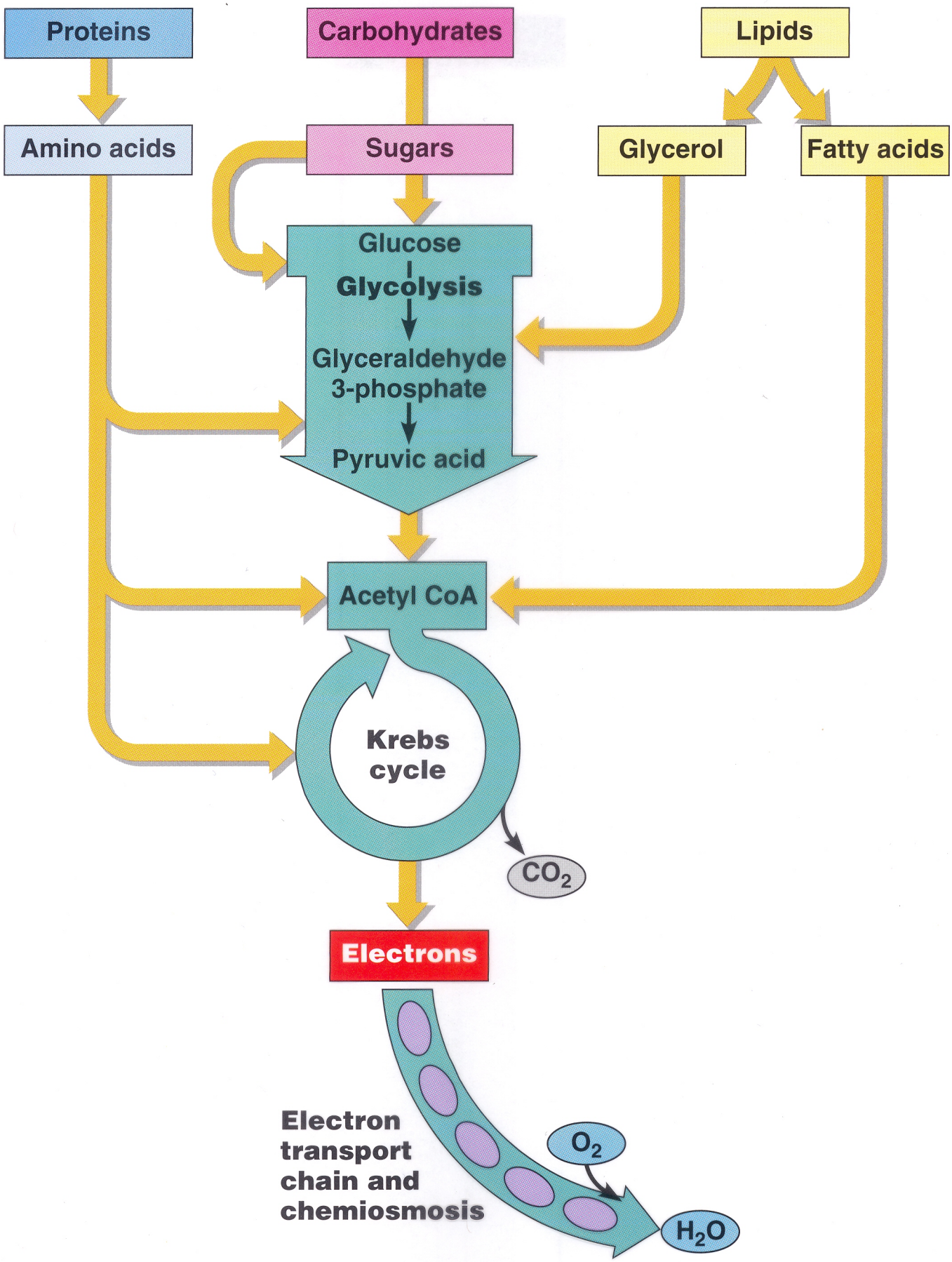
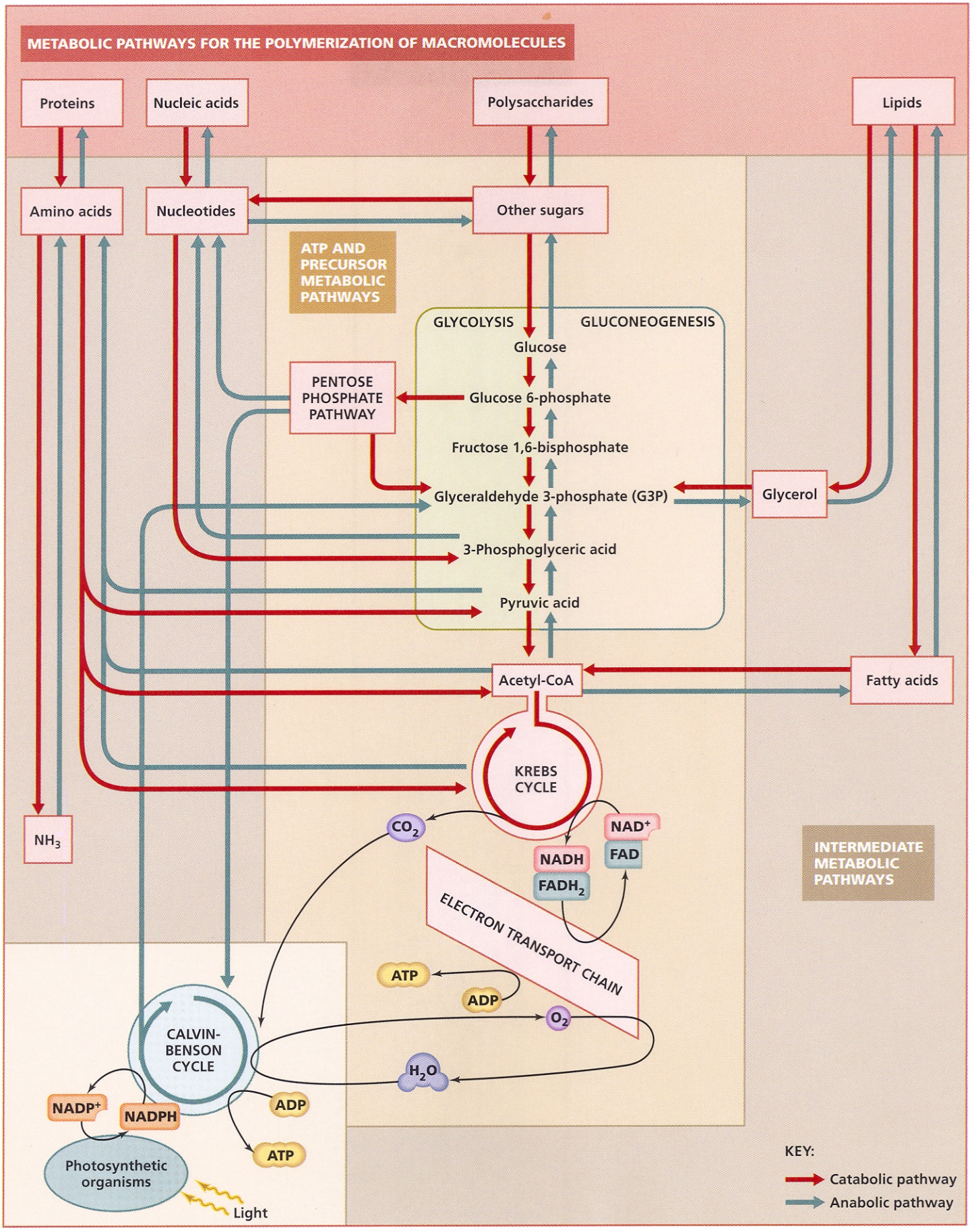


Figure 5.34: Integration of cellular metabolism



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