

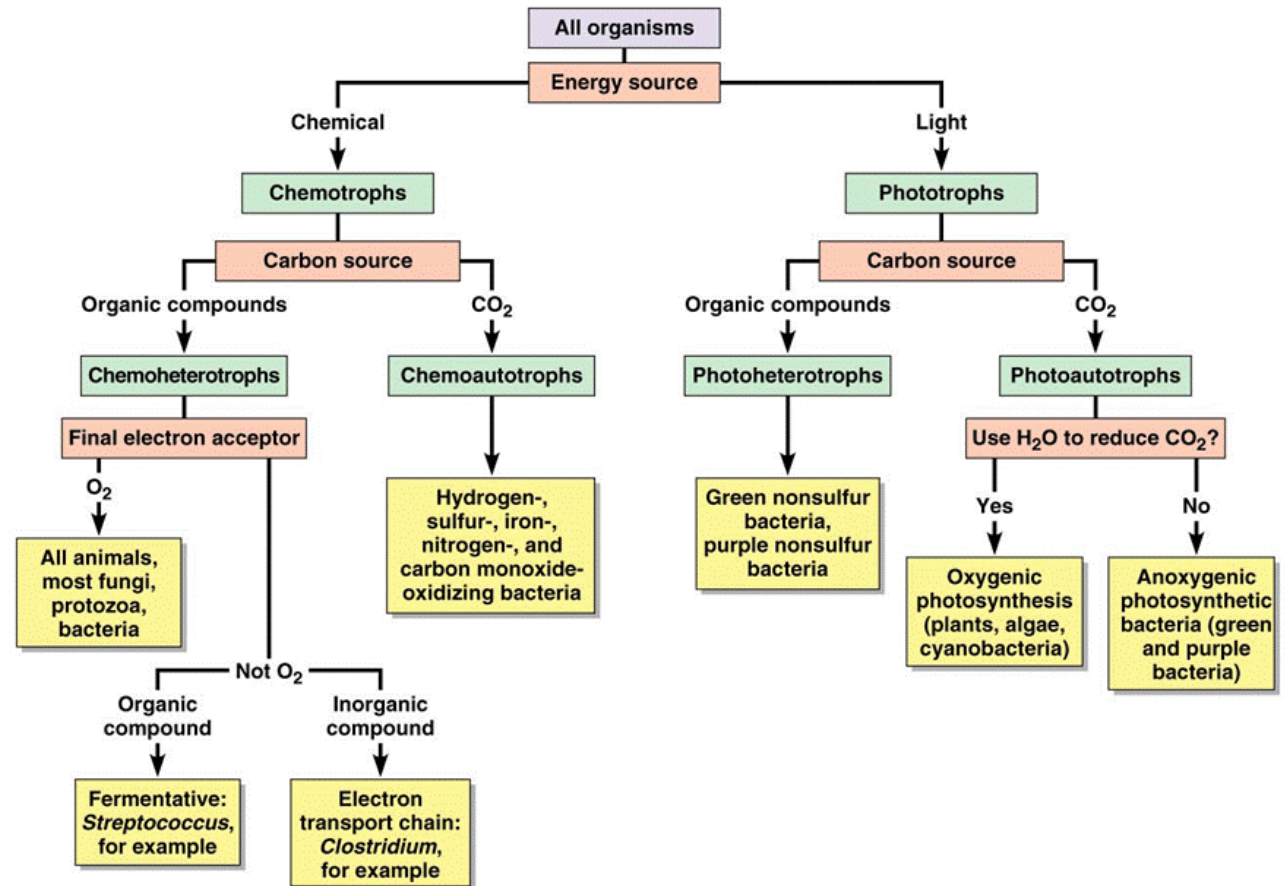
Early Metabolisms: Energetics

Sarah Maurer

Central Connecticut State University
Department of Chemistry and
Biochemistry

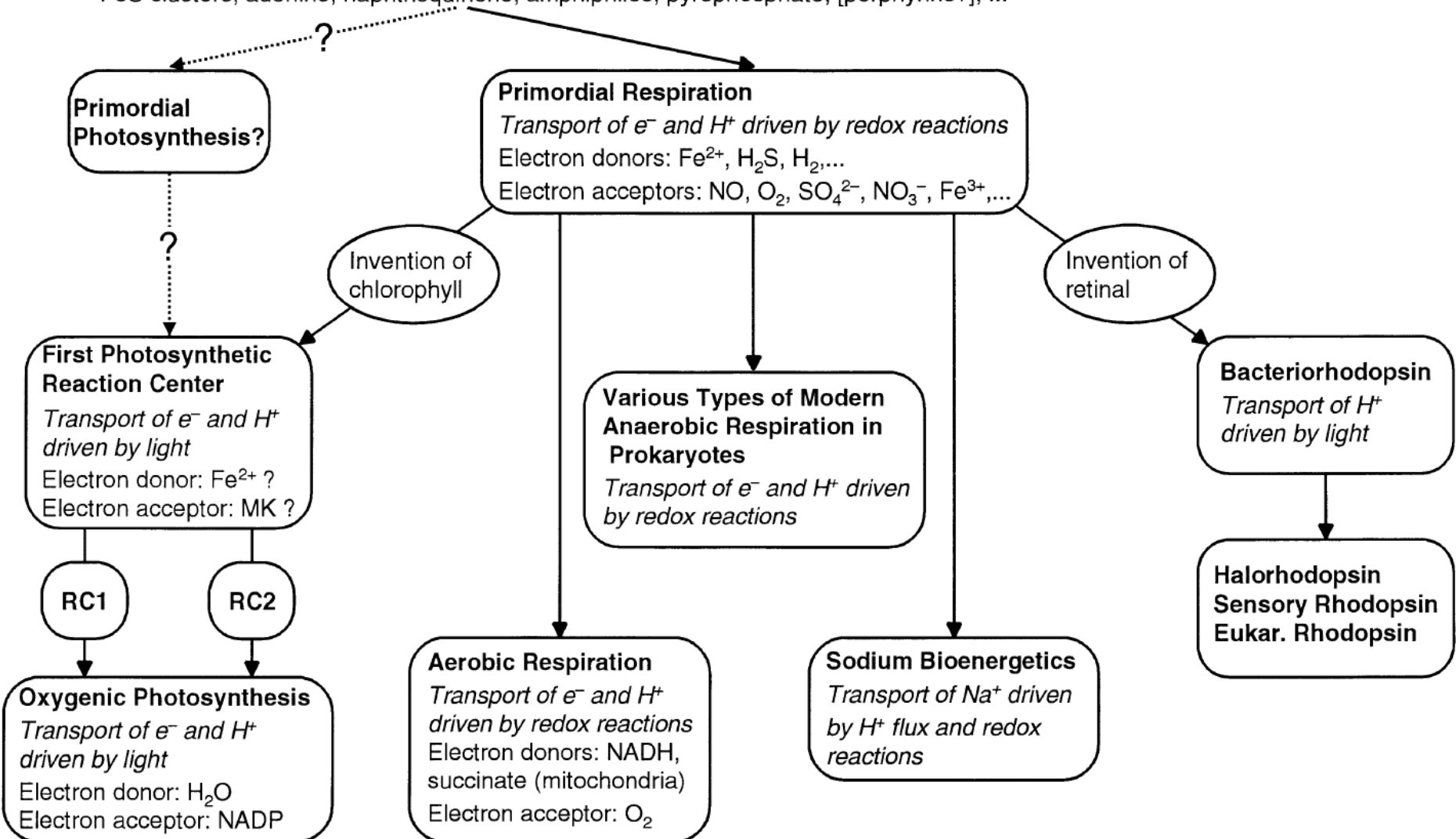


Classification of energy generation in organisms

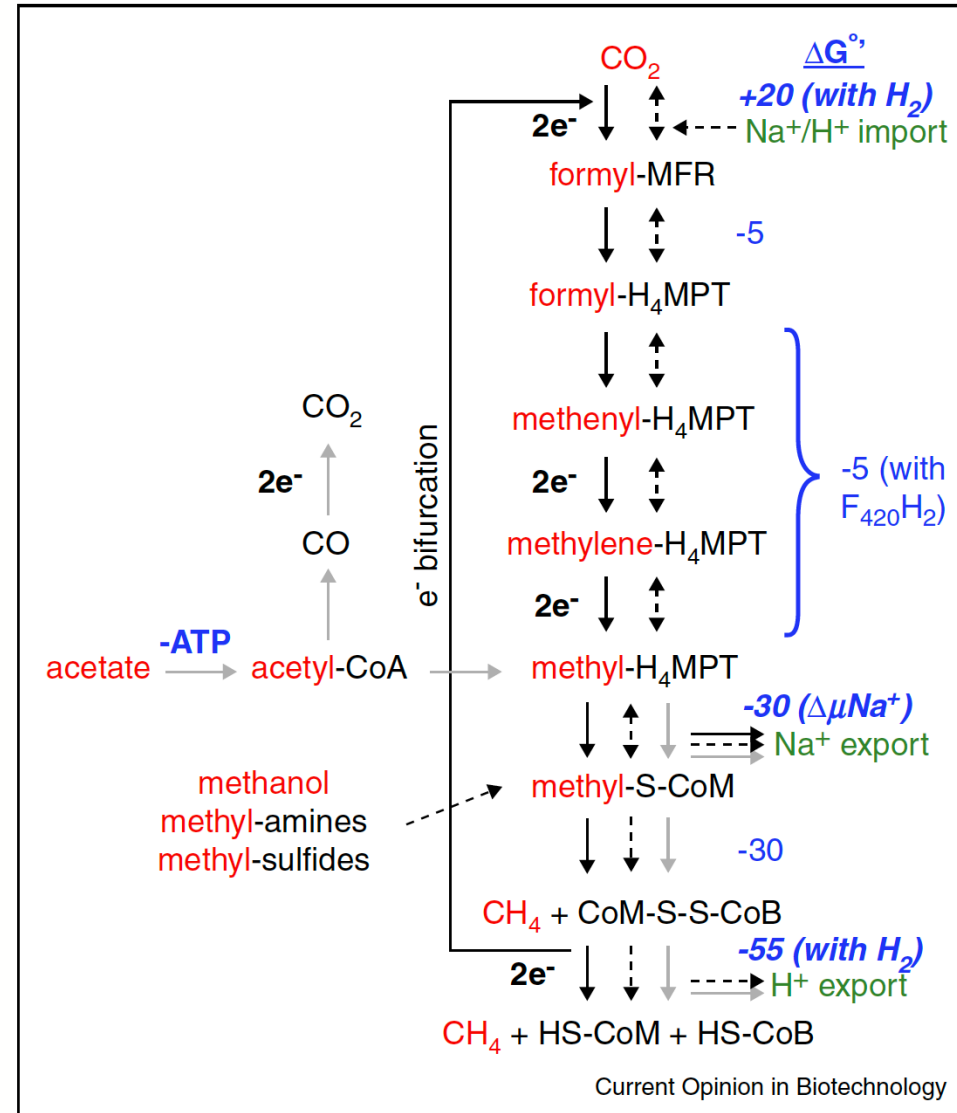


Evolution of Metabolism

