

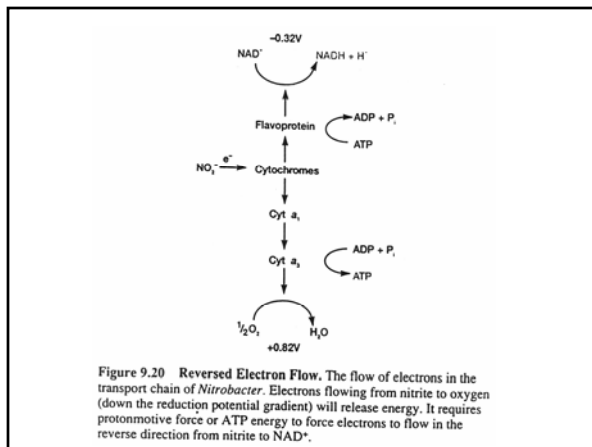
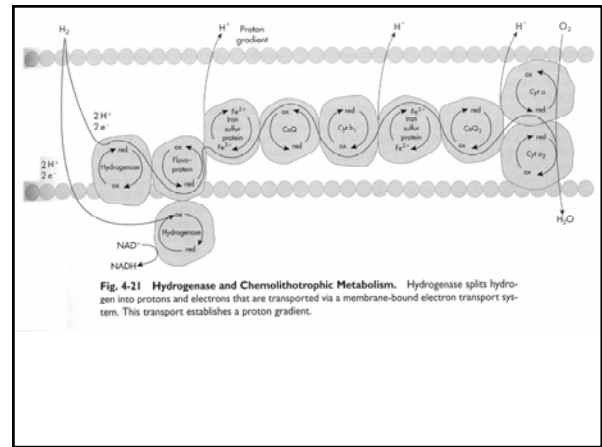
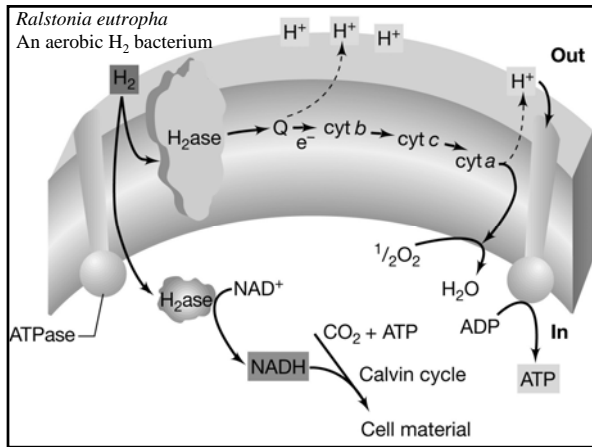
Identification for the Octopus Spring Pink Filaments



Aquifex pyrophilus

Yellowstone "Pink Filament" Isolates

0.05



Making Sugar from CO₂: The Calvin–Benson Cycle

- The Calvin–Benson cycle has three phases:
- Fixation of CO₂
- Reduction (and carbohydrate production)
- Regeneration of RuBP.
- RuBP is the initial CO₂ acceptor, 3PG is the first stable product of CO₂ fixation. Rubisco catalyzes the reaction of CO₂ and RuBP to form 3PG.

