**Chapter 6**

**Nitrogen fixation**

Boyd, E. & Peters, J. (2013). New insights into the evolutionary history of biological nitrogen fixation. *Frontiers in Microbiology* **4**, 00201. <https://www.frontiersin.org/article/10.3389/fmicb.2013.00201>

Brenes-Álvarez, M. *et al*. (2022). The heterocyst-specific small RNA NsiR1 regulates the commitment to differentiation in *Nostoc*. *Microbiology Spectrum* **10**(2), e02274-21. <https://journals.asm.org/doi/abs/10.1128/spectrum.02274-21>

Deb, S. *et al*. (2022). Phylogenomic analysis of metagenome-assembled genomes deciphered novel acetogenic nitrogen-fixing *Bathyarchaeota* from hot spring sediments. *Microbiology Spectrum* **10**(3), e00352-22. <https://journals.asm.org/doi/abs/10.1128/spectrum.00352-22>

diCenzo, G. C. *et al*. (2022). DNA methylation in *Ensifer* species during free-living growth and during nitrogen-fixing symbiosis with *Medicago* spp. *mSystems* **7**(1), e01092-21. <https://journals.asm.org/doi/abs/10.1128/mSystems.01092-21>

Hara, S. *et al*. (2022). *in vivo* evidence of single 13C and 15N isotope-labeled methanotrophic nitrogen-fixing bacterial cells in rice roots. *mBio* **13**(3), e01255-22. <https://journals.asm.org/doi/abs/10.1128/mbio.01255-22>

Li, F.-f. *et al*. (in press). Investigating the performance and mechanism of nitrogen gas fixation and conversion to ammonia based on biocathode bioelectrochemistry system. *Journal of Chemical Technology & Biotechnology*. <https://doi.org/10.1002/jctb.7092>

Quintas-Nunes, F. *et al*. (2022). Genomic insights into the plant-associated lifestyle of *Kosakonia radicincitans* MUSA4, a diazotrophic plant-growth-promoting bacterium. *Systematic & Applied Microbiology* **45**(2), 126303. <https://www.sciencedirect.com/science/article/pii/S0723202022000108>

Takimoto, R. *et al*. (2022). A critical role of an oxygen-responsive gene for aerobic nitrogenase activity in *Azotobacter vinelandii* and its application to *Escherichia coli*. *Scientific Reports* **12**, 4182. <https://doi.org/10.1038/s41598-022-08007-4>

**Amino acid synthesis**

Esposito, N. *et al*. (2022). Indole-3-glycerol phosphate synthase from *Mycobacterium tuberculosis*: A potential new drug target. *ChemBioChem* **23**(2), e202100314. <https://chemistry-europe.onlinelibrary.wiley.com/doi/abs/10.1002/cbic.202100314>

Jeong, B. *et al*. (2022). *Staphylococcus aureus* does not synthesize arginine from proline under physiological conditions. *Journal of Bacteriology* **204**(6), e00018-22. <https://journals.asm.org/doi/abs/10.1128/jb.00018-22>

**Nucleotide synthesis**

Goncheva, M. I. *et al*. (in press). Nucleotide biosynthesis: the base of bacterial pathogenesis. *Trends in Microbiology*. <https://doi.org/10.1016/j.tim.2021.12.007>

Rehling, D. *et al*. (2022). Structural and biochemical investigation of class I ribonucleotide reductase from the hyperthermophile *Aquifex aeolicus*. *Biochemistry* **61**(2), 92-106. <https://doi.org/10.1021/acs.biochem.1c00503>

**Monomer synthesis – lipids**

Cronan, J. E. & Luk, T. (2022). Advances in the structural biology, mechanism, and physiology of cyclopropane fatty acid modifications of bacterial membranes. *Microbiology & Molecular Biology Reviews* **86**(2), e00013-22. <https://journals.asm.org/doi/abs/10.1128/mmbr.00013-22>

Lambert, C. *et al*. (in press). FabT, a bacterial transcriptional repressor that limits futile fatty acid biosynthesis. *Microbiology & Molecular Biology Reviews*. e00029-22. <https://journals.asm.org/doi/abs/10.1128/mmbr.00029-22>

Sahonero-Canavesi, D. X. *et al*. (2022). Changes in the distribution of membrane lipids during growth of *Thermotoga maritima* at different temperatures: Indications for the potential mechanism of biosynthesis of ether-bound diabolic acid (membrane-spanning) lipids. *Applied & Environmental Microbiology* **88**(2), e01763-21. <https://journals.asm.org/doi/abs/10.1128/AEM.01763-21>

**Monomer synthesis – others**

**Cell surface polymer synthesis**

Dobihal, G. S. *et al*. (2022). The WalR-WalK signaling pathway modulates the activities of both CwlO and LytE through control of the peptidoglycan deacetylase PdaC in *Bacillus subtilis*. *Journal of Bacteriology* **204**(2), e00533-21. <https://journals.asm.org/doi/abs/10.1128/jb.00533-21>

Jones, C. S. *et al*. (2021). Mechanism of *Staphylococcus aureus* peptidoglycan *O*-acetyltransferase A as an *O*-acyltransferase. *Proceedings of the National Academy of Sciences of the USA* **118**(36), e2103602118.