FeS clusters, adenine, naphthoquinone, amphiphiles, pyrophosphate, [porphyrins?], ...



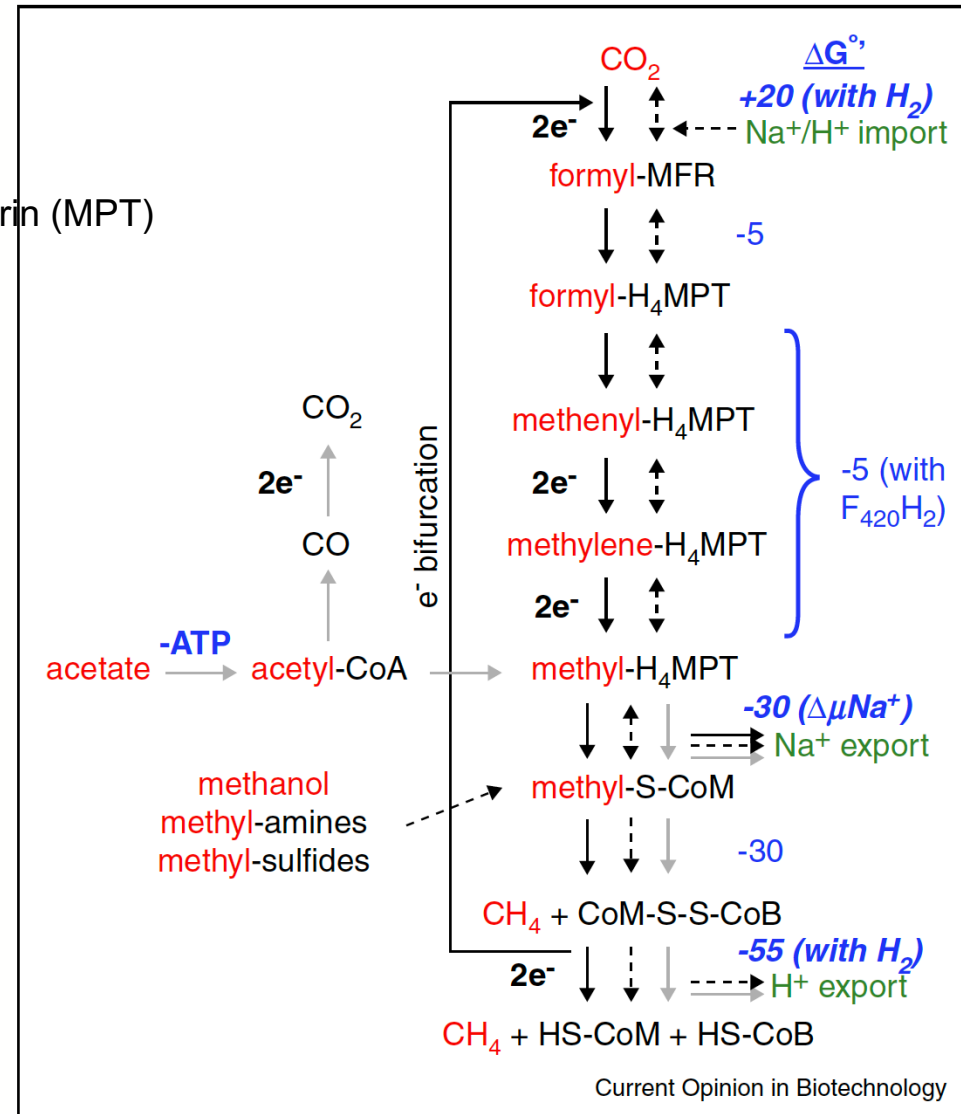
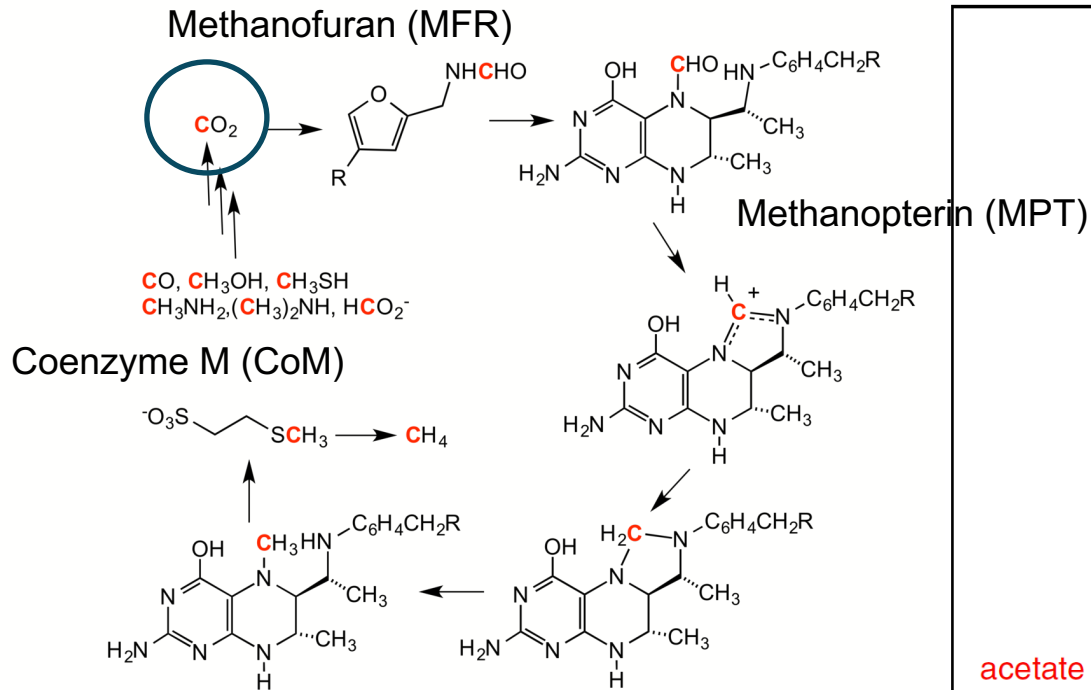
Methanogenesis



Costa, K. C.; Leigh, J. A. Metabolic Versatility in Methanogens. *Curr. Opin. Biotechnol.* **2014**, 29 (1), 70–75.

