**Chapter 12**

**General**

Feaga, H. A. & Dworkin, J. (2021). Transcription regulates ribosome hibernation. *Molecular Microbiology* **116**(2), 663-673. <https://doi.org/10.1111/mmi.14762>

Kim, J. (2021). How do bacteria maximize their cellular assets? *Microbiology & Biotechnology Letters* **49**(4), 478–484. <http://dx.doi.org/10.48022/mbl.2110.10010>

Mahto, K. U. *et al*. (in press). Unraveling the complex regulatory networks in biofilm formation in bacteria and relevance of biofilms in environmental remediation. *Critical Reviews in Biochemistry & Molecular Biology*. <https://doi.org/10.1080/10409238.2021.2015747>

Montaño López, J. *et al*. (2022). Physiological limitations and opportunities in microbial metabolic engineering. *Nature Reviews Microbiology* **20**(1), 35-48. <https://doi.org/10.1038/s41579-021-00600-0>

**Promoter and σ-factor**

Abram, F. *et al*. (2021). Evolutionary trade-offs between growth and survival: The delicate balance between reproductive success and longevity in bacteria. *Advances in Microbial Physiology* **79**,133-162. <https://doi.org/10.1016/bs.ampbs.2021.07.002>

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://doi.org/10.1111/mmi.14705>

Keffeler, E. C. *et al*. (2021). Influence of the alternative sigma factor RpoN on global gene expression and carbon catabolism in *Enterococcus faecalis* V583. *mBio* **12**(3), e00380-21. <https://journals.asm.org/doi/abs/10.1128/mBio.00380-21>

Klein, C. A. *et al*. (2021). The bacterial promoter spacer modulates promoter strength and timing by length, TG-motifs and DNA supercoiling sensitivity. *Scientific Reports* **11**, 24399. <https://doi.org/10.1038/s41598-021-03817-4>

Martinez, G. S. *et al*. (2021). Characterization of promoters in archaeal genomes based on DNA structural parameters. *MicrobiologyOpen* **10**(5), e1230. <https://doi.org/10.1002/mbo3.1230>

Pennetzdorfer, N. *et al*. (2021). σE controlled regulation of porin OmpU in *Vibrio cholerae*. *Molecular Microbiology* **115**(6), 1244-1261. <https://doi.org/10.1111/mmi.14669>

Schofield, M. C. *et al*. (2021). The anti-sigma factor MucA is required for viability in *Pseudomonas aeruginosa*. *Molecular Microbiology* **116**(2), 550-563. <https://onlinelibrary.wiley.com/doi/abs/10.1111/mmi.14732>

Schumacher, M. A. *et al*. (2021). Evolution of a σ–(c-di-GMP)–anti-σ switch. *Proceedings of the National Academy of Sciences of the USA* **118**(30), e2105447118. <https://www.pnas.org/content/pnas/118/30/e2105447118.full.pdf>

Sun, G. *et al*. (2021). Regulation of pro-σK activation: a key checkpoint in *Bacillus subtilis* sporulation. *Environmental Microbiology* **23**(5), 2366-2373. <https://doi.org/10.1111/1462-2920.15415>

**Enzyme induction – activation, and repression**

DebRoy, S. *et al*. (2021). Genome-wide analysis of *in vivo* CcpA binding with and without its key co-factor HPr in the major human pathogen group A *Streptococcus*. *Molecular Microbiology* **115**(6), 1207-1228. <https://doi.org/10.1111/mmi.14667>

Evangelista, W. *et al*. (2021). Signal transmission in *Escherichia coli* cyclic AMP receptor protein for survival in extreme acidic conditions. *Biochemistry* **60**(40), 2987-3006. <https://doi.org/10.1021/acs.biochem.1c00388>

Jin, Y. *et al*. (2021). Transcriptome analysis reveals catabolite control protein A regulatory mechanisms underlying glucose-excess or -limited conditions in a ruminal bacterium, *Streptococcus bovis*. *Frontiers in Microbiology* **12**, 3462. <https://www.frontiersin.org/article/10.3389/fmicb.2021.767769>