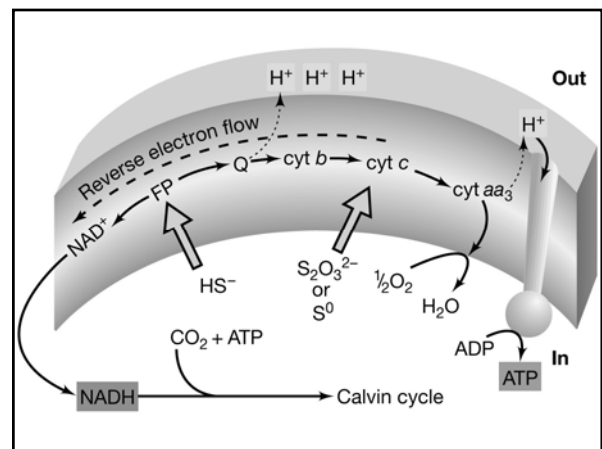
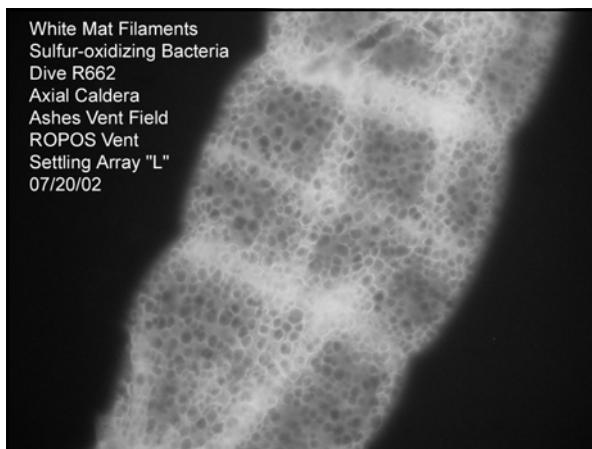
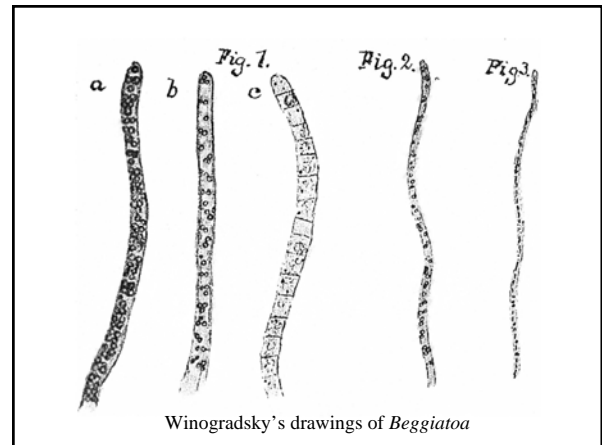
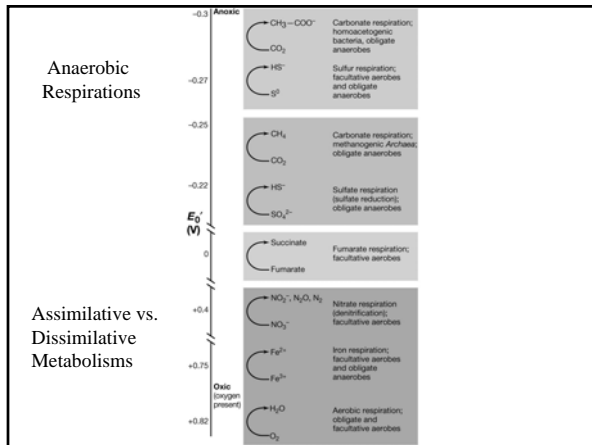
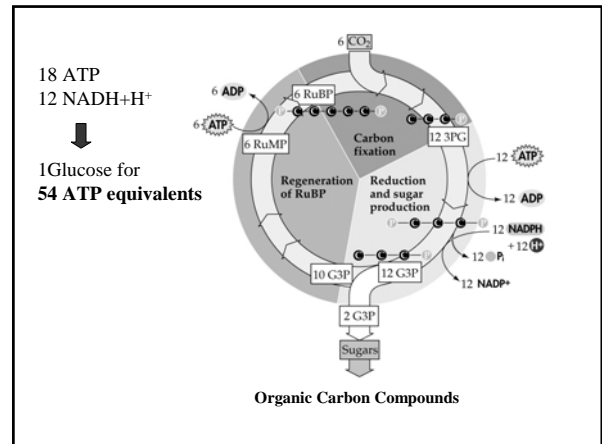
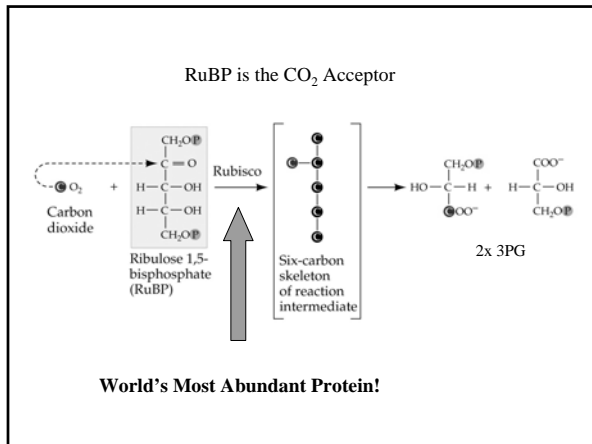