Lehman, K. M. *et al*. (2022). A biological signature for the inhibition of outer membrane lipoprotein biogenesis. *mBio* **13**(3), e00757-22. <https://journals.asm.org/doi/abs/10.1128/mbio.00757-22>

Riegert, A. S. *et al*. (2022). Discovery and functional characterization of a clandestine ATP-dependent amidoligase in the biosynthesis of the capsular polysaccharide from *Campylobacter jejuni*. *Biochemistry* **61**(2), 117-124. <https://doi.org/10.1021/acs.biochem.1c00707>

Subedi, B. P. *et al*. (2021). Archaeal pseudomurein and bacterial murein cell wall biosynthesis share a common evolutionary ancestry. *FEMS Microbes* **2**, xtab012. <https://doi.org/10.1093/femsmc/xtab012>

**Cell wall, S-layer and surface structure assembly**

Chodisetti, P. K. *et al*. (2022). A LytM-domain factor, ActS, functions in two distinctive peptidoglycan hydrolytic pathways in *E. coli*. *Frontiers in Microbiology* **13**, 913949. <https://www.frontiersin.org/article/10.3389/fmicb.2022.913949>

Coullon, H. & Candela, T. (2022). *Clostridioides difficile* peptidoglycan modifications. *Current Opinion in Microbiology* **65**, 156-161. <https://doi.org/10.1016/j.mib.2021.11.010>

Jeon, W.-J. & Cho, H. (2022). A cell wall hydrolase MepH is ngatively regulated by proteolysis involving Prc and NlpI in *Escherichia coli*. *Frontiers in Microbiology* **13**, 878049. <https://www.frontiersin.org/article/10.3389/fmicb.2022.878049>

Lee, M.-S. *et al*. (2022). Structural basis for the peptidoglycan-editing activity of YfiH. *mBio* **13**(1), e03646-21. <https://journals.asm.org/doi/abs/10.1128/mbio.03646-21>

Müh, U. *et al*. (2022). The WalRK two-component system is essential for proper cell envelope biogenesis in *Clostridioides difficile*. *Journal of Bacteriology* **204**(6), e00121-22. <https://journals.asm.org/doi/abs/10.1128/jb.00121-22>

Salamaga, B. *et al*. (2021). Demonstration of the role of cell wall homeostasis in *Staphylococcus aureus* growth and the action of bactericidal antibiotics. *Proceedings of the National Academy of Sciences of the USA* **118**(44), e2106022118. <https://www.pnas.org/content/pnas/118/44/e2106022118.full.pdf>

Sardis, M. F. *et al*. (2021). The LpoA activator is required to stimulate the peptidoglycan polymerase activity of its cognate cell wall synthase PBP1a. *Proceedings of the National Academy of Sciences of the USA* **118**(35), e2108894118. <https://www.pnas.org/content/pnas/118/35/e2108894118.full.pdf>

Taguchi, A. *et al*. (2021). Biochemical reconstitution defines new functions for membrane-bound glycosidases in assembly of the bacterial cell wall. *Proceedings of the National Academy of Sciences of the USA* **118**(36), e2103740118. <https://www.pnas.org/content/pnas/118/36/e2103740118.full.pdf>

**Outer membrane assembly**

Doyle, M. T. *et al*. (2022). Cryo-EM structures reveal multiple stages of bacterial outer membrane protein folding. *Cell* **185**(7), 1143-1156.e1113. <https://doi.org/10.1016/j.cell.2022.02.016>

Kuk, A. C. Y. et al. (2022). Structure and mechanism of the lipid flippase MurJ. *Annual Review of Biochemistry* **91**, 705-729. <https://www.annualreviews.org/doi/abs/10.1146/annurev-biochem-040320-105145>

Mamou, G. *et al*. (2022). Peptidoglycan maturation controls outer membrane protein assembly. *Nature* **606**(7916), 953-959. <https://doi.org/10.1038/s41586-022-04834-7>

Rosas, N. C. & Lithgow, T. (2022). Targeting bacterial outer-membrane remodelling to impact antimicrobial drug resistance. *Trends in Microbiology* **30**(6), 544-552. <https://doi.org/10.1016/j.tim.2021.11.002>

