**Chapter 9**

**General**

Price, E. E. *et al*. (2021). Bacterial approaches to sensing and responding to respiration and respiration metabolites. *Molecular Microbiology* **116**(4), 1009-1021. <https://doi.org/10.1111/mmi.14795>

**Denitrification**

Cole, J. A. (2021). Anaerobic bacterial response to nitric oxide stress: Widespread misconceptions and physiologically relevant responses. *Molecular Microbiology* **116**(1), 29-40. <https://doi.org/10.1111/mmi.14713>

Dong, L. *et al*. (in press). Characteristics and mechanism of heterotrophic nitrification/aerobic denitrification in a novel *Halomonas piezotolerans* strain. *Journal of Basic Microbiology*. <https://doi.org/10.1002/jobm.202100446>

Hein, S. & Simon, J. (2019). Bacterial nitrous oxide respiration: electron transport chains and copper transfer reactions. *Advances in Microbial Physiology* **75**,137-175. <https://doi.org/10.1016/bs.ampbs.2019.07.001>

Jakus, N. *et al*. (2021). Nitrate removal by a novel lithoautotrophic nitrate-reducing, Iron(II)-oxidizing culture enriched from a pyrite-rich limestone aquifer. *Applied & Environmental Microbiology* **87**(16), e00460-21. <https://journals.asm.org/doi/abs/10.1128/AEM.00460-21>

Okubo, T. & Takami, H. (2021). Metabolic potential of the imperfect denitrifier *Candidatus* Desulfobacillus denitrificans in an anammox bioreactor. *MicrobiologyOpen* **10**(4), e1227. <https://doi.org/10.1002/mbo3.1227>

Ren, J. *et al*. (2021). Simultaneous nitrification and aerobic denitrification by a novel isolated *Ochrobactrum anthropi* HND19. *Bioresource Technology* **340**, 125582. <https://doi.org/10.1016/j.biortech.2021.125582>

Unden, G. & Klein, R. (2021). Sensing of O2 and nitrate by bacteria: alternative strategies for transcriptional regulation of nitrate respiration by O2 and nitrate. *Environmental Microbiology* **23**(1), 5-14. <https://doi.org/10.1111/1462-2920.15293>

Xie, S. *et al*. (2021). *Sulfurovum indicum* sp. nov., a novel hydrogen- and sulfur-oxidizing chemolithoautotroph isolated from a deep-sea hydrothermal plume in the Northwestern Indian Ocean. *International Journal of Systematic & Evolutionary Microbiology* **71**(3), 0.004748. <https://doi.org/10.1099/ijsem.0.004748>

Zhang, I. H. *et al*. (2021). Ratio of electron donor to acceptor influences metabolic specialization and denitrification dynamics in *Pseudomonas aeruginosa* in a mixed carbon medium. *Frontiers in Microbiology* **12**, 2512. <https://www.frontiersin.org/article/10.3389/fmicb.2021.711073>

**Metal reduction**

Blake, R. C. *et al*. (2021). *Ferrimicrobium acidiphilum* exchanges electrons with a platinum electrode via a cytochrome with reduced absorbance maxima at 448 and 605 nm. *Frontiers in Microbiology* **12**, 2096. <https://www.frontiersin.org/article/10.3389/fmicb.2021.705187>

Clark, M. M. *et al*. (2021). Adaptive synthesis of a rough lipopolysaccharide in *Geobacter sulfurreducens* for metal reduction and detoxification. *Applied & Environmental Microbiology* **87**(20), e00964-21. <https://journals.asm.org/doi/abs/10.1128/AEM.00964-21>

Cologgi, D. L. *et al*. (2021). Genetic analysis of electroactive biofilms. *International Microbiology* **24**(4), 631-648. <https://doi.org/10.1007/s10123-021-00176-y>

Dong, Y. *et al*. (2021). The proposed molecular mechanisms used by archaea for Fe(III) reduction and Fe(II) oxidation. *Frontiers in Microbiology* **12**, 1710. <https://www.frontiersin.org/article/10.3389/fmicb.2021.690918>

