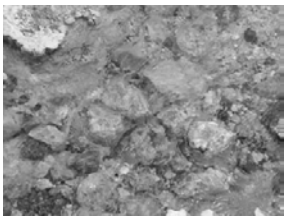
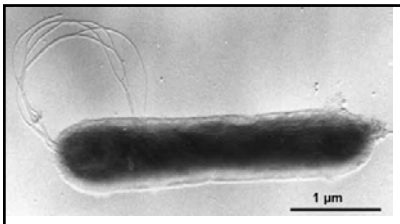
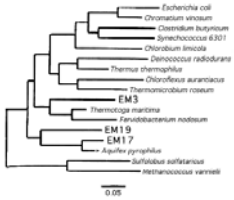
Identification for the Octopus Spring Pink Filaments



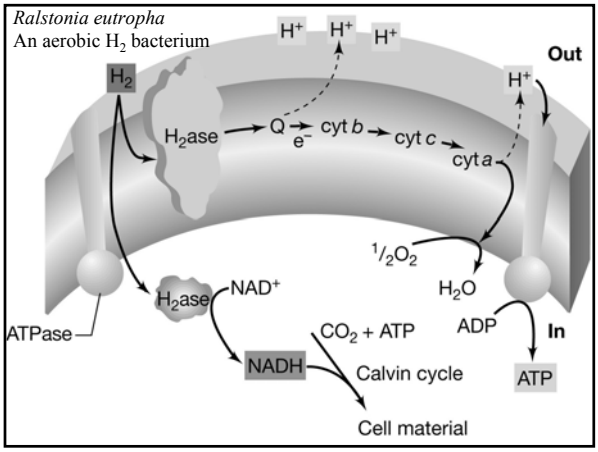


Aquifex pyrophilus



Yellowstone "Pink Filament" Isolates

Ralstonia eutropha
An aerobic H_2 bacterium



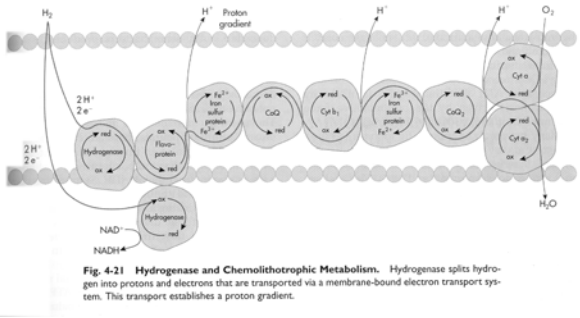


Fig. 4-21 Hydrogenase and Chemolithotrophic Metabolism. Hydrogenase splits hydrogen into protons and electrons that are transported via a membrane-bound electron transport system. This transport establishes a proton gradient.

