

7.014
Lecture 17:
Carbon and Energy Metabolism
March 14, 2005

Summary of the options for Life

(the simplified view – see also Freeman Ch 25)

	<u>Organism</u>	<u>Carbon Source</u>	<u>Energy Source</u>
<u>Autotrophs</u>			
Oxygenic Photosynthesis	pro and euk	CO ₂	sun
Anoxygenic Photosynthesis	prokaryotic	CO ₂	sun
Chemosynthesis	prokaryotic	CO ₂	Reduced chemical compounds
<u>Heterotrophs</u>			
Aerobic Respiration	pro or euk	organic C	organic C
Anaerobic Respiration	pro or euk	organic C	organic C
Fermentation	pro or euk	organic C	organic C

euk = eukaryotic

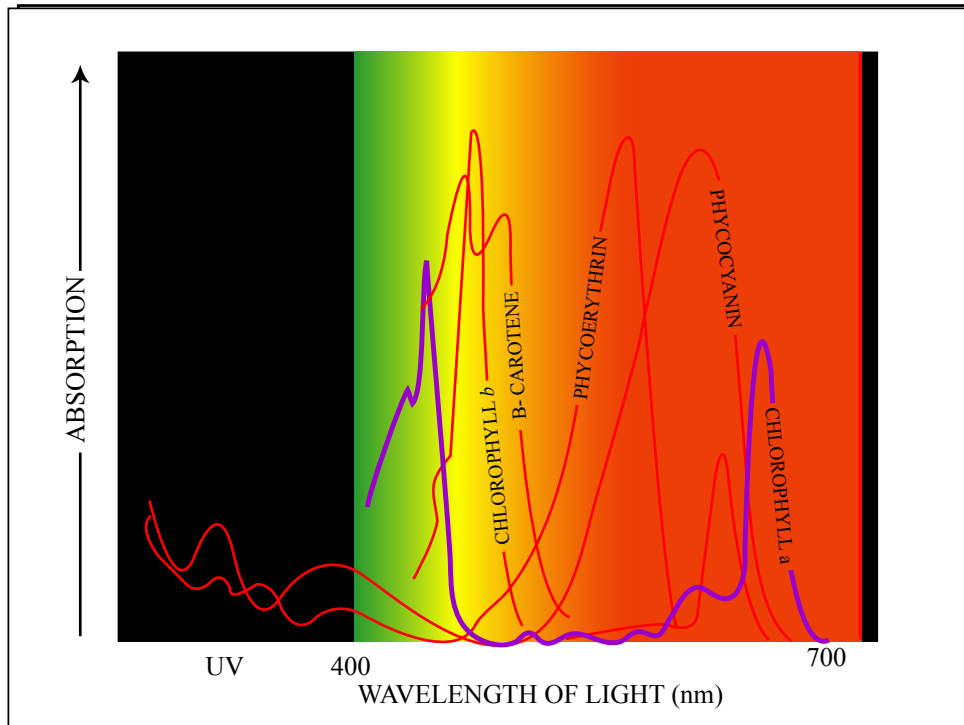
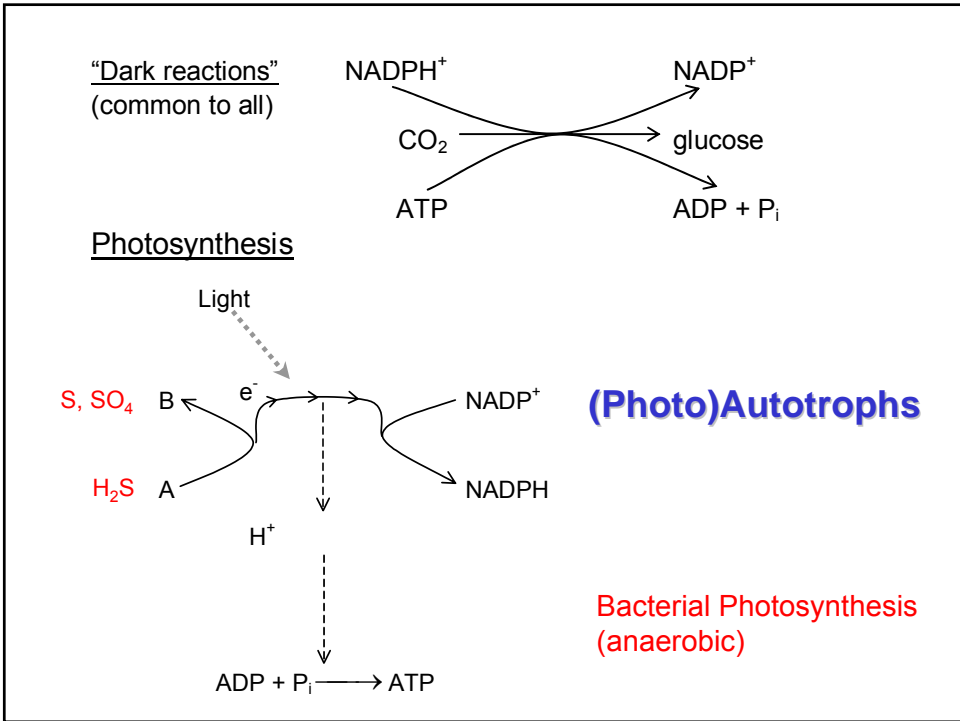
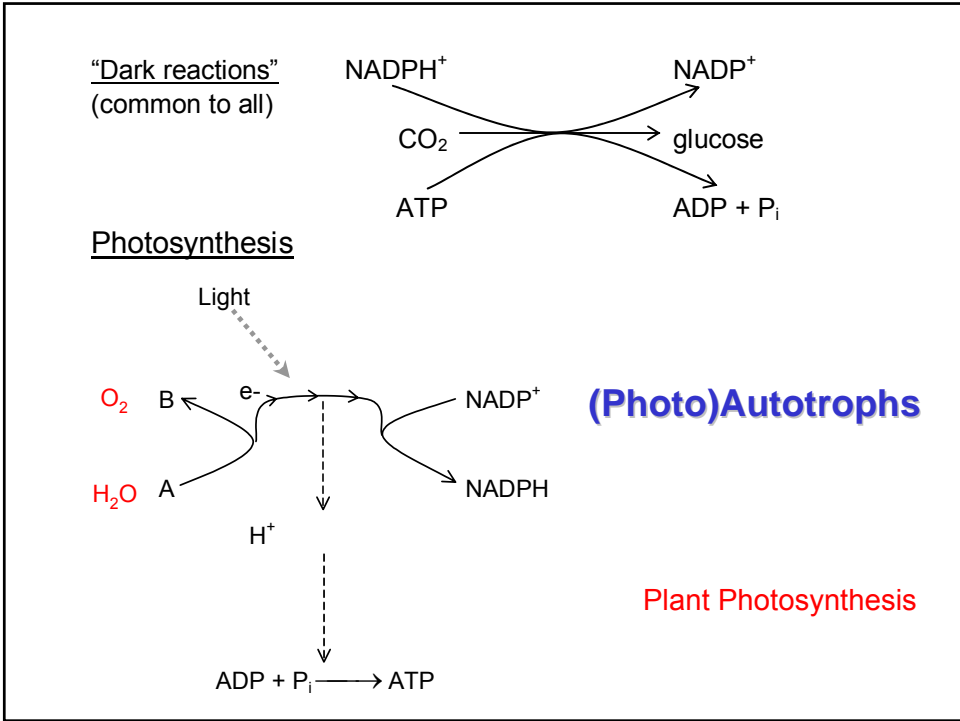