Gu, Y. *et al*. (2021). Structure of *Geobacter* pili reveals secretory rather than nanowire behaviour. *Nature* **597**(7876), 430-434. <https://doi.org/10.1038/s41586-021-03857-w>

Jing, X. *et al*. (2022). Anode respiration-dependent biological nitrogen fixation by *Geobacter sulfurreducens*. *Water Research* **208**, 117860. <https://doi.org/10.1016/j.watres.2021.117860>

Joo, H.-W. *et al*. (2021). Relaxation behavior in low-frequency complex conductivity of sands caused by bacterial growth and biofilm formation by *Shewanella oneidensis* under a high-salinity condition. *Geophysics* **86**(6), B389-B400. <https://doi.org/10.1190/geo2020-0213.1>

Joshi, K. *et al*. (2021). *Geobacter sulfurreducens* inner membrane cytochrome CbcBA controls electron transfer and growth yield near the energetic limit of respiration. *Molecular Microbiology* **116**(4), 1124-1139. <https://doi.org/10.1111/mmi.14801>

Kato, S. *et al*. (2021). A single bacterium capable of oxidation and reduction of iron at circumneutral pH. *Microbiology Spectrum* **9**(1), e00161-21. <https://journals.asm.org/doi/abs/10.1128/Spectrum.00161-21>

Lekbach, Y. *et al*. (2021). Microbial corrosion of metals: The corrosion microbiome. *Advances in Microbial Physiology* **78**,317-390. <https://doi.org/10.1016/bs.ampbs.2021.01.002>

Li, Y. *et al*. (2021). *Paradesulfitobacterium ferrireducens* gen. nov., sp. nov., a Fe(III)-reducing bacterium from petroleum-contaminated soil and reclassification of *Desulfitobacterium aromaticivorans* as *Paradesulfitobacterium aromaticivorans* comb. nov. *International Journal of Systematic & Evolutionary Microbiology* **71**(9), 0.005025. <https://doi.org/10.1099/ijsem.0.005025>

Liu, X. *et al*. (2021). Direct observation of electrically conductive pili emanating from *Geobacter sulfurreducens*. *mBio* **12**(4), e02209-21. <https://journals.asm.org/doi/abs/10.1128/mBio.02209-21>

Lovley, D. R. & Yao, J. (2021). Intrinsically Conductive Microbial Nanowires for 'Green' Electronics with Novel Functions. *Trends in Biotechnology* **39**(9), 940-952. <https://doi.org/10.1016/j.tibtech.2020.12.005>

Piper, S. E. H. *et al*. (2021). Bespoke biomolecular wires for transmembrane electron transfer: Spontaneous assembly of a functionalized multiheme electron conduit. *Frontiers in Microbiology* **12**, 2200. <https://www.frontiersin.org/article/10.3389/fmicb.2021.714508>

Qiu, D. *et al*. (2021). *Fusibacter ferrireducens* sp. nov., an anaerobic, Fe(Ⅲ)- and sulphur-reducing bacterium isolated from mangrove sediment. *International Journal of Systematic & Evolutionary Microbiology* **71**(11), 0.004952. <https://doi.org/10.1099/ijsem.0.004952>

Rajput, V. D. *et al*. (2021). Insights into the biosynthesis of nanoparticles by the genus *Shewanella*. *Applied & Environmental Microbiology* **87**(22), e01390-21. <https://journals.asm.org/doi/abs/10.1128/AEM.01390-21>

Starwalt-Lee, R. *et al*. (2021). Electrolocation? The evidence for redox-mediated taxis in *Shewanella oneidensis*. *Molecular Microbiology* **115**(6), 1069-1079. <https://doi.org/10.1111/mmi.14647>

Tang, H.-Y. *et al*. (2021). Stainless steel corrosion via direct iron-to-microbe electron transfer by *Geobacter* species. *The ISME Journal* **15**(10), 3084-3093. <https://doi.org/10.1038/s41396-021-00990-2>

Zhao, J. *et al*. (2021). Microbial extracellular electron transfer and strategies for engineering electroactive microorganisms. *Biotechnology Advances* **53**, 107682. <https://doi.org/10.1016/j.biotechadv.2020.107682>