<https://doi.org/10.1016/j.copbio.2014.02.012>

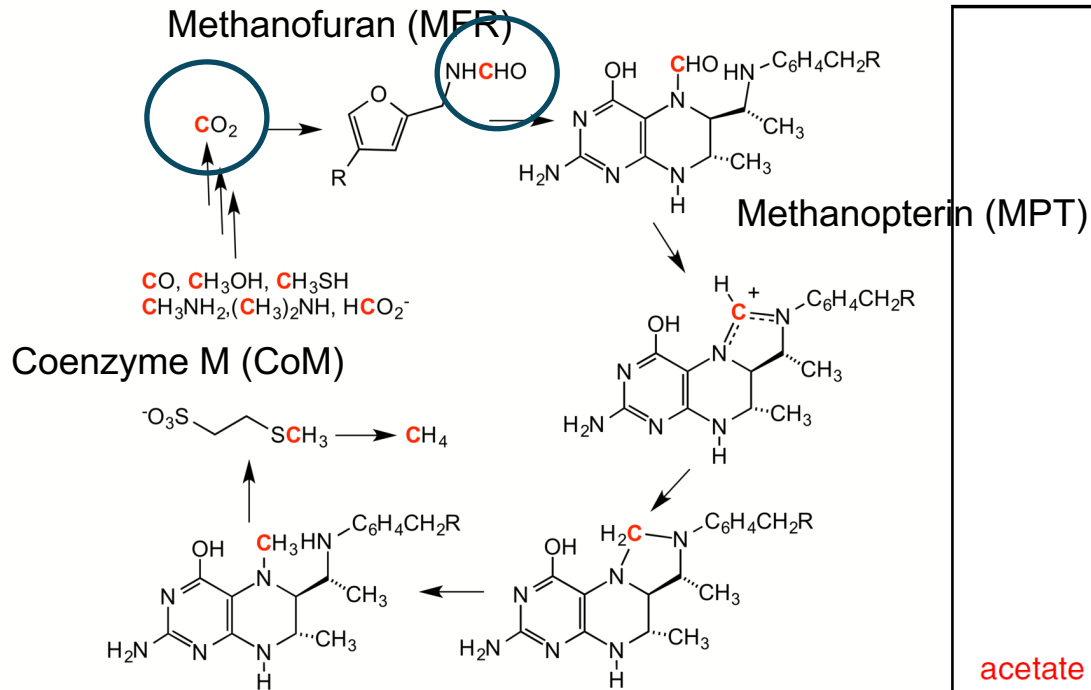
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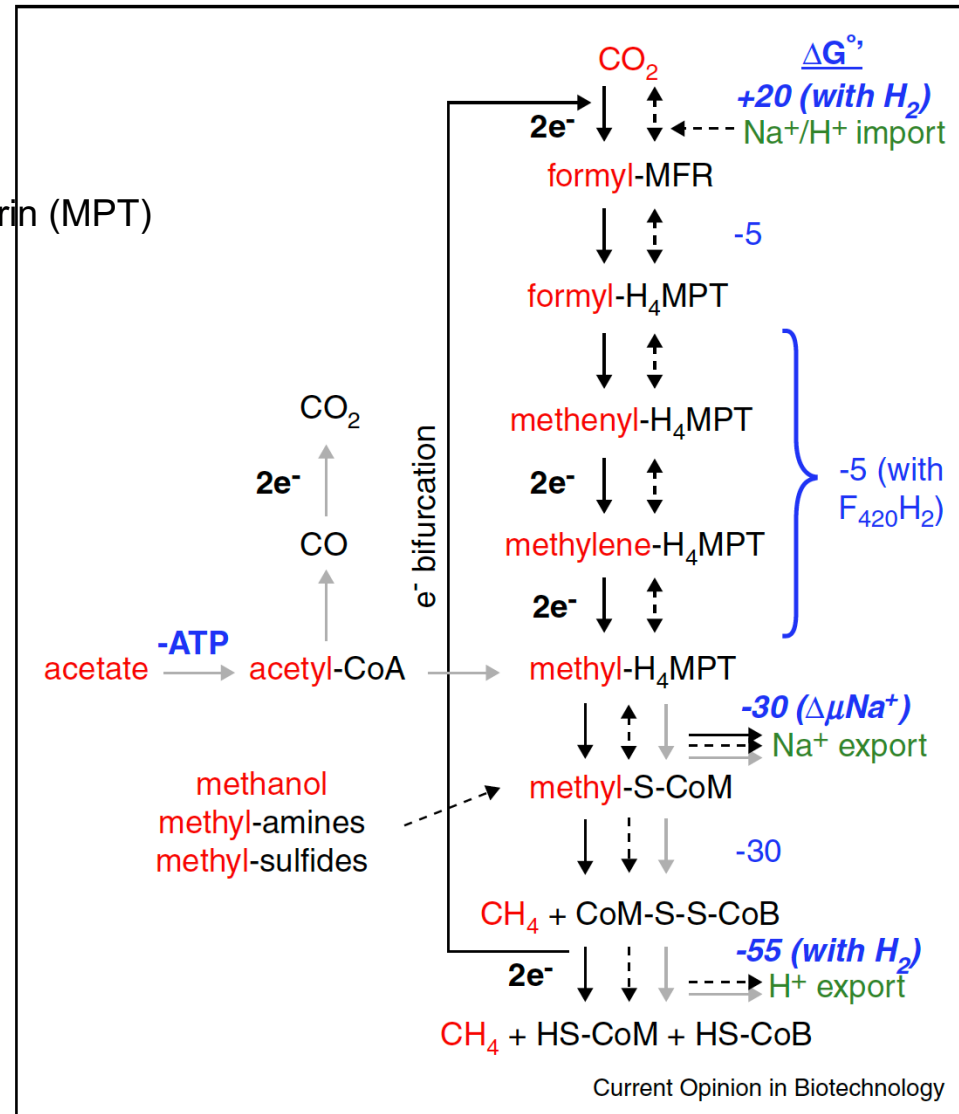
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Methanogenesis