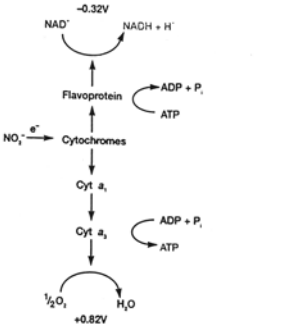
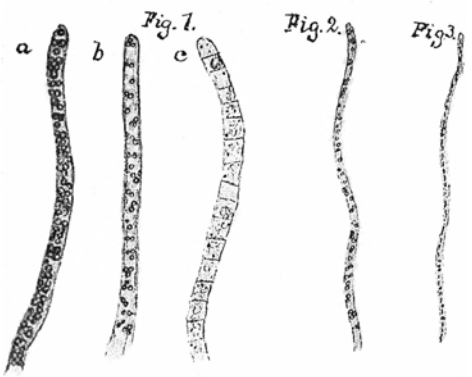
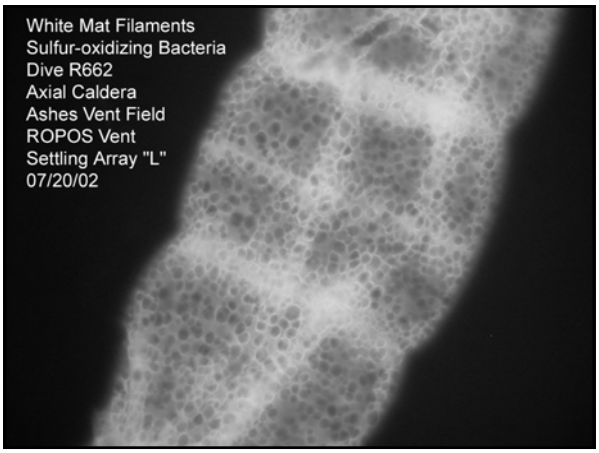
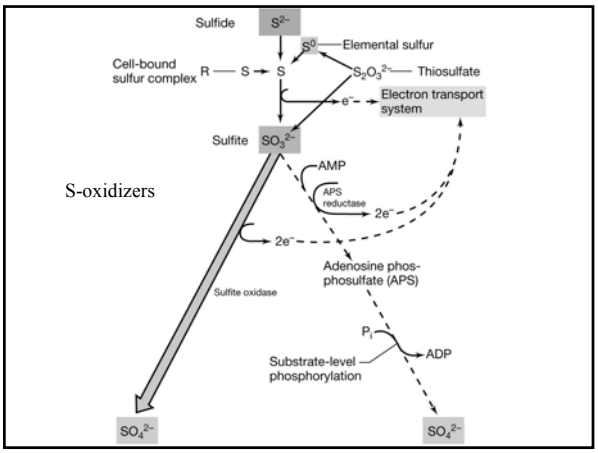


Figure 9.20 Reversed Electron Flow. The flow of electrons in the transport chain of *Nitrobacter*. Electrons flowing from nitrite to oxygen (down the reduction potential gradient) will release energy. It requires protonmotive force or ATP energy to force electrons to flow in the reverse direction from nitrite to NAD+.