**Sulfidogenesis**

Alain, K. *et al*. (2021). *Thermococcus henrietii* sp. nov., a novel extreme thermophilic and piezophilic sulfur-reducing archaeon isolated from a deep-sea hydrothermal chimney. *International Journal of Systematic & Evolutionary Microbiology* **71**(7), 1466-5034. <https://doi.org/10.1099/ijsem.0.004895>

Burrichter, A. G. *et al*. (2021). Bacterial microcompartments for isethionate desulfonation in the taurine-degrading human-gut bacterium *Bilophila wadsworthia*. *BMC Microbiology* **21**, 340. <https://doi.org/10.1186/s12866-021-02386-w>

Chatterjee, M. *et al*. (2021). Proteomic study of *Desulfovibrio ferrophilus* IS5 reveals overexpressed extracellular multi-heme cytochrome associated with severe microbiologically influenced corrosion. *Scientific Reports* **11**, 15458. <https://doi.org/10.1038/s41598-021-95060-0>

Fiévet, A. *et al*. (2021). OrpR is a σ54-dependent activator using an iron-sulfur cluster for redox sensing in *Desulfovibrio vulgaris* Hildenborough. *Molecular Microbiology* **116**(1), 231-244. <https://onlinelibrary.wiley.com/doi/abs/10.1111/mmi.14705>

Hashimoto, Y. *et al*. (2021). *Desulfomarina profundi* gen. nov., sp. nov., a novel mesophilic, hydrogen-oxidizing, sulphate-reducing chemolithoautotroph isolated from a deep-sea hydrothermal vent chimney. *International Journal of Systematic & Evolutionary Microbiology* **71**(11), 0.005083. <https://doi.org/10.1099/ijsem.0.005083>

Johnson, D. B. & Sánchez-Andrea, I. (2019). Dissimilatory reduction of sulfate and zero-valent sulfur at low pH and its significance for bioremediation and metal recovery. *Advances in Microbial Physiology* **75**,205-231. <https://doi.org/10.1016/bs.ampbs.2019.07.002>

Lekbach, Y. *et al*. (2021). Microbial corrosion of metals: The corrosion microbiome. *Advances in Microbial Physiology* **78**,317-390. <https://doi.org/10.1016/bs.ampbs.2021.01.002>

Liang, D. *et al*. (2021). Extracellular electron exchange capabilities of *Desulfovibrio ferrophilus* and *Desulfopila corrodens*. *Environmental Science & Technology* **55**(23), 16195-16203. <https://doi.org/10.1021/acs.est.1c04071>

Liu, L.-J. *et al*. (2021). Physiology, taxonomy, and sulfur metabolism of the *Sulfolobales*, an order of thermoacidophilic archaea. *Frontiers in Microbiology* **12**, 3096. <https://www.frontiersin.org/article/10.3389/fmicb.2021.768283>

Marietou, A. (2021). Sulfate reducing microorganisms in high temperature oil reservoirs. *Advances in Applied Microbiology* **116**,99-131. <https://doi.org/10.1016/bs.aambs.2021.03.004>

Sorokin, D. Y. *et al*. (2021). Carbohydrate-dependent sulfur respiration in halo(alkali)philic archaea. *Environmental Microbiology* **23**(7), 3789-3808. <https://doi.org/10.1111/1462-2920.15421>

Thorup, C. *et al*. (2021). How to grow your cable bacteria: Establishment of a stable single-strain culture in sediment and proposal of *Candidatus* Electronema aureum GS. *Systematic & Applied Microbiology* **44**(5), 126236. <https://doi.org/10.1016/j.syapm.2021.126236>

Zhang, L. *et al*. (2021). Elemental sulfur as electron donor and/or acceptor: Mechanisms, applications and perspectives for biological water and wastewater treatment. *Water Research* **202**, 117373. <https://doi.org/10.1016/j.watres.2021.117373>