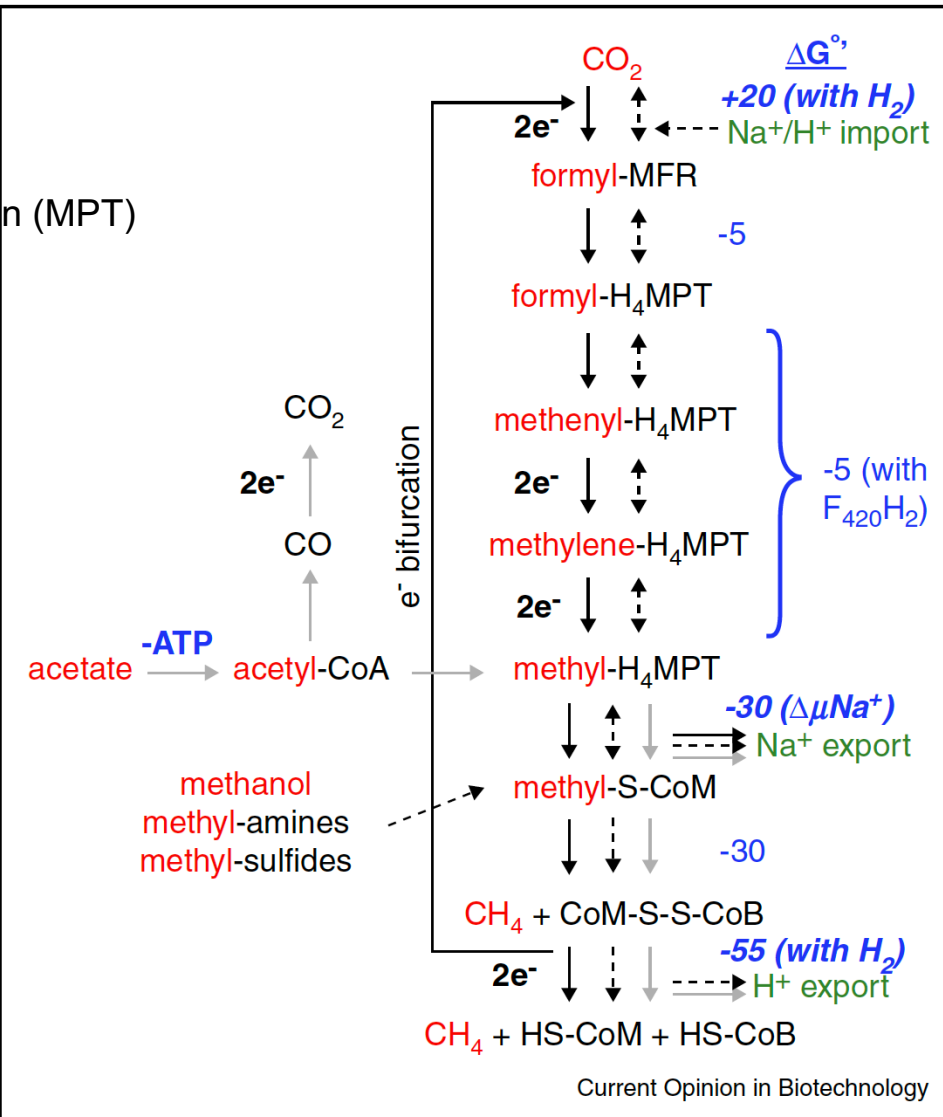
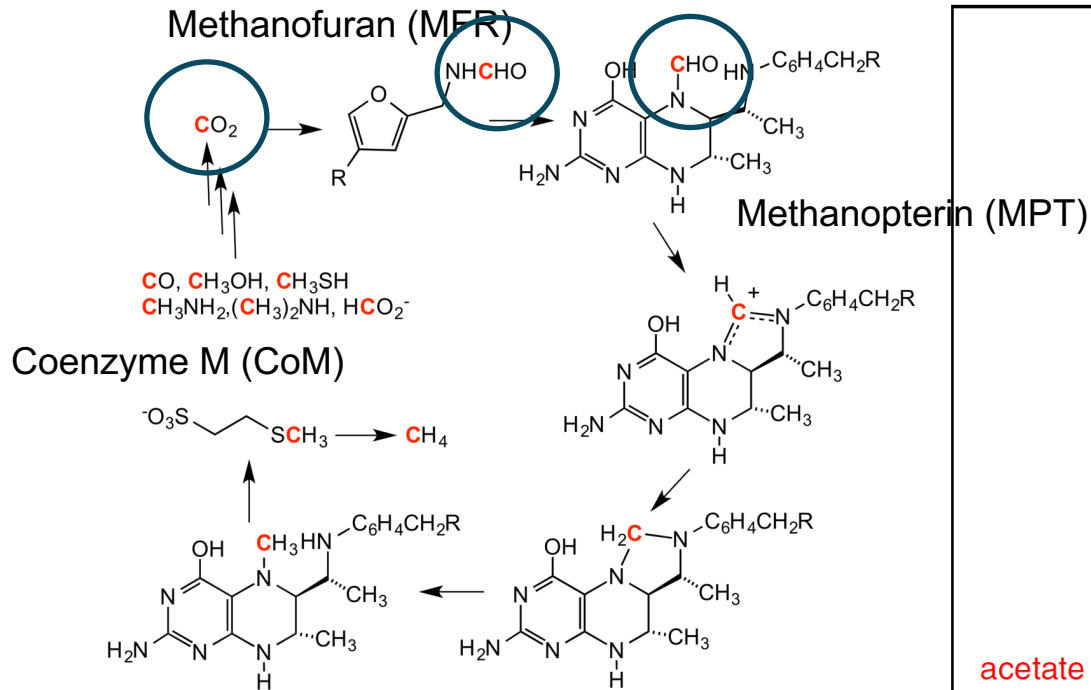