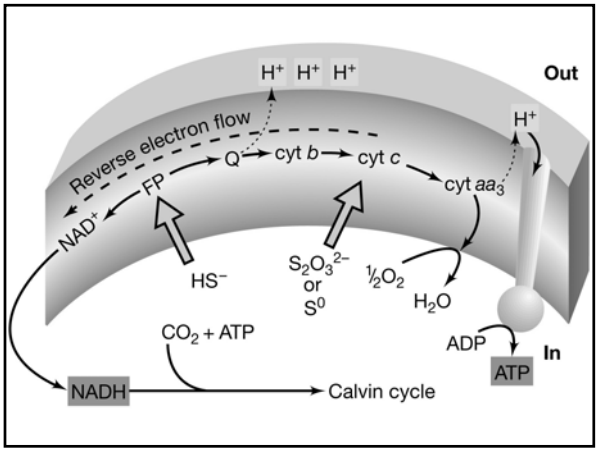


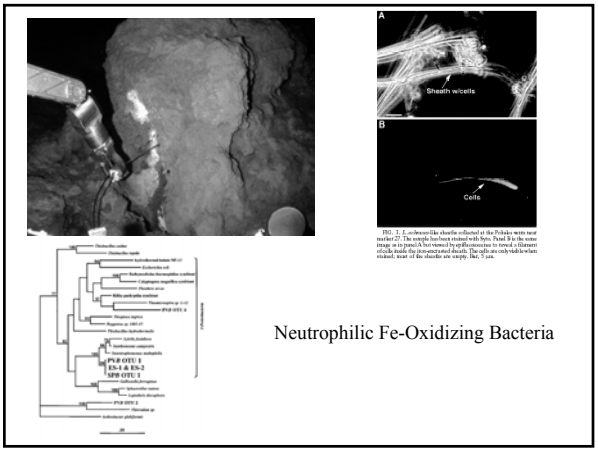
Winogradsky's drawings of *Beggiatoa*



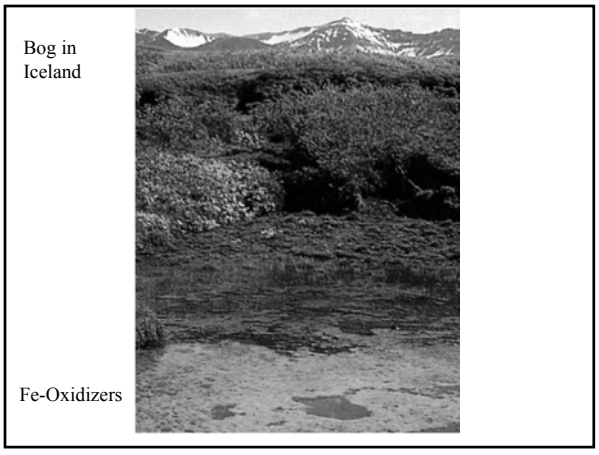


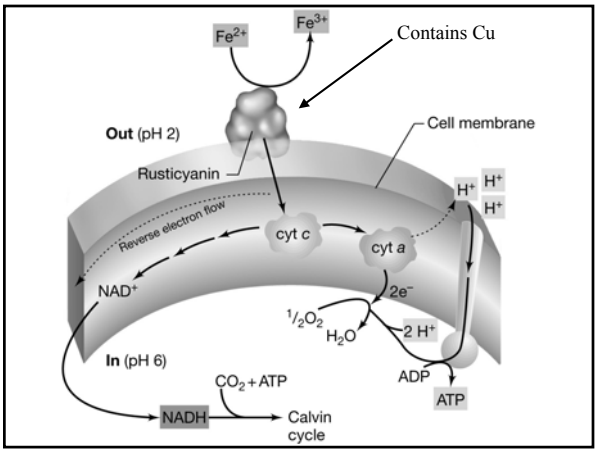
S-oxidizers





Neutrophilic Fe-Oxidizing Bacteria





Anaerobic Respirations

Assimilative vs. Dissimilative Metabolisms

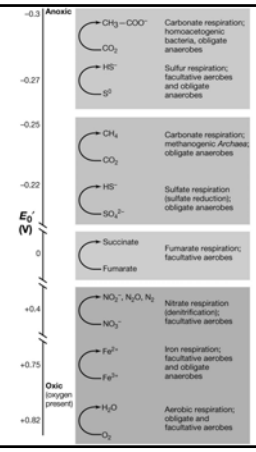
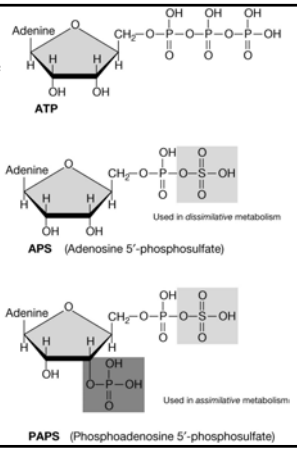


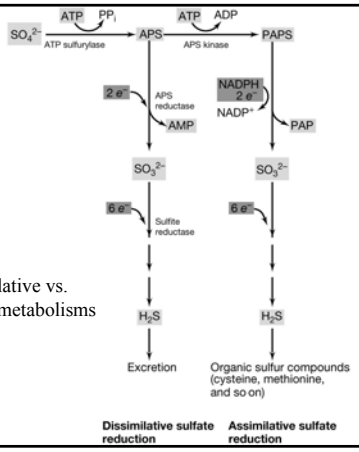
TABLE 17.3 Sulfur compounds and electron donors for sulfate reduction

Compound	Oxidation state
Oxidation states of key sulfur compounds	
Organic S (R—SH)	−2
Sulfide (H_2S)	−2
Elemental sulfur (S^0)	0
Thiosulfate ($S_2O_3^{2-}$)	+2 (average per S)
Sulfur dioxide (SO_2)	+4
Sulfite (SO_3^{2-})	+4
Sulfate (SO_4^{2-})	+6
Some electron donors used for sulfate reduction	
H_2	Acetate
Lactate	Propionate
Pyruvate	Butyrate
Ethanol and other alcohols	Long-chain fatty acids
Fumarate	Benzoate
Malate	Indole
Choline	Hexadecane