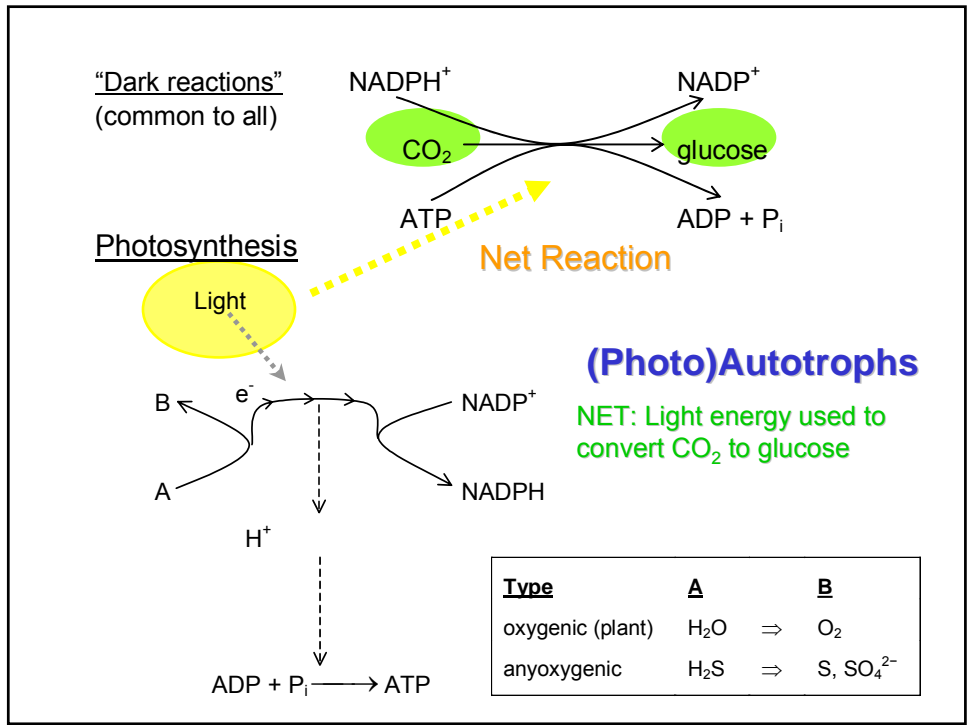
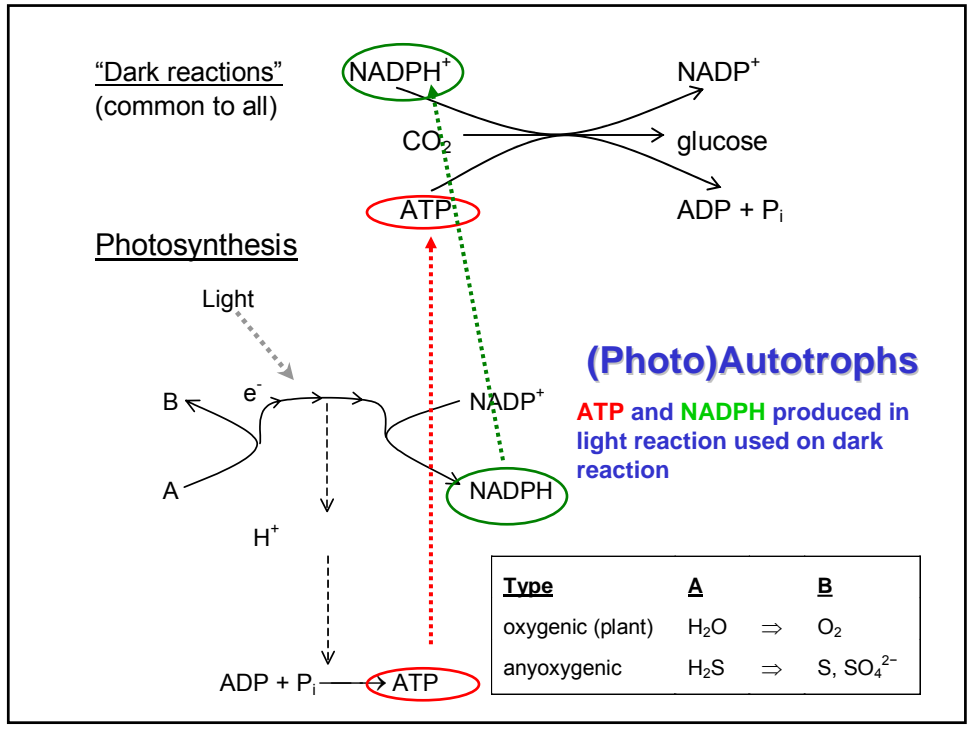
Figure by MIT OCW.

Figure removed due to copyright considerations.

Please see:

Freeman, Scott. *Biological Science*. Upper Saddle River, NJ: Prentice Hall, 2002. ISBN: 0130819239. Fig 25-6.