Kampik, C. *et al*. (2021). Handling several sugars at a time: a case study of xyloglucan utilization by *Ruminiclostridium cellulolyticum*. *mBio* **12**(6), 02206-21. <https://doi.org/10.1128/mBio.02206-21>

Lai, Y.-J. *et al*. (in press). CsrA regulation via binding to the base-pairing small RNA Spot 42. *Molecular Microbiology*. <https://doi.org/10.1111/mmi.14769>

Meyer, L. *et al*. (2021). Regulation of *ytfK* by cAMP-CRP contributes to SpoT-dependent accumulation of (p)ppGpp in response to carbon starvation YtfK responds to glucose exhaustion. *Frontiers in Microbiology* **12**, 3232. <https://www.frontiersin.org/article/10.3389/fmicb.2021.775164>

Nair, A. & Sarma, S. J. (2021). The impact of carbon and nitrogen catabolite repression in microorganisms. *Microbiological Research* **251**, 126831. <https://doi.org/10.1016/j.micres.2021.126831>

Okano, H. *et al*. (2021). Hierarchical and simultaneous utilization of carbon substrates: mechanistic insights, physiological roles, and ecological consequences. *Current Opinion in Microbiology* **63**, 172-178. <https://doi.org/10.1016/j.mib.2021.07.008>

**Attenuation**

Cai, X. *et al*. (2021). Attenuator LRR – a regulatory tool for modulating gene expression in Gram-positive bacteria. *Microbial Biotechnology* **14**(6), 2538-2551. <https://doi.org/10.1111/1751-7915.13797>

Lee, J.-H. *et al*. (in press). uORF-mediated riboregulation controls transcription of *whiB7/wblC* antibiotic resistance gene. *Molecular Microbiology*. <https://onlinelibrary.wiley.com/doi/abs/10.1111/mmi.14834>

**Termination/antitermination**

Felden, B. & Augagneur, Y. (2021). Diversity and versatility in small RNA-mediated regulation in bacterial pathogens. *Frontiers in Microbiology* **12**, 2273. <https://www.frontiersin.org/article/10.3389/fmicb.2021.719977>

Hwang, S. *et al*. (2021). Elucidating the regulatory elements for transcription termination and posttranscriptional processing in the *Streptomyces clavuligerus* genome. *mSystems* **6**(3), e01013-20. <https://journals.asm.org/doi/abs/10.1128/mSystems.01013-20>

**Autogenous control**

Landick, R. (2021). Transcriptional pausing as a mediator of bacterial gene regulation. *Annual Review of Microbiology* **75**, 291-314. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-051721-043826>

**Post-transcriptional regulation (Riboswitch)**

**Stability and translational efficiency of mRNA**

Apura, P. *et al*. (2021). The world of ribonucleases from pseudomonads: a short trip through the main features and singularities. *Microbial Biotechnology* **14**(6), 2316-2333. <https://doi.org/10.1111/1751-7915.13890>

Dar, D. *et al*. (2021). Spatial transcriptomics of planktonic and sessile bacterial populations at single-cell resolution. *Science* **373**(6556), eabi4882. <https://science.sciencemag.org/content/sci/373/6556/eabi4882.full.pdf>

Dendooven, T. *et al*. (in press). Multi-scale ensemble properties of the *Escherichia coli* RNA degradosome. *Molecular Microbiology*. <https://doi.org/10.1111/mmi.14800>

Deutscher, M. P. (2021). Regulation of bacterial ribonucleases. *Annual Review of Microbiology* **75**, 71-76. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-020121-011201>

Gilles-Gonzalez, M.-A. & Sousa, E. H. S. (2019). *Escherichia coli* DosC and DosP: a role of c-di-GMP in compartmentalized sensing by degradosomes. *Advances in Microbial Physiology* **75**,53-67. <https://doi.org/10.1016/bs.ampbs.2019.05.002>

Hamouche, L. *et al*. (2021). Polyribosome-dependent clustering of membrane-anchored RNA degradosomes to form sites of mRNA degradation in *Escherichia coli*. *mBio* **12**(5), e01932-21. <https://journals.asm.org/doi/abs/10.1128/mBio.01932-21>