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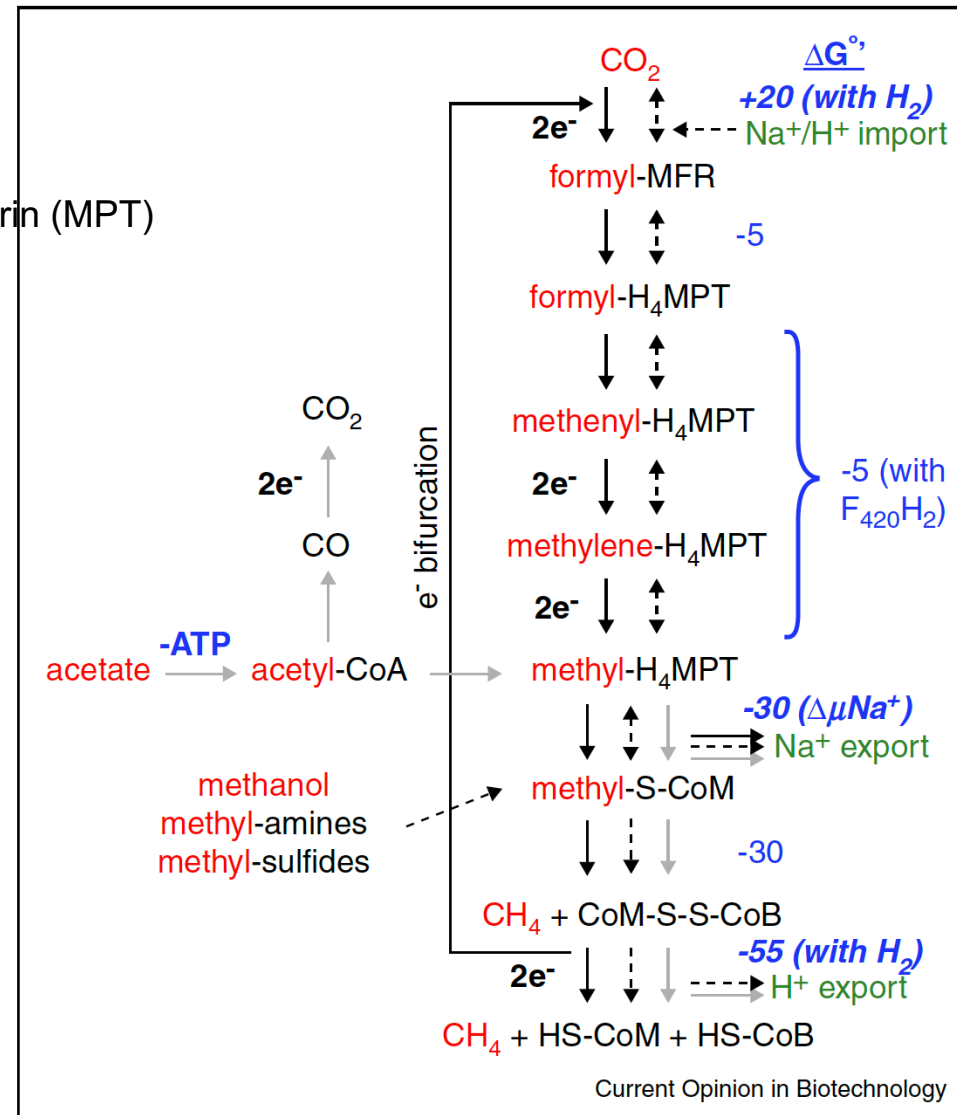
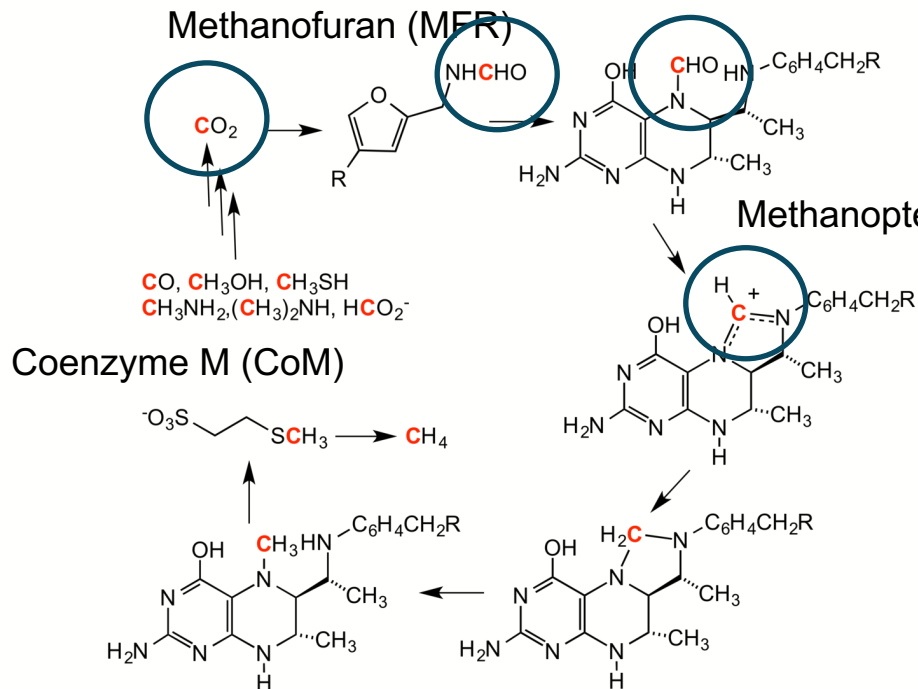
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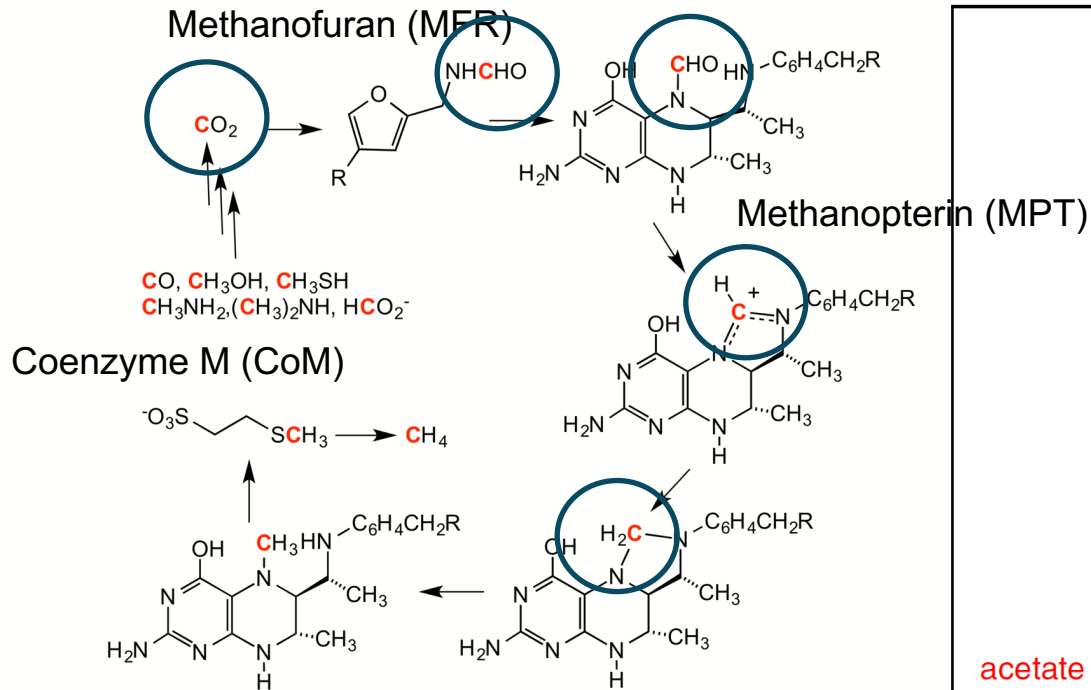
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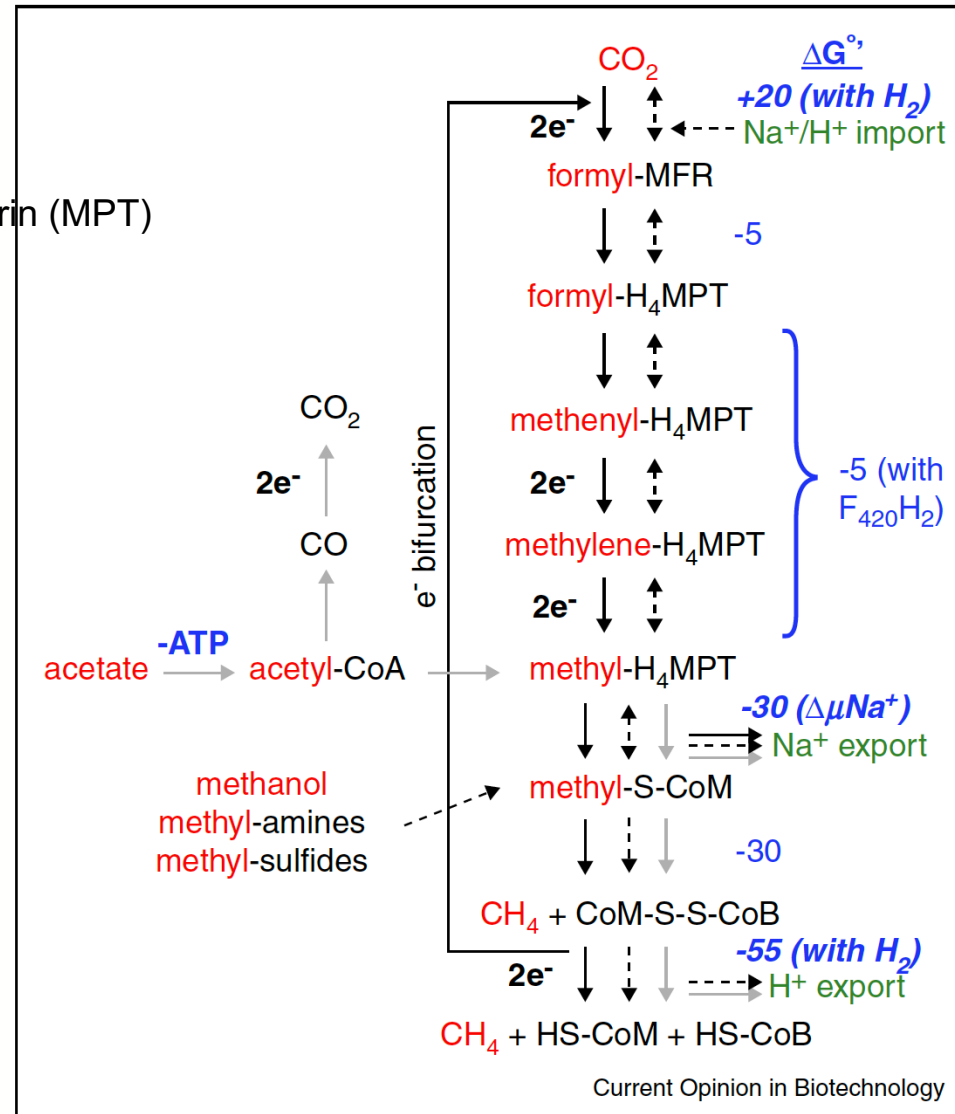
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Methanogenesis