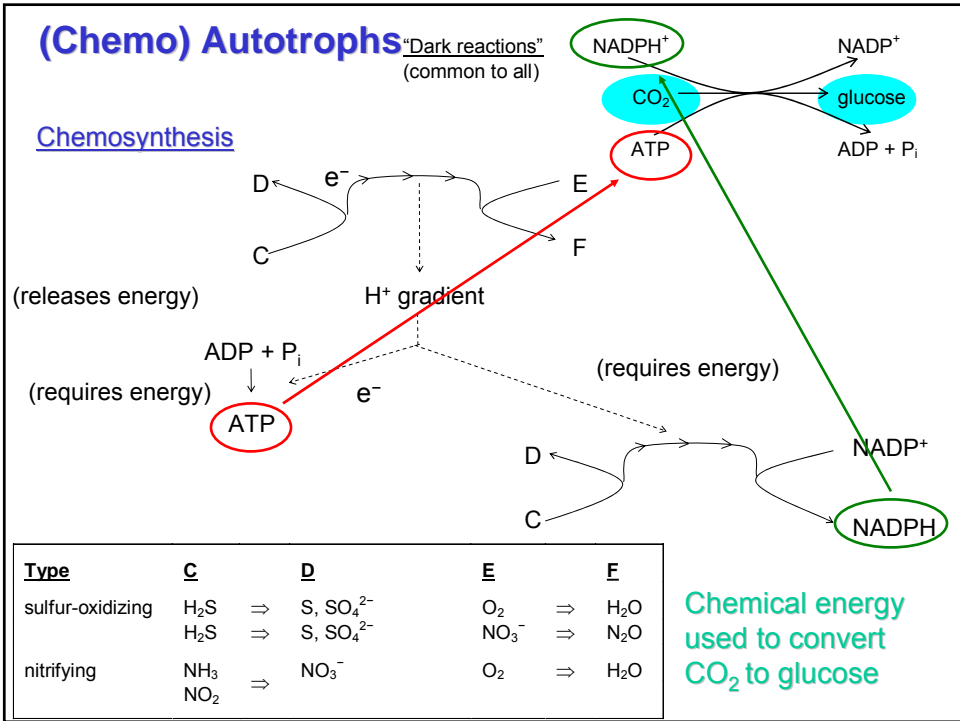
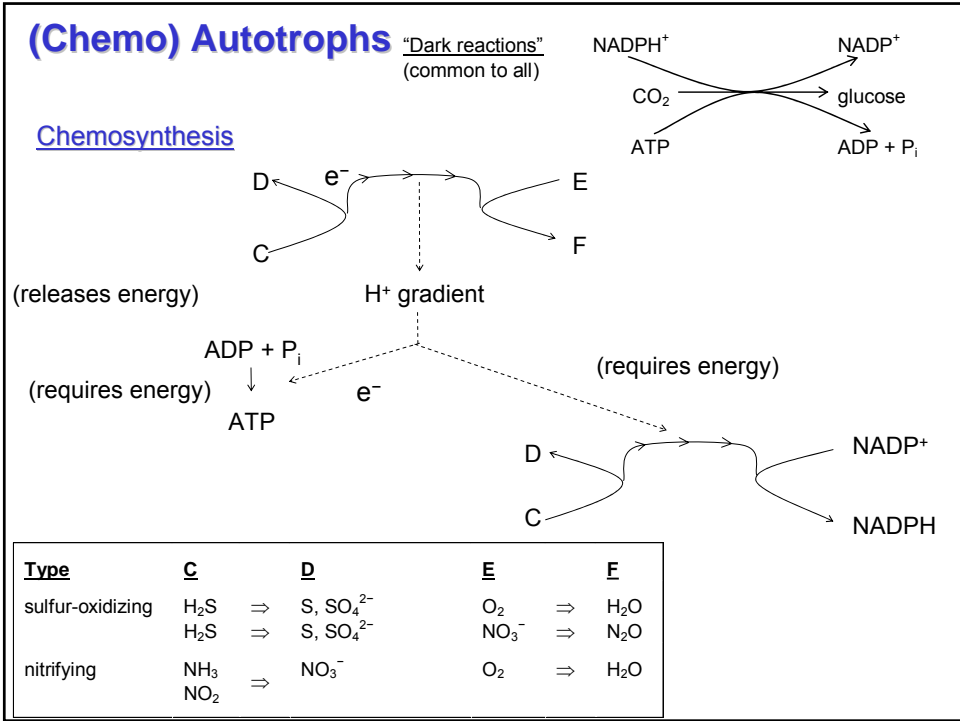
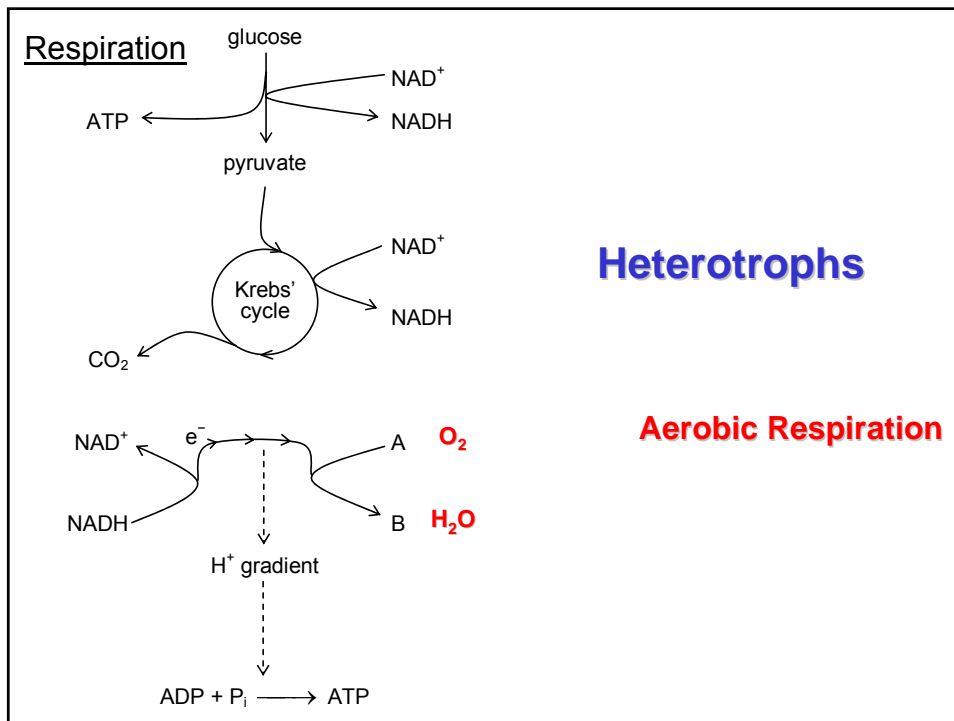