Ifill, G. *et al*. (2021). RNase III and RNase E influence posttranscriptional regulatory networks involved in virulence factor production, metabolism, and regulatory RNA processing in *Bordetella pertussis*. *mSphere* **6**(4), e00650-21. <https://journals.asm.org/doi/abs/10.1128/mSphere.00650-21>

Lipońska, A. *et al*. (2021). Hibernation-promoting factor sequesters *Staphylococcus aureus* ribosomes to antagonize RNase R-mediated nucleolytic degradation. *mBio* **12**(4), e00334-21. <https://journals.asm.org/doi/abs/10.1128/mBio.00334-21>

McQuail, J. *et al*. (in press). The association between Hfq and RNase E in long-term nitrogen-starved *Escherichia coli*. *Molecular Microbiology*. <https://doi.org/10.1111/mmi.14782>

Mohanty, B. K. & Kushner, S. R. (in press). Regulation of mRNA decay in *E. coli*. *Critical Reviews in Biochemistry & Molecular Biology*. <https://doi.org/10.1080/10409238.2021.1968784>

Mohanty, B. K. & Kushner, S. R. (in press). Inactivation of RNase P in *Escherichia coli* significantly changes post-transcriptional RNA metabolism. *Molecular Microbiology*. <https://doi.org/10.1111/mmi.14808>

**Modulation of translation by protein**

Adams, A. N. D. *et al*. (2021). A novel family of RNA-binding proteins regulate polysaccharide metabolism in *Bacteroides thetaiotaomicron*. *Journal of Bacteriology* **203**(21), e00217-21. <https://journals.asm.org/doi/abs/10.1128/JB.00217-21>

**Modulation of translation by sRNA**

Barrientos, L. *et al*. (2021). Assembling the current pieces: The puzzle of RNA-mediated regulation in *Staphylococcus aureus*. *Frontiers in Microbiology* **12**, 2063. <https://www.frontiersin.org/article/10.3389/fmicb.2021.706690>

Felden, B. & Augagneur, Y. (2021). Diversity and versatility in small RNA-mediated regulation in bacterial pathogens. *Frontiers in Microbiology* **12**, 2273. <https://www.frontiersin.org/article/10.3389/fmicb.2021.719977>

Ferrara, S. *et al*. (2021). The small RNA ErsA impacts the anaerobic metabolism of *Pseudomonas aeruginosa* through post-transcriptional modulation of the master regulator Anr. *Frontiers in Microbiology* **12**, 2365. <https://www.frontiersin.org/article/10.3389/fmicb.2021.691608>

Lai, Y.-J. *et al*. (in press). CsrA regulation via binding to the base-pairing small RNA Spot 42. *Molecular Microbiology*. <https://doi.org/10.1111/mmi.14769>

Lee, J.-H. *et al*. (in press). uORF-mediated riboregulation controls transcription of *whiB7/wblC* antibiotic resistance gene. *Molecular Microbiology*. <https://doi.org/10.1111/mmi.14834>

Miyakoshi, M. *et al*. (in press). Mining RNA-seq data reveals the massive regulon of GcvB small RNA and its physiological significance in maintaining amino acid homeostasis in *Escherichia coli*. *Molecular Microbiology*. <https://doi.org/10.1111/mmi.14814>

Parise, M. T. D. *et al*. (2021). An integrated database of small RNAs and their interplay with transcriptional gene regulatory networks in corynebacteria. *Frontiers in Microbiology* **12**, 1540. <https://www.frontiersin.org/article/10.3389/fmicb.2021.656435>

Stenum, T. S. & Holmqvist, E. (in press). CsrA enters Hfq’s territory: regulation of a base-pairing small RNA. *Molecular Microbiology*. <https://doi.org/10.1111/mmi.14785>

Svensson, S. L. & Sharma, C. M. (in press). Small RNAs that target G-rich sequences are generated by diverse biogenesis pathways in Epsilonproteobacteria. *Molecular Microbiology*. <https://doi.org/10.1111/mmi.14850>

Tejada-Arranz, A. & De Reuse, H. (2021). Riboregulation in the major gastric pathogen *Helicobacter pylori*. *Frontiers in Microbiology* **12**, 1978. <https://www.frontiersin.org/article/10.3389/fmicb.2021.712804>