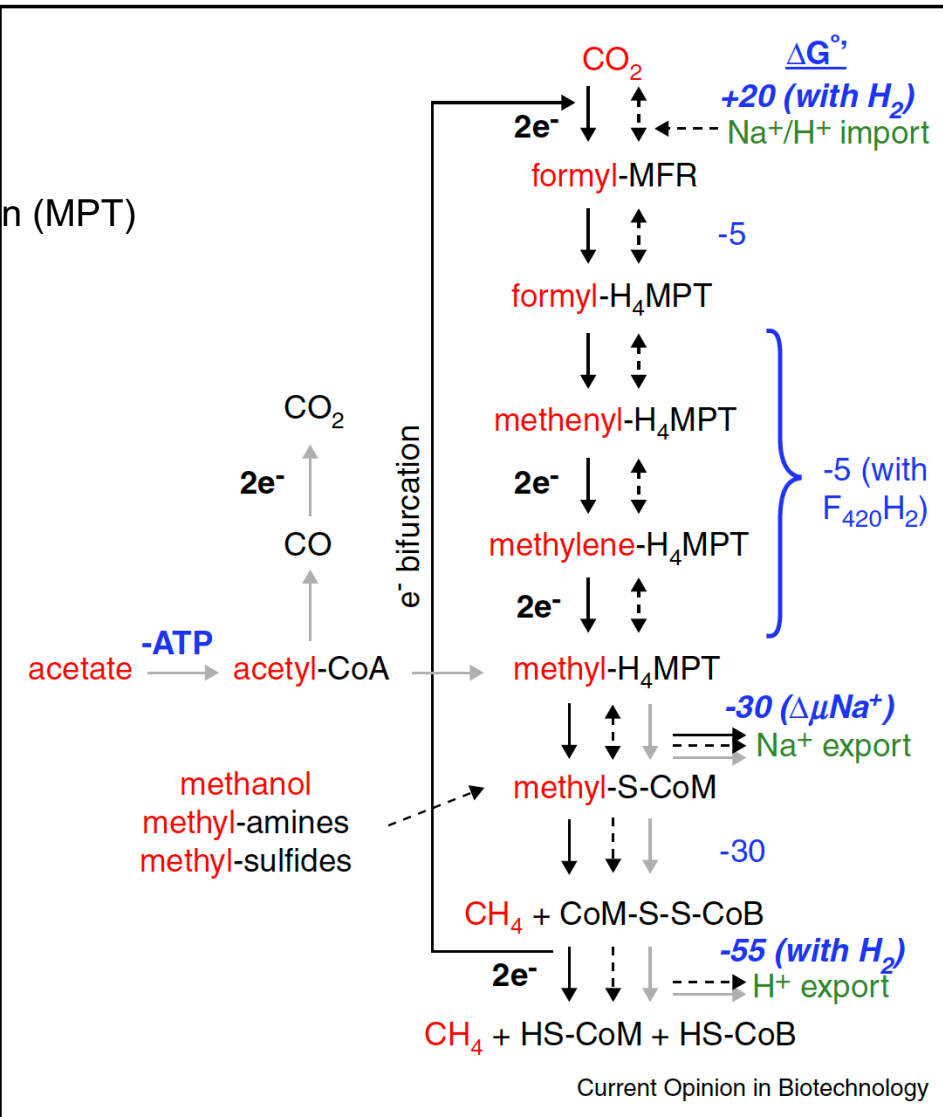
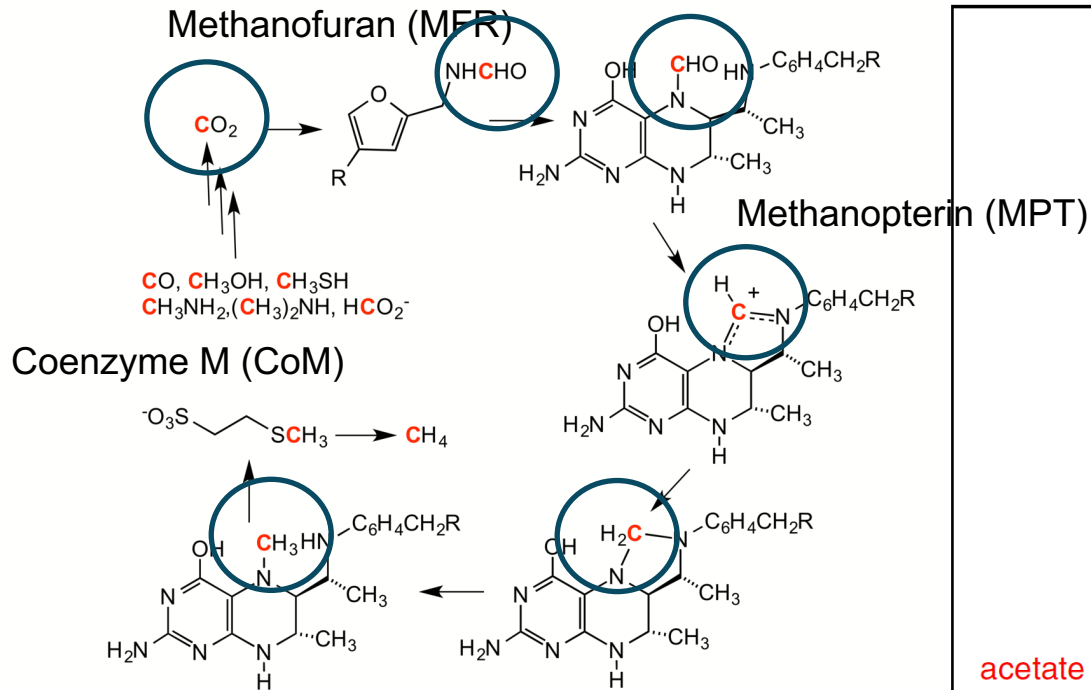