Wang, S. *et al*. (2021). Elemental sulfur reduction by a deep-sea hydrothermal vent Campylobacterium *Sulfurimonas* sp. NW10. *Environmental Microbiology* **23**(2), 965-979. <https://sfamjournals.onlinelibrary.wiley.com/doi/abs/10.1111/1462-2920.15247>

**Methanogenesis**

Balch, W. E. & Ferry, J. G. (2021). The Wolfe cycle of carbon dioxide reduction to methane revisited and the Ralph Stoner Wolfe legacy at 100 years. *Advances in Microbial Physiology* **79**,1-23. <https://doi.org/10.1016/bs.ampbs.2021.07.003>

Grinter, R. & Greening, C. (2021). Cofactor F420: an expanded view of its distribution, biosynthesis and roles in bacteria and archaea. *FEMS Microbiology Reviews* **45**(5), fuab021. <https://doi.org/10.1093/femsre/fuab021>

Holmes, D. E. *et al*. (2021). Mechanisms for electron uptake by *Methanosarcina acetivorans* during direct interspecies electron transfer. *mBio* **12**(5), e02344-21. <https://journals.asm.org/doi/abs/10.1128/mBio.02344-21>

Wang, Q. *et al*. (2021). Aerobic bacterial methane synthesis. *Proceedings of the National Academy of Sciences of the USA* **118**(27), e2019229118. <https://www.pnas.org/content/pnas/118/27/e2019229118.full.pdf>

Watanabe, T. *et al*. (2021). Three-megadalton complex of methanogenic electron-bifurcating and CO2-fixing enzymes. *Science* **373**(6559), 1151-1156. <https://www.science.org/doi/10.1126/science.abg5550>

**Homoacetogenesis**

Chowdhury, N. P. *et al*. (2021). Adh4, an alcohol dehydrogenase controls alcohol formation within bacterial microcompartments in the acetogenic bacterium *Acetobacterium woodii*. *Environmental Microbiology* **23**(1), 499-511. <https://doi.org/10.1111/1462-2920.15340>

Dietrich, H. M. *et al*. (2021). Biochemistry of methanol-dependent acetogenesis in *Eubacterium callanderi* KIST612. *Environmental Microbiology* **23**(8), 4505-4517. <https://doi.org/10.1111/1462-2920.15643>

Fan, Y.-X. *et al*. (2021). Biofuel and chemical production from carbon one industry flux gas by acetogenic bacteria. *Advances in Applied Microbiology* **117**,1-34. <https://doi.org/10.1016/bs.aambs.2021.07.001>

Fischer, P. Q. *et al*. (2021). Anaerobic microbial methanol conversion in marine sediments. *Environmental Microbiology* **23**(3), 1348-1362. <https://doi.org/10.1111/1462-2920.15434>

Fuentes, L. *et al*. (2021). Knowing the enemy: homoacetogens in hydrogen production reactors. *Applied Microbiology & Biotechnology* **105**(23), 8989-9002. <https://doi.org/10.1007/s00253-021-11656-6>

Jiao, J.-Y. *et al*. (2021). Insight into the function and evolution of the Wood–Ljungdahl pathway in Actinobacteria. *The ISME Journal* **15**(10), 3005-3018. <https://doi.org/10.1038/s41396-021-00935-9>

Jin, S. *et al*. (2021). Acetogenic bacteria utilize light-driven electrons as an energy source for autotrophic growth. *Proceedings of the National Academy of Sciences of the USA* **118**(9), e2020552118. <https://www.pnas.org/content/pnas/118/9/e2020552118.full.pdf>

Katsyv, A. *et al*. (2021). Electron carriers involved in autotrophic and heterotrophic acetogenesis in the thermophilic bacterium *Thermoanaerobacter kivui*. *Extremophiles* **25**(5), 513-526. <https://doi.org/10.1007/s00792-021-01247-8>

Katsyv, A. & Müller, V. (2020). Overcoming energetic barriers in acetogenic C1 conversion. *Frontiers in Bioengineering and Biotechnology* **8**, 1420. <https://www.frontiersin.org/article/10.3389/fbioe.2020.621166>