Villa, J. K. *et al*. (2021). A small RNA regulates *pprM*, a modulator of pleiotropic proteins promoting DNA repair, in *Deinococcus radiodurans* under ionizing radiation. *Scientific Reports* **11**, 12949. <https://doi.org/10.1038/s41598-021-91335-8>

**c-di-GMP riboswitch and other cyclic dinucleotide**

Braun, F. *et al*. (2021). Putative nucleotide-based second messengers in the archaeal model organisms *Haloferax volcanii* and *Sulfolobus acidocaldarius*. *Frontiers in Microbiology* **12**, 3604. <https://www.frontiersin.org/article/10.3389/fmicb.2021.779012>

Collins, A. J. *et al*. (2020). From input to output: The Lap/c-di-GMP biofilm regulatory circuit. *Annual Review of Microbiology* **74**, 607-631. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-011520-094214>

Edwards, A. N. *et al*. (2021). c-di-GMP inhibits early sporulation in *Clostridioides difficile*. *mSphere* **6**(6), e00919-21. <https://doi.org/10.1128/msphere.00919-21>

Fu, Y. *et al*. (2021). The multiple regulatory relationship between RNA-chaperone Hfq and the second messenger c-di-GMP. *Frontiers in Microbiology* **12**, 1923. <https://www.frontiersin.org/article/10.3389/fmicb.2021.689619>

Gilles-Gonzalez, M.-A. & Sousa, E. H. S. (2019). *Escherichia coli* DosC and DosP: a role of c-di-GMP in compartmentalized sensing by degradosomes. *Advances in Microbial Physiology* **75**,53-67. <https://doi.org/10.1016/bs.ampbs.2019.05.002>

Hermanas, T. M. *et al*. (2021). Spore-associated proteins involved in c-di-GMP synthesis and degradation of *Bacillus anthracis*. *Journal of Bacteriology* **203**(17), e00135-21. <https://journals.asm.org/doi/abs/10.1128/JB.00135-21>

Huang, M. *et al*. (2021). c-di-GMP homeostasis is critical for heterocyst development in *Anabaena* sp. PCC 7120. *Frontiers in Microbiology* **12**, 3698. <https://www.frontiersin.org/article/10.3389/fmicb.2021.793336>

Ojha, R. *et al*. (2021). *Shigella flexneri* diguanylate cyclases regulate virulence. *Journal of Bacteriology* **203**(23), e00242-21. <https://journals.asm.org/doi/abs/10.1128/JB.00242-21>

Patterson, D. C. *et al*. (2021). Differential ligand-selective control of opposing enzymatic activities within a bifunctional c-di-GMP enzyme. *Proceedings of the National Academy of Sciences of the USA* **118**(36), e2100657118. <https://www.pnas.org/content/pnas/118/36/e2100657118.full.pdf>

Poulin, M. B. & Kuperman, L. L. (2021). Regulation of biofilm exopolysaccharide production by cyclic di-guanosine monophosphate. *Frontiers in Microbiology* **12**, 2506. <https://www.frontiersin.org/article/10.3389/fmicb.2021.730980>

Rørvik, G. H. *et al*. (2021). The c-di-AMP signaling system influences stress tolerance and biofilm formation of *Streptococcus mitis*. *MicrobiologyOpen* **10**(4), e1203. <https://doi.org/10.1002/mbo3.1203>

Schumacher, M. A. et al. (2021). Evolution of a σ–(c-di-GMP)–anti-σ switch. *Proceedings of the National Academy of Sciences of the USA* **118**(30), e2105447118. <https://www.pnas.org/content/pnas/118/30/e2105447118.full.pdf>

Tal, N. *et al*. (2021). Cyclic CMP and cyclic UMP mediate bacterial immunity against phages. *Cell* **184**(23), 5728-5739.E5716. <https://doi.org/10.1016/j.cell.2021.09.031>

**Metabolic regulation in archaea**

Braun, F. *et al*. (2021). Putative nucleotide-based second messengers in the archaeal model organisms *Haloferax volcanii* and *Sulfolobus acidocaldarius*. *Frontiers in Microbiology* **12**, 3604. <https://www.frontiersin.org/article/10.3389/fmicb.2021.779012>