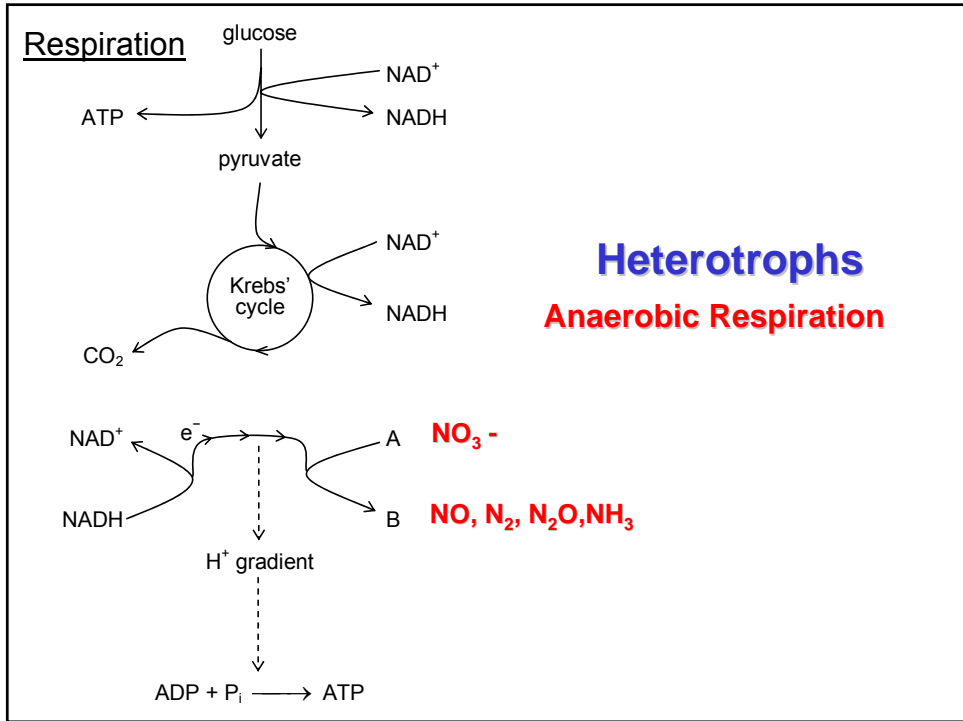
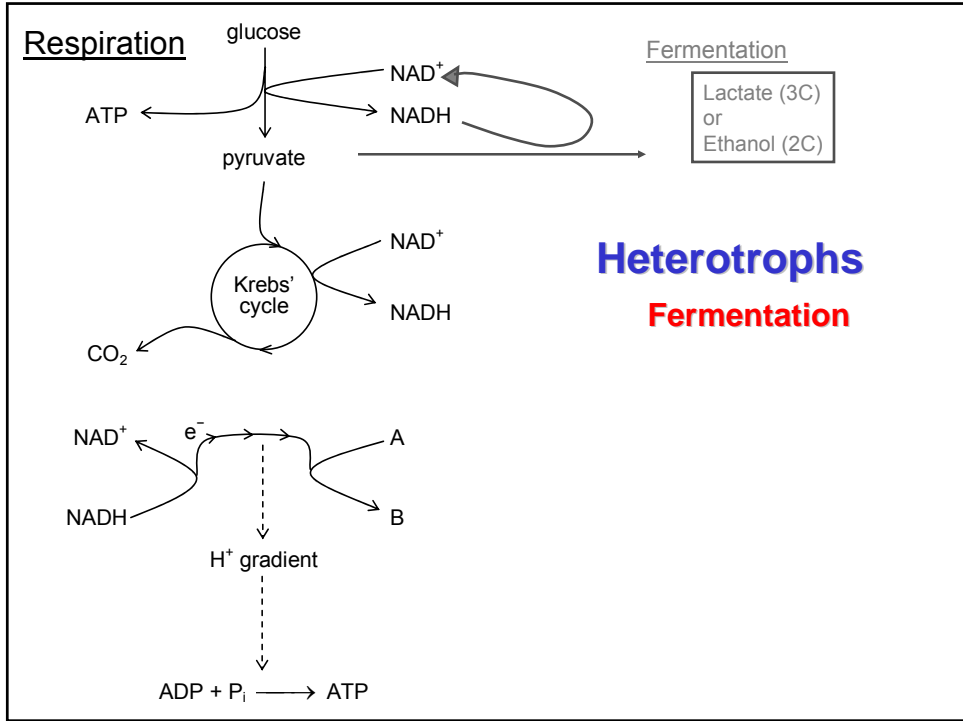