Moon, J. *et al*. (2021). Formate metabolism in the acetogenic bacterium *Acetobacterium woodii*. *Environmental Microbiology* **23**(8), 4214-4227. <https://doi.org/10.1111/1462-2920.15598>

Moon, J. & Müller, V. (2021). Physiology and genetics of ethanologenesis in the acetogenic bacterium *Acetobacterium woodii*. *Environmental Microbiology* **23**(11), 6953-6964. <https://doi.org/10.1111/1462-2920.15739>

Öppinger, C. *et al*. (in press). Is reduced ferredoxin the physiological electron donor for MetVF-type methylenetetrahydrofolate reductases in acetogenesis? A hypothesis. *International Microbiology*. <https://doi.org/10.1007/s10123-021-00190-0>

Rosenbaum, F. P. & Müller, V. (2021). Energy conservation under extreme energy limitation: the role of cytochromes and quinones in acetogenic bacteria. *Extremophiles* **25**(5), 413-424. <https://doi.org/10.1007/s00792-021-01241-0>

Rosenbaum, F. P. *et al*. (2021). Lactate metabolism in strictly anaerobic microorganisms with a soluble NAD+-dependent l-lactate dehydrogenase. *Environmental Microbiology* **23**(8), 4661-4672. <https://doi.org/10.1111/1462-2920.15657>

Smith, A. R. *et al*. (2021). Ancient metabolisms of a thermophilic subseafloor bacterium. *Frontiers in Microbiology* **12**: 3477. <https://www.frontiersin.org/article/10.3389/fmicb.2021.764631>

Sorokin, D. Y. *et al*. (2021). *Natranaerofaba carboxydovora* gen. nov., sp. nov., an extremely haloalkaliphilic CO-utilizing acetogen from a hypersaline soda lake representing a novel deep phylogenetic lineage in the class ‘*Natranaerobiia*’. *Environmental Microbiology* **23**(7), 3460-3476. <https://doi.org/10.1111/1462-2920.15241>

Trifunović, D. *et al*. (2021). Growth of the acetogenic bacterium *Acetobacterium woodii* on glycerol and dihydroxyacetone. *Environmental Microbiology* **23**(5), 2648-2658. <https://doi.org/10.1111/1462-2920.15503>

**Organohalide respiration**

Zhao, S. *et al*. (2021). Identification of reductive dehalogenases that mediate complete debromination of penta- and tetrabrominated diphenyl ethers in *Dehalococcoides* spp. *Applied & Environmental Microbiology* **87**(17), e00602-21. <https://journals.asm.org/doi/abs/10.1128/AEM.00602-21>

**Anaerobic respiration on miscellaneous electron acceptors**

Fukuyama, Y. *et al*. (2020). Anaerobic and hydrogenogenic carbon monoxide-oxidizing prokaryotes: Versatile microbial conversion of a toxic gas into an available energy. *Advances in Applied Microbiology* **110**,99-148. <https://doi.org/10.1016/bs.aambs.2019.12.001>

Reyes-Umana, V. *et al*. (2022). Genetic and phylogenetic analysis of dissimilatory iodate-reducing bacteria identifies potential niches across the world’s oceans. *The ISME Journal* **16**(1), 38-49. <https://doi.org/10.1038/s41396-021-01034-5>

Wang, H. *et al*. (2021). *Citrobacter arsenatis* sp. nov., an arsenate-reducing bacterium isolated from freshwater sediment. *Antonie van Leeuwenhoek* **114**(8), 1285-1292. <https://doi.org/10.1007/s10482-021-01601-y>

**Syntrophic associations**

Agne, M. *et al*. (2021). The missing enzymatic link in syntrophic methane formation from fatty acids. *Proceedings of the National Academy of Sciences of the USA* **118**(40), e2111682118. <https://www.pnas.org/content/pnas/118/40/e2111682118.full.pdf>

Baesman, S. M. *et al*. (2021). *Syntrophotalea acetylenivorans* sp. nov., a diazotrophic, acetylenotrophic anaerobe isolated from intertidal sediments. *International Journal of Systematic & Evolutionary Microbiology* **71**(3), 0.004698. <https://doi.org/10.1099/ijsem.0.004698>