Gutt, M. *et al*. (2021). High complexity of glutamine synthetase regulation in *Methanosarcina mazei*: Small protein 26 interacts and enhances glutamine synthetase activity. *The FEBS Journal* **288**(18), 5350-5373. <https://doi.org/10.1111/febs.15799>

Liao, Y. *et al*. (in press). CdrS is a global transcriptional regulator influencing cell division in *Haloferax volcanii*. *mBio*: e01416-21. <https://journals.asm.org/doi/abs/10.1128/mBio.01416-21>

Martinez, G. S. *et al*. (2021). Characterization of promoters in archaeal genomes based on DNA structural parameters. *MicrobiologyOpen* **10**(5), e1230. <https://doi.org/10.1002/mbo3.1230>

Martinez-Liu, L. *et al*. (2021). Comparative genomics of DNA-binding transcription factors in archaeal and bacterial organisms. *Plos One* **16**(7), e0254025. <https://doi.org/10.1371/journal.pone.0254025>

**Stringent response**

Anderson, B. W. *et al*. (2021). Regulatory themes and variations by the stress-signaling nucleotide alarmones (p)ppGpp in bacteria. *Annual Review of Genetics* **55**, 115-133. <https://www.annualreviews.org/doi/abs/10.1146/annurev-genet-021821-025827>

Aggarwal, S. D. *et al*. (2021). A molecular link between cell wall biosynthesis, translation fidelity, and stringent response in *Streptococcus pneumoniae*. *Proceedings of the National Academy of Sciences of the USA* **118**(14), e2018089118. <https://www.pnas.org/content/pnas/118/14/e2018089118.full.pdf>

Bai, K. *et al*. (in press). The Role of RelA and SpoT on ppGpp production, stress response, growth regulation, and pathogenicity in *Xanthomonas campestris* pv. campestris. *Microbiology Spectrum*. e02057-21. <https://journals.asm.org/doi/abs/10.1128/spectrum.02057-21>

Bange, G. *et al*. (2021). Two P or not two P: Understanding regulation by the bacterial second messengers (p)ppGpp. *Annual Review of Microbiology* **75**, 383-406. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-042621-122343>

Giramma, C. N. *et al*. (2021). The alarmone (p)ppGpp regulates primer extension by bacterial primase. *Journal of Molecular Biology* **433**(19), 167189. <https://doi.org/10.1016/j.jmb.2021.167189>

Meyer, L. *et al*. (2021). Regulation of *ytfK* by cAMP-CRP contributes to SpoT-dependent accumulation of (p)ppGpp in response to carbon starvation YtfK responds to glucose exhaustion. *Frontiers in Microbiology* **12**, 3232. <https://www.frontiersin.org/article/10.3389/fmicb.2021.775164>

**Nitrogen control**

McQuail, J. *et al*. (in press). The association between Hfq and RNase E in long-term nitrogen-starved *Escherichia coli*. *Molecular Microbiology*. <https://doi.org/10.1111/mmi.14782>

Nair, A. & Sarma, S. J. (2021). The impact of carbon and nitrogen catabolite repression in microorganisms. *Microbiological Research* **251**, 126831. <https://doi.org/10.1016/j.micres.2021.126831>

Waite, C. J. *et al*. (2021). Resource allocation during the transition to diazotrophy in *Klebsiella oxytoca*. *Frontiers in Microbiology* **12**, 2194. <https://www.frontiersin.org/article/10.3389/fmicb.2021.718487>

**Pho system**

Groisman, E. A. *et al*. (2021). How the PhoP/PhoQ system controls virulence and Mg2+ homeostasis: lessons in signal transduction, pathogenesis, physiology, and evolution. *Microbiology & Molecular Biology Reviews* **85**(3), e00176-20. <https://journals.asm.org/doi/abs/10.1128/MMBR.00176-20>

Shprung, T. *et al*. (2021). Opposing effects of PhoPQ and PmrAB on the properties of *Salmonella enterica* serovar Typhimurium: Implications on resistance to antimicrobial peptides. *Biochemistry* **60**(39), 2943-2955. <https://doi.org/10.1021/acs.biochem.1c00287>