**Replication and chromosome segregation**

Chan, H. *et al*. (2022). FtsK and SpoIIIE, coordinators of chromosome segregation and envelope remodeling in bacteria. *Trends in Microbiology* **30**(5), 480-494. <https://doi.org/10.1016/j.tim.2021.10.002>

Chase, J. *et al*. (2022). Convergent evolution in two bacterial replicative helicase loaders. *Trends in Biochemical Sciences* **47**(7), 620-630. <https://doi.org/10.1016/j.tibs.2022.02.005>

diCenzo, G. C. *et al*. (2022). DNA methylation in *Ensifer* species during free-living growth and during nitrogen-fixing symbiosis with *Medicago* spp. *mSystems* **7**(1), e01092-21. <https://journals.asm.org/doi/abs/10.1128/mSystems.01092-21>

**Transcription and post-transcriptional modification**

Pukhrambam, C. *et al*. (2022). Structural and mechanistic basis of -dependent transcriptional pausing. *Proceedings of the National Academy of Sciences of the USA* **119**(23), e2201301119. <https://www.pnas.org/doi/abs/10.1073/pnas.2201301119>

**Translation and protein folding**

Cerullo, F. *et al*, (2022). Bacterial ribosome collision sensing by a MutS DNA repair ATPase paralogue. *Nature* **603**(7901), 509-514. <https://doi.org/10.1038/s41586-022-04487-6>

Hartman, M. C. T. (2022). Non-canonical amino acid substrates of *E. coli* aminoacyl-tRNA synthetases. *ChemBioChem* **23**(1), e202100299. <https://doi.org/10.1002/cbic.202100299>

Horovitz, A. *et al*. (2022). Chaperonin mechanisms: Multiple and (mis)understood? *Annual Review of Biophysics* **51**(1), 115-133. <https://www.annualreviews.org/doi/abs/10.1146/annurev-biophys-082521-113418>

Mitra, R. *et al*. (2022). ATP-Independent Chaperones. *Annual Review of Biophysics* **51**(1), 409-429. <https://www.annualreviews.org/doi/abs/10.1146/annurev-biophys-090121-082906>

Potteth, U. S. *et al*. (2022). Novel antibacterial targets in protein biogenesis pathways. *ChemBioChem* **23**(4), e202100459. <https://doi.org/10.1002/cbic.202100459>

Saito, K. *et al*. (2022). Ribosome collisions induce mRNA cleavage and ribosome rescue in bacteria. *Nature* **603**(7901), 503-508. <https://doi.org/10.1038/s41586-022-04416-7>

Vargas-Rodriguez, O. *et al*. (2021). Bacterial translation machinery for deliberate mistranslation of the genetic code. *Proceedings of the National Academy of Sciences of the USA* **118**(35), e2110797118. <https://www.pnas.org/content/pnas/118/35/e2110797118.full.pdf>

**Assembly of cellular structures**

Ferreira-Cerca, S. *et al*. (2021). Archaeal ribosomes: Biogenesis, structure and function. *Frontiers in Microbiology* **12**, 800052. <https://www.frontiersin.org/article/10.3389/fmicb.2021.800052>

**Cell division & growth**

Hammond, L. R. *et al*. (2019). ¡vIVA la DivIVA! *Journal of Bacteriology* **201**(21), e00245-19. <https://journals.asm.org/doi/abs/10.1128/JB.00245-19>

Hammond, L. R. *et al*. (2022). GpsB coordinates cell division and cell surface decoration by wall teichoic acids in *Staphylococcus aureus*. *Microbiology Spectrum* **10**(3), e01413-22. <https://journals.asm.org/doi/abs/10.1128/spectrum.01413-22>

Hunt, K. A. *et al*. (in press). Microbial maintenance energy quantified and modeled with microcalorimetry. *Biotechnology & Bioengineering*. <https://doi.org/10.1002/bit.28155>

Ithurbide, S. *et al*. (2022). Spotlight on FtsZ-based cell division in Archaea. *Trends in Microbiology* 30(7), 665-678. <https://doi.org/10.1016/j.tim.2022.01.005>

Karasz, D. C. *et al*. (2022). Conditional filamentation as an adaptive trait of bacteria and its ecological significance in soils. *Environmental Microbiology* **24**(1), 1-17. <https://doi.org/10.1111/1462-2920.15871>

Park, K.-T. *et al*. (2021). FtsA acts through FtsW to promote cell wall synthesis during cell division in *Escherichia coli*. *Proceedings of the National Academy of Sciences of the USA* **118**(35), e2107210118. <https://www.pnas.org/content/pnas/118/35/e2107210118.full.pdf>

Wu, C. *et al*. (2022). Cellular perception of growth rate and the mechanistic origin of bacterial growth law. Proceedings of the National Academy of Sciences of the USA **119**(20), e2201585119. <https://www.pnas.org/doi/abs/10.1073/pnas.2201585119>