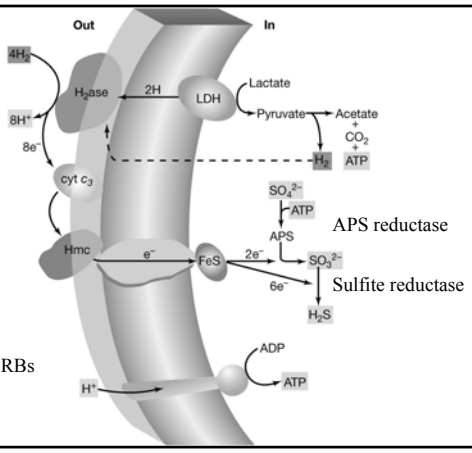
SRB's can make active sulfate compounds



SRB dissimilative vs. assimilative metabolisms



ETS in SRBs



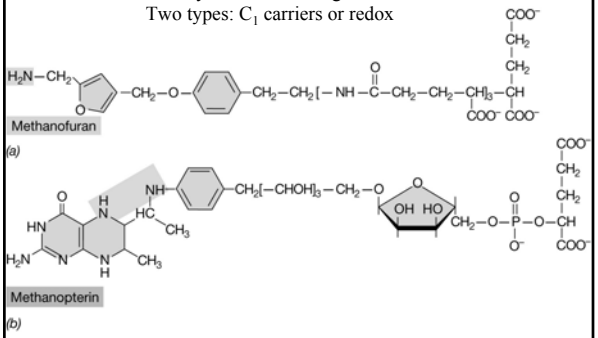
Sulfur Disproportionation

$S_2O_3^{2-} + H_2O \rightarrow SO_4^{2-} + H_2S$

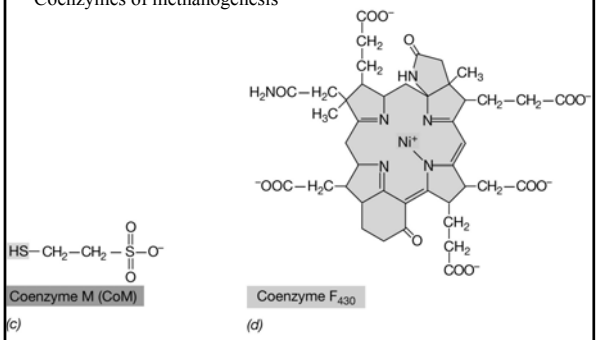
$\Delta G^{0'} = -21.9$ kJ/rxn

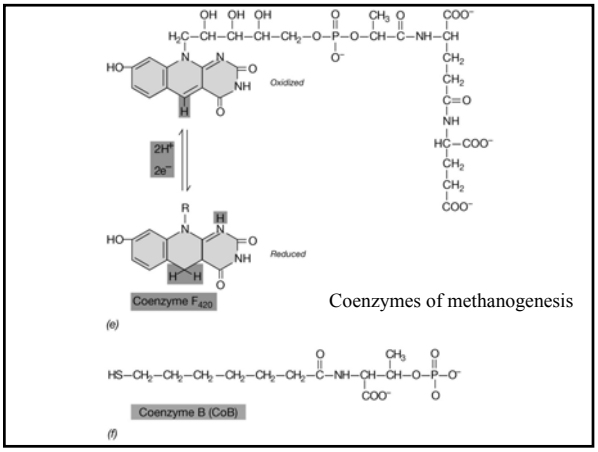
Get your cake and eat it too!

Coenzymes of methanogenesis
Two types: C_1 carriers or redox

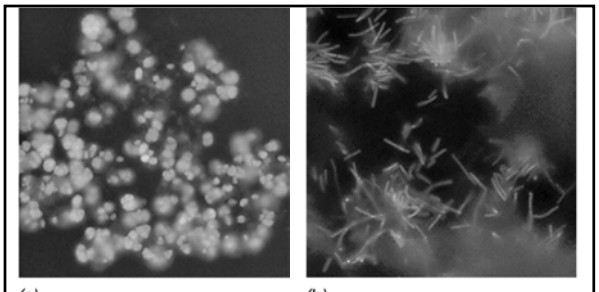


Coenzymes of methanogenesis



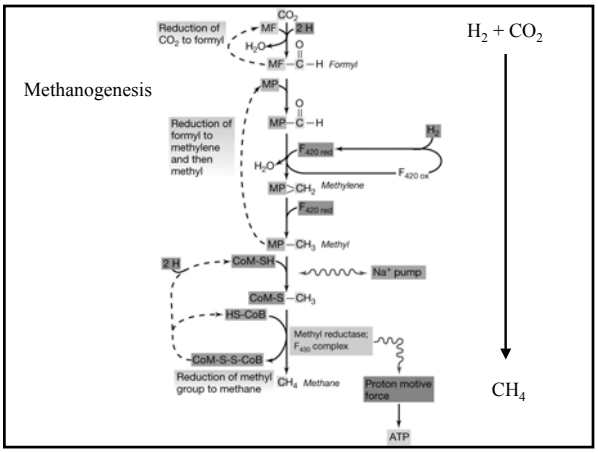


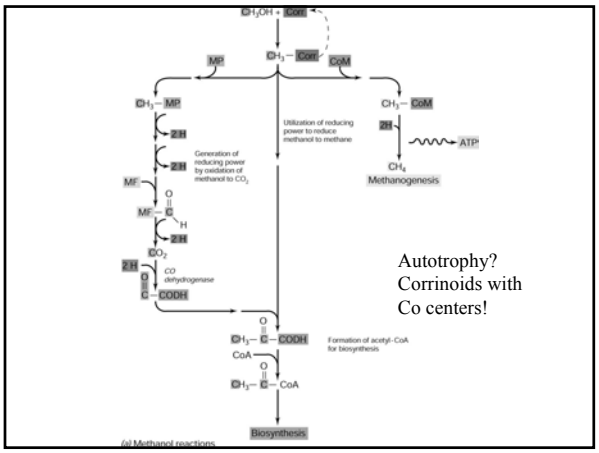
Coenzymes of methanogenesis

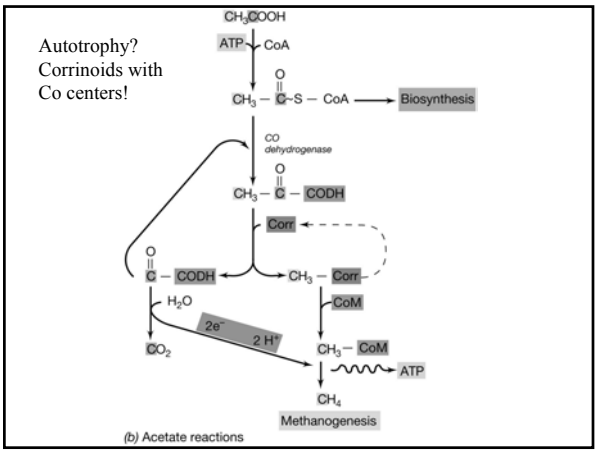


Autofluorescence in methanogen cells due to the presence of the unique electron carrier F_{420}

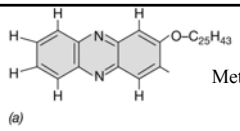
Methanogenesis



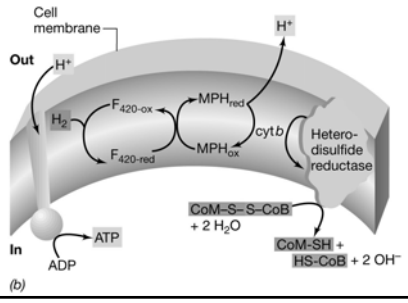




Conservation of Energy



Methanophenazine



Methanogenesis

Chemoautotrophs:
CO_2 → CH_4 + Org. C
H_2 as electron donor

Chemoorganotrophs:
Acetate/MeOH → CH_4 + CO_2
Org. C as electron donor

Global Biogenic Methane Production:
1/3 Chemoautotrophs
2/3 Chemoorganotrophs