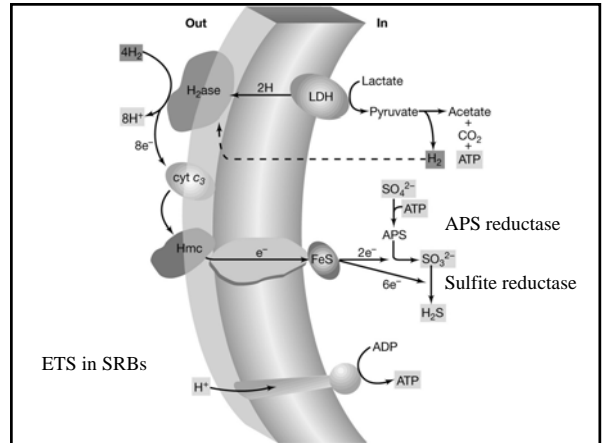
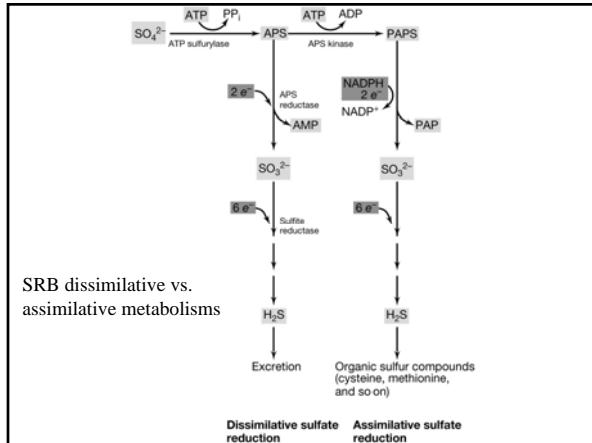
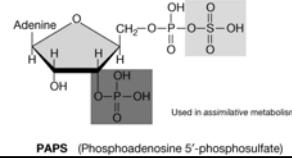
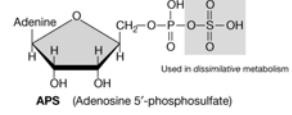
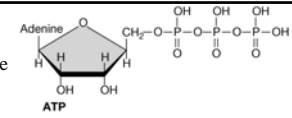