**ArcB/ArcA and PrrB/PrrA systems**

Jiang, F. *et al*. (2021). Citrate utilization under anaerobic environment in Escherichia coli is under direct control of Fnr and indirect control of ArcA and Fnr via CitA-CitB system. *Environmental Microbiology* **23**(3), 1496-1509. <https://doi.org/10.1111/1462-2920.15357>

**FNR system**

Jiang, F. *et al*. (2021). Citrate utilization under anaerobic environment in Escherichia coli is under direct control of Fnr and indirect control of ArcA and Fnr via CitA-CitB system. *Environmental Microbiology* **23**(3), 1496-1509. <https://doi.org/10.1111/1462-2920.15357>

Sun, D. *et al*. (2021). Fnr negatively regulates prodigiosin synthesis in *Serratia* sp. ATCC 39006 during aerobic fermentation. *Frontiers in Microbiology* **12**, 2642. <https://www.frontiersin.org/article/10.3389/fmicb.2021.734854>

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>

**General stress**

Allen, A. C. *et al*. (2021). Parallel in vivo experimental evolution reveals that increased stress resistance was key for the emergence of persistent tuberculosis bacilli. *Nature Microbiology* **6**(8), 1082-1093. <https://doi.org/10.1038/s41564-021-00938-4>

Anderson, B. W. *et al*. (2021). Regulatory themes and variations by the stress-signaling nucleotide alarmones (p)ppGpp in bacteria. *Annual Review of Genetics* **55**, 115-133. <https://www.annualreviews.org/doi/abs/10.1146/annurev-genet-021821-025827>

Bai, K. *et al*. (in press). The Role of RelA and SpoT on ppGpp production, stress response, growth regulation, and pathogenicity in *Xanthomonas campestris* pv. campestris. *Microbiology Spectrum*. e02057-21. <https://journals.asm.org/doi/abs/10.1128/spectrum.02057-21>

Balakrishnan, R. *et al*. (2021). Suboptimal resource allocation in changing environments constrains response and growth in bacteria. *Molecular Systems Biology* **17**(12), e10597. <https://doi.org/10.15252/msb.202110597>

Bosch, J. *et al*. (2021). Microbial anhydrobiosis. *Environmental Microbiology* **23**(11), 377-6390. <https://doi.org/10.1111/1462-2920.15699>

Cardoza, E. & Singh, H. (in press). Involvement of CspC in response to diverse environmental stressors in *Escherichia coli*. *Journal of Applied Microbiology*. <https://doi.org/10.1111/jam.15219>

de la Garza-García, J. A. *et al*. (2021). Comparative genome-wide transcriptome analysis of *Brucella suis* and *Brucella microti* under acid stress at pH 4.5: Cold shock protein CspA and Dps are associated with acid resistance of *B. microti*. *Frontiers in Microbiology* **12**, 3770. <https://www.frontiersin.org/article/10.3389/fmicb.2021.794535>

Doukyu, N. & Taguchi, K. (2021). Involvement of catalase and superoxide dismutase in hydrophobic organic solvent tolerance of *Escherichia coli*. *AMB Express* **11**(1), 97. <https://doi.org/10.1186/s13568-021-01258-w>

Rørvik, G. H. *et al*. (2021). The c-di-AMP signaling system influences stress tolerance and biofilm formation of *Streptococcus mitis*. *MicrobiologyOpen* **10**(4), e1203. <https://doi.org/10.1002/mbo3.1203>

Wu, P. *et al*. (2021). Stress preadaptation and overexpression of rpoS and hfq genes increase stress resistance of Pseudomonas fluorescens ATCC13525. *Microbiological Research* **250**, 126804. <https://doi.org/10.1016/j.micres.2021.126804>

**Oxidative stress**

Anes, J. *et al*. (2021). Analysis of the oxidative stress regulon identifies *soxS* as a genetic target for resistance reversal in multidrug-resistant *Klebsiella pneumoniae*. *mBio* **12**(3), e00867-21. <https://journals.asm.org/doi/abs/10.1128