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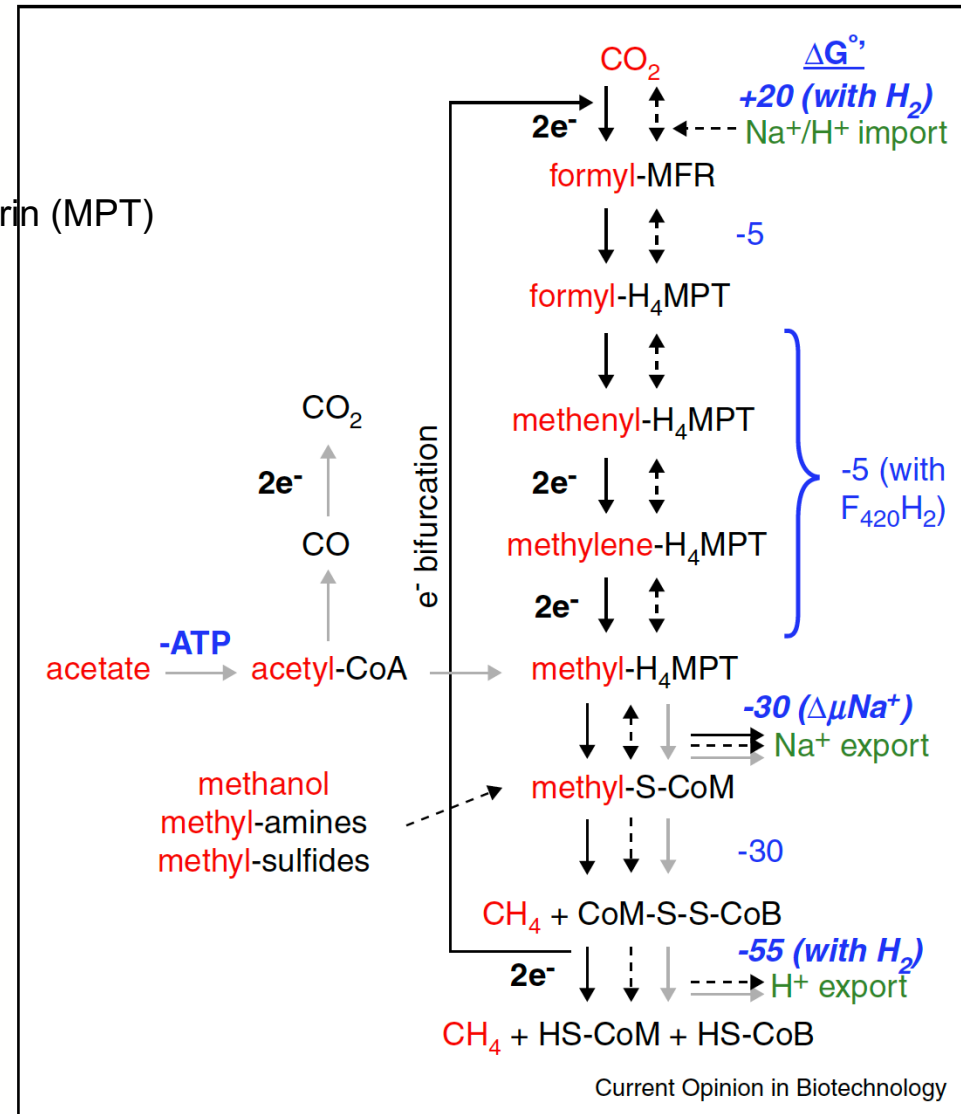
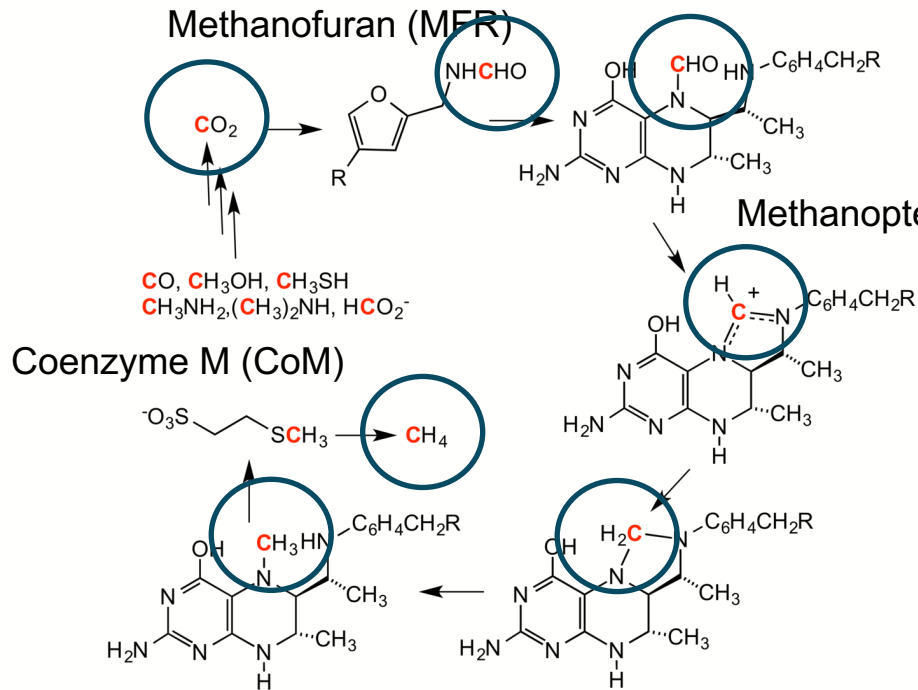
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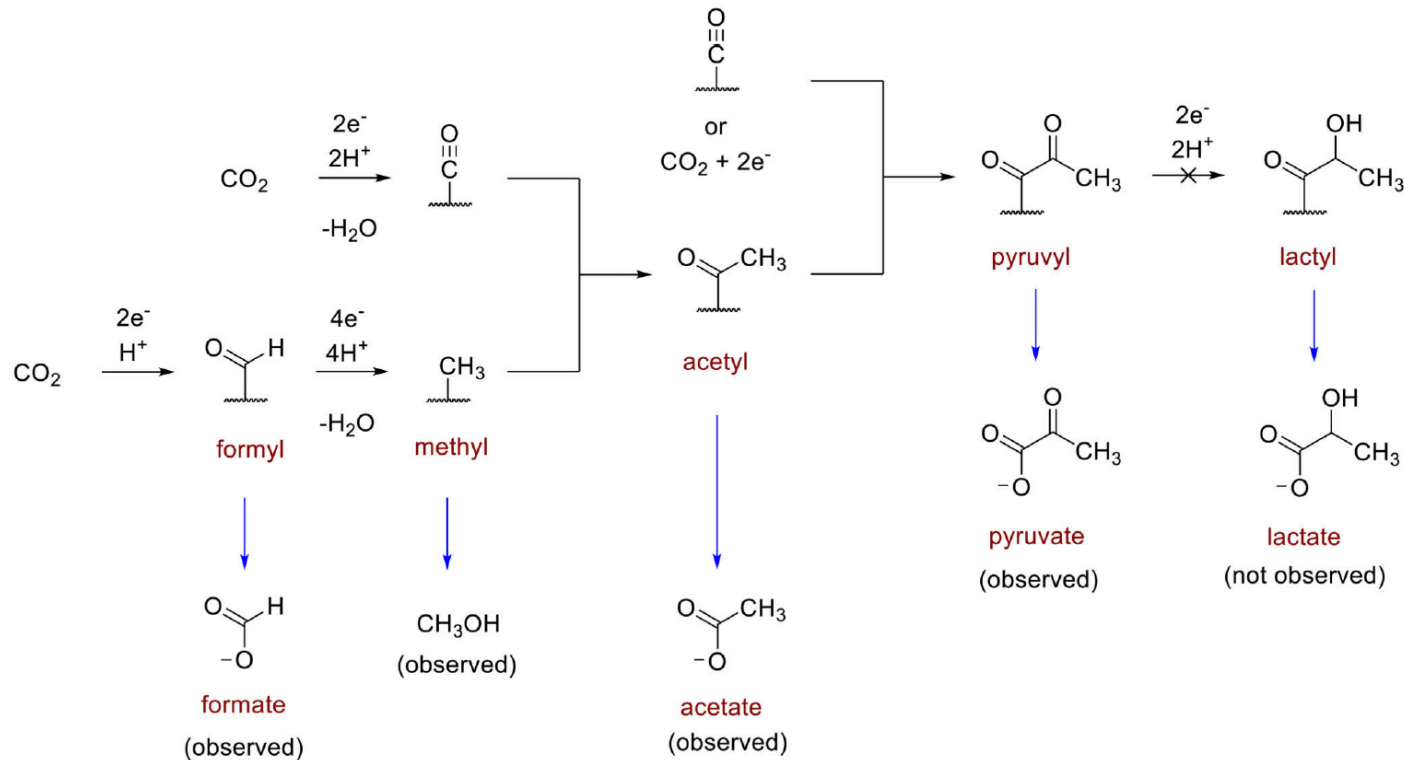
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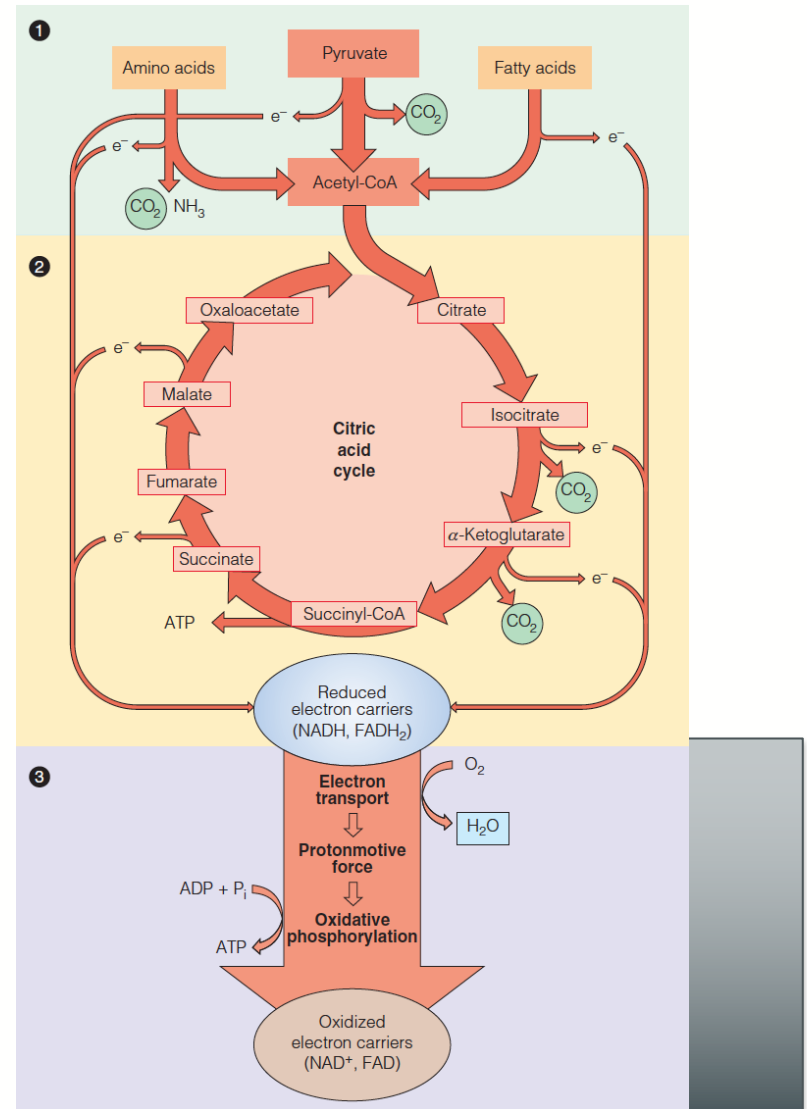
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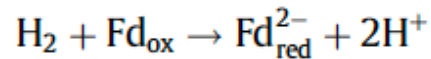
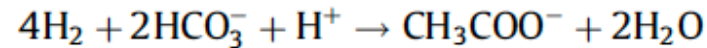
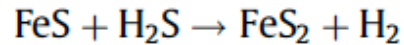
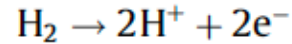
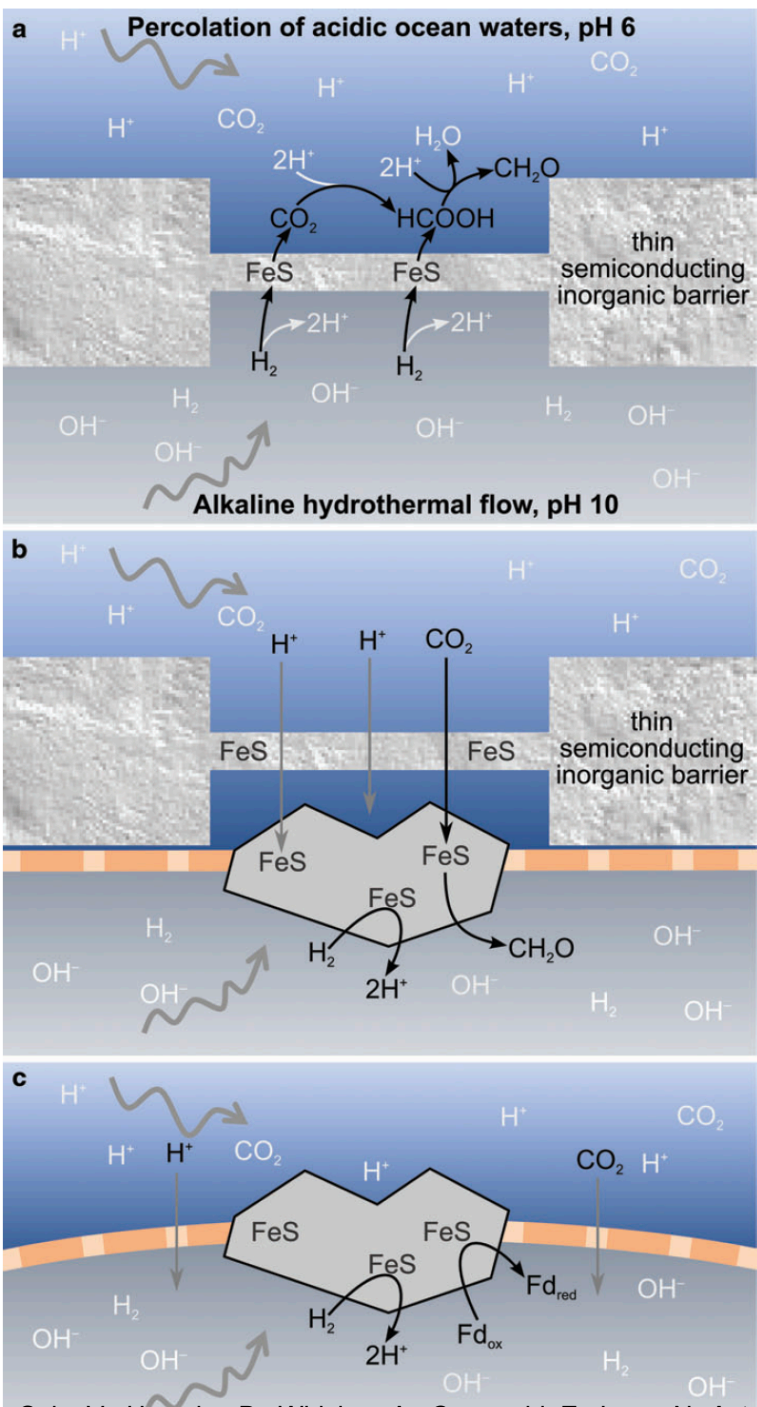
Carbon fixation on minerals