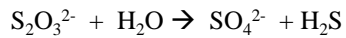
TABLE 17.3 Sulfur compounds and electron donors for sulfate reduction

Compound	Oxidation state
Oxidation states of key sulfur compounds	
Organic S (R—SH)	-2
Sulfide (H ₂ S)	-2
Elemental sulfur (S ⁰)	0
Thiosulfate (S ₂ O 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



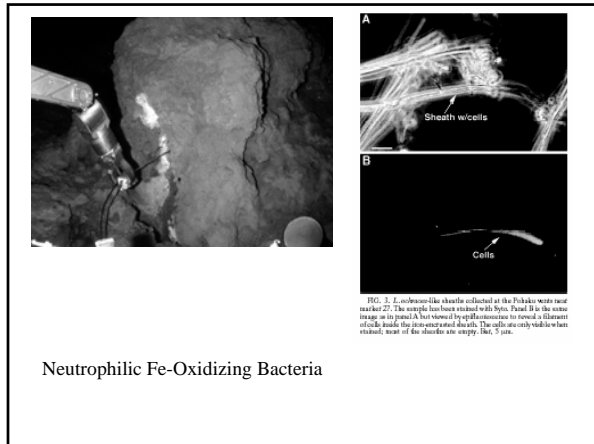
Sulfur Disproportionation



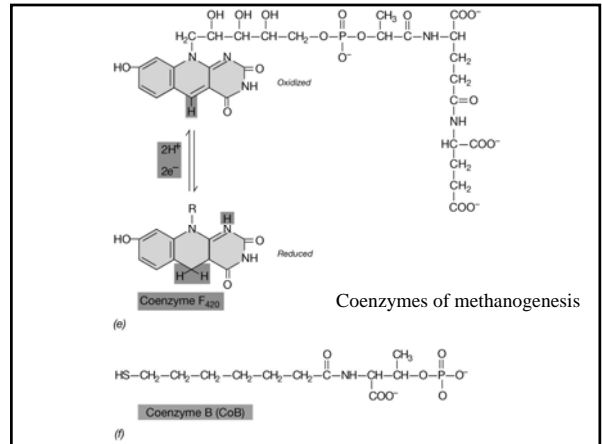
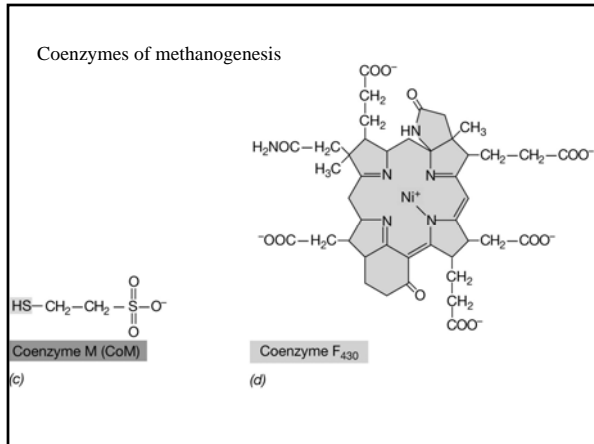
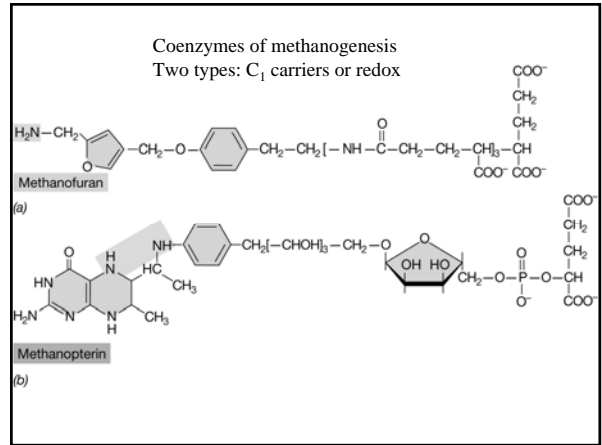
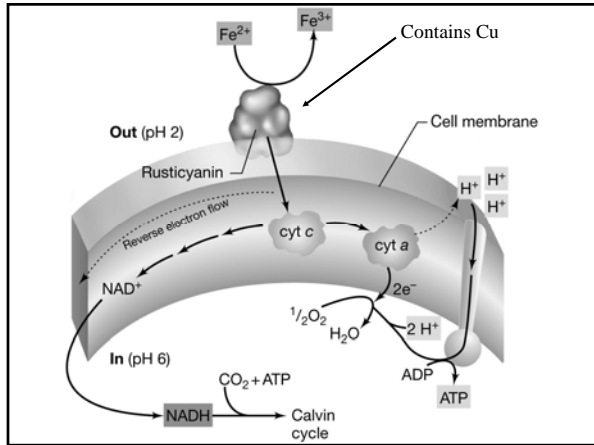
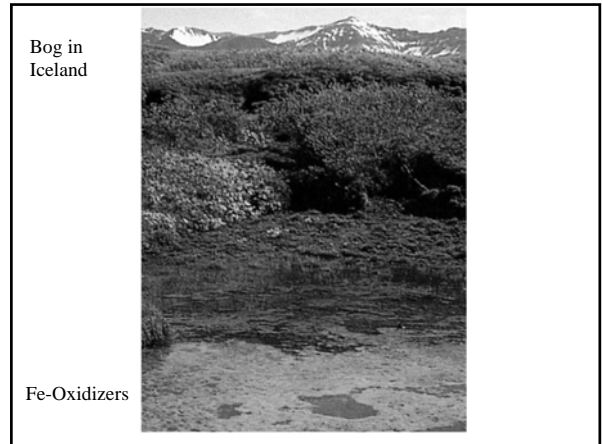
$$\Delta G^0 = -21.9 \text{ kJ/rxn}$$