Cong, S. *et al*. (2021). Growth coordination between butyrate-oxidizing syntrophs and hydrogenotrophic methanogens. *Frontiers in Microbiology* **12**, 2619. <https://www.frontiersin.org/article/10.3389/fmicb.2021.742531>

He, X. *et al*. (2021). Controls on interspecies electron transport and size limitation of anaerobically methane-oxidizing microbial consortia. *mBio* **12**(3), e03620-20. <https://journals.asm.org/doi/abs/10.1128/mBio.03620-20>

Holmes, D. E. *et al*. (2021). Mechanisms for electron uptake by *Methanosarcina acetivorans* during direct interspecies electron transfer. *mBio* **12**(5), e02344-21. <https://journals.asm.org/doi/abs/10.1128/mBio.02344-21>

Liu, X. *et al*. (2021). *in situ* spectroelectrochemical characterization reveals cytochrome-mediated electric syntrophy in *Geobacter* coculture. *Environmental Science & Technology* **55**(14), 10142-10151. <https://doi.org/10.1021/acs.est.1c00356>

Mollaei, M. *et al*. (2021). Proteomic analysis of a syntrophic coculture of *Syntrophobacter fumaroxidans* MPOBT and *Geobacter sulfurreducens* PCAT. *Frontiers in Microbiology* **12**, 3631. <https://www.frontiersin.org/article/10.3389/fmicb.2021.708911>

Nguyen, L. N. *et al*. (2021). Promotion of direct interspecies electron transfer and potential impact of conductive materials in anaerobic digestion and its downstream processing - a critical review. *Bioresource Technology* **341**, 125847. <https://doi.org/10.1016/j.biortech.2021.125847>

Singh, A. *et al*. (2021). Enrichment and description of novel bacteria performing syntrophic propionate oxidation at high ammonia level. *Environmental Microbiology* **23**(3), 1620-1637. <https://doi.org/10.1111/1462-2920.15388>

Yuan, H. *et al*. (2021). Disentangling the syntrophic electron transfer mechanisms of *Candidatus* Geobacter eutrophica through electrochemical stimulation and machine learning. *Scientific Reports* **11**, 15140. <https://doi.org/10.1038/s41598-021-94628-0>

Zheng, S. *et al*. (2020). Methanobacterium capable of direct interspecies electron transfer. *Environmental Science & Technology* **54**(23), 15347-15354. <https://doi.org/10.1021/acs.est.0c05525>

**Oxidation of hydrocarbons under anaerobic conditions**

Wang, Y. *et al*. (2021). Methyl/alkyl-coenzyme M reductase-based anaerobic alkane oxidation in archaea. *Environmental Microbiology* **23**(2), 530-541. <https://doi.org/10.1111/1462-2920.15057>

**Methane oxidation under anaerobic conditions**

Gambelli, L. *et al*. (2021). The polygonal cell shape and surface protein layer of anaerobic methane-oxidizing *Methylomirabilis lanthanidiphila* bacteria. *Frontiers in Microbiology* **12**, 3684. <https://www.frontiersin.org/article/10.3389/fmicb.2021.766527>

He, X. *et al*. (2021). Controls on interspecies electron transport and size limitation of anaerobically methane-oxidizing microbial consortia. *mBio* **12**(3), e03620-20. <https://journals.asm.org/doi/abs/10.1128/mBio.03620-20>

Zhang, X. *et al*. (2021). Anaerobic oxidation of methane mediated by microbial extracellular respiration. *Environmental Microbiology Reports* **13**(6), 790-804. <https://doi.org/10.1111/1758-2229.13008>

**Degradation of xenobiotics under anaerobic conditions**

Zhang, Z. et al. (2021). Anaerobic biodegradation of phenanthrene by a newly isolated nitrate-dependent *Achromobacter denitrificans* strain PheN1 and exploration of the biotransformation processes by metabolite and genome analyses. *Environmental Microbiology* **23**(2), 908-923. <https://doi.org/10.1111/1462-2920.15201>