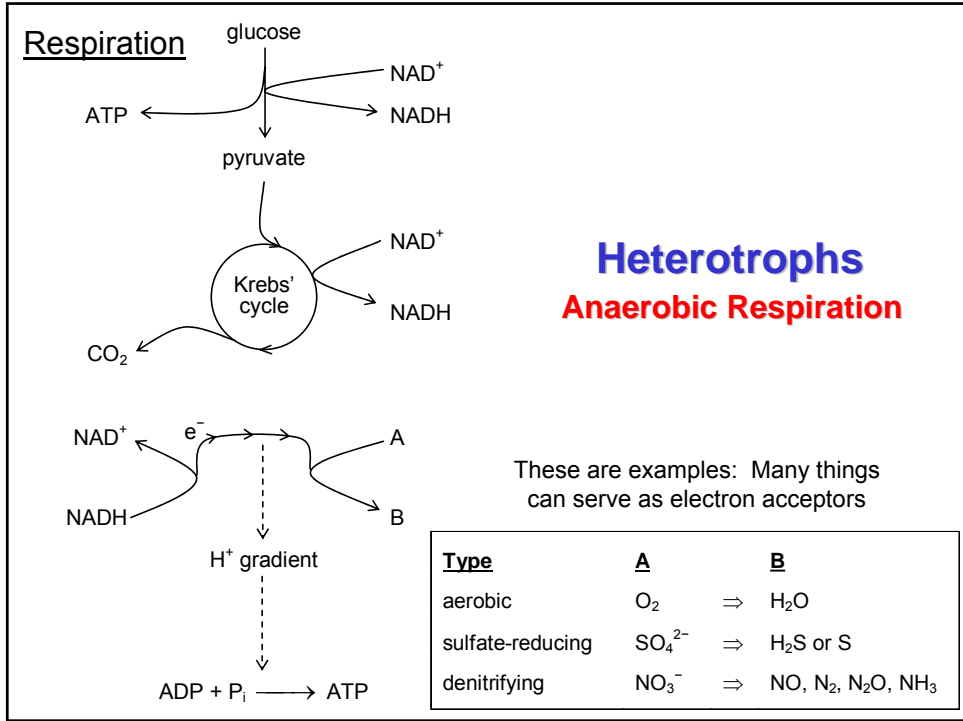
Figure removed due to copyright considerations.