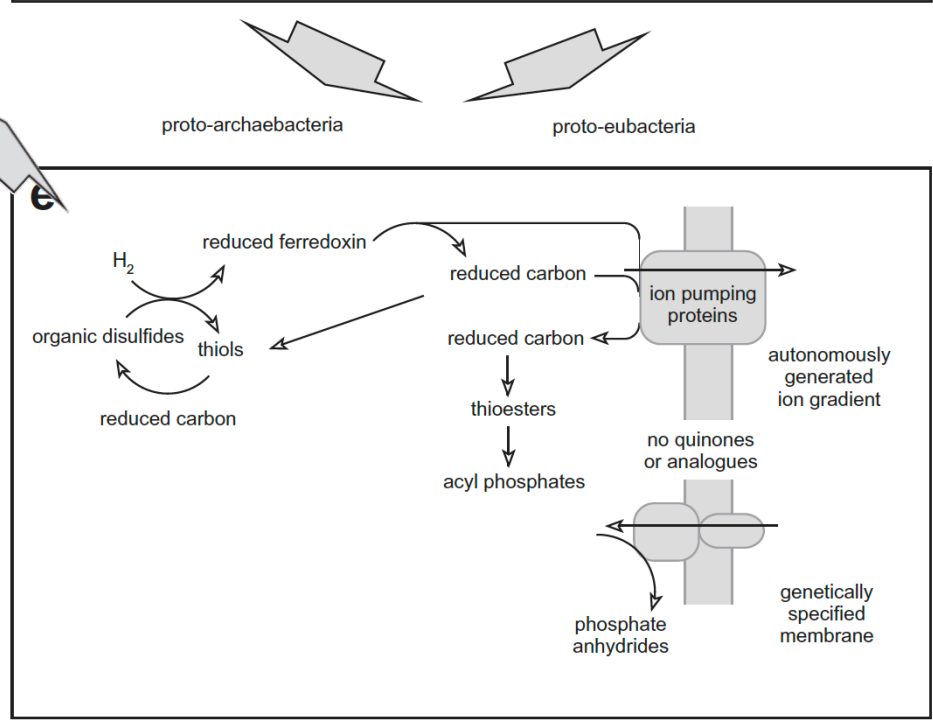
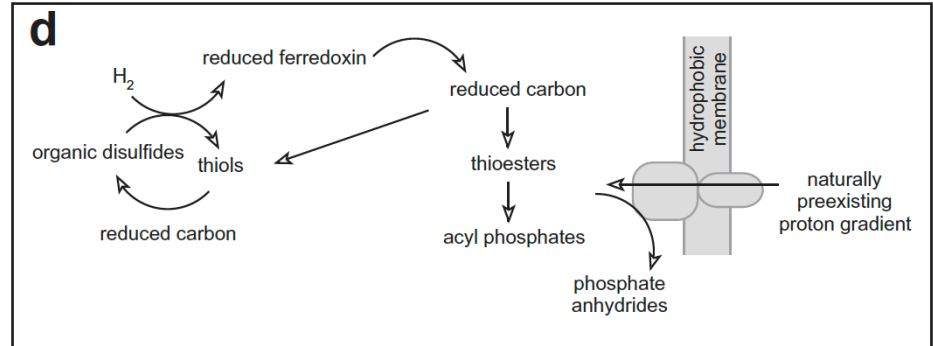
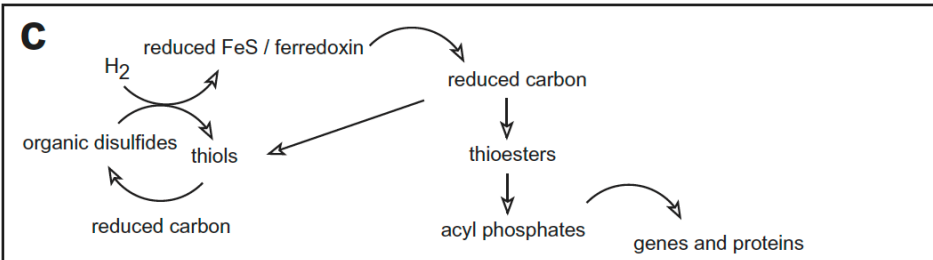
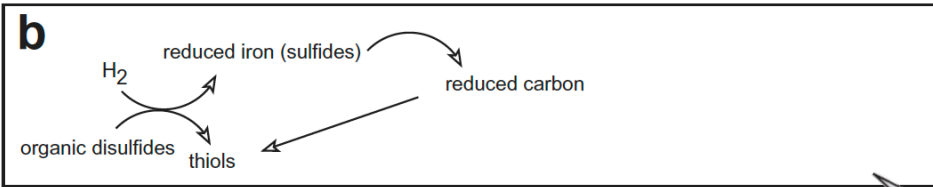
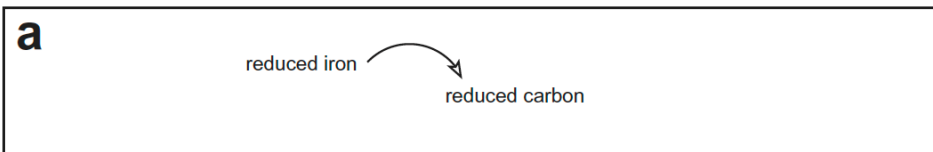
Modern Redox Chemistry



Primordial Redox Chemistry?



Loses electrons oxidized,
Gains electrons reduced
(LEO GER)



free-living
methanogens

free-living
acetogens