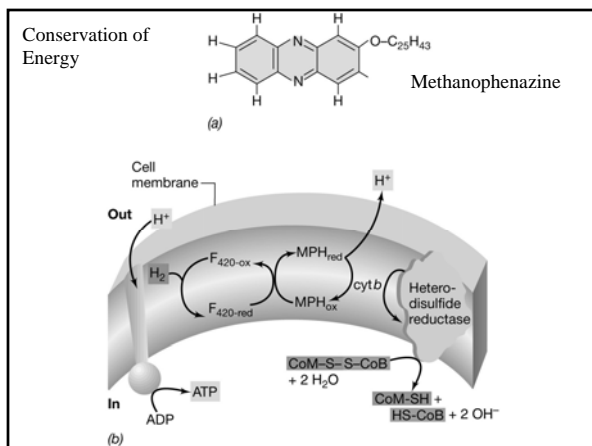
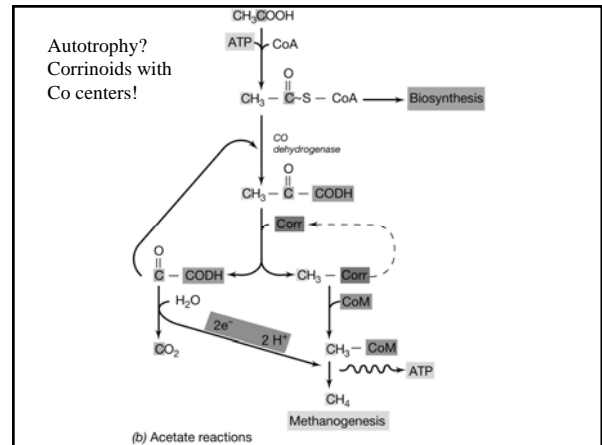
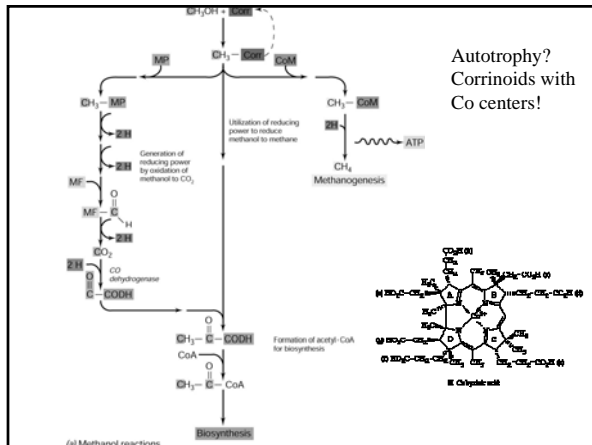
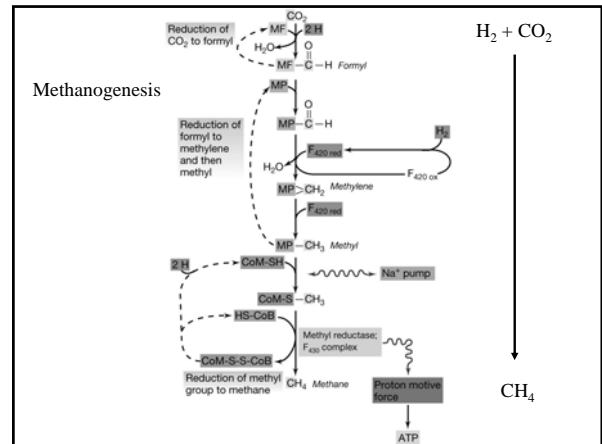
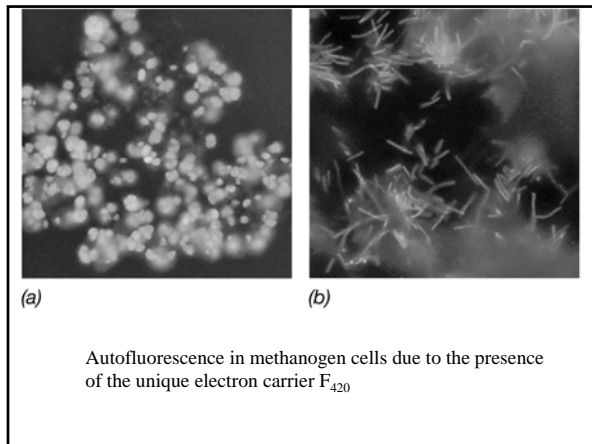
Get your cake and eat it too!





Neutrophilic Fe-Oxidizing Bacteria





Methanogenesis

Chemoautotrophs:
 $CO_2 \rightarrow CH_4 + Org. C$
 H_2 as electron donor

Chemoorganotrophs:
 Acetate/MeOH $\rightarrow CH_4 + CO_2$
 Org. C as electron donor

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