Please see:

Freeman, Scott. *Biological Science*. Upper Saddle River, NJ: Prentice Hall, 2002. ISBN: 0130819239. Fig 25-5.

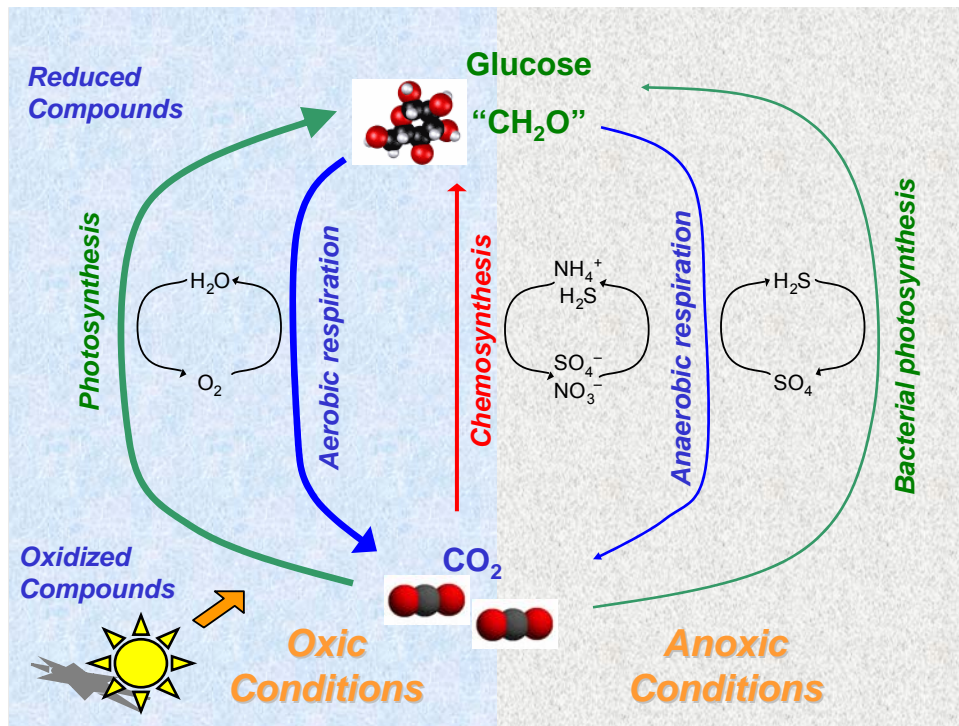






Heterotrophs
Anaerobic Respiration

Figure removed due to copyright considerations.
Please see:
Freeman, Scott. *Biological Science*. Upper Saddle River, NJ:
Prentice Hall, 2002. ISBN: 0130819239. Fig 25-5.



Take Home Messages

- There is more than one way to be alive – *energy and carbon and electrons*
- Microbes have most of the metabolic diversity available
- Products of one organism are the substrate for another
- Where metabolic pathway is energetically favorable, a microbe has evolved to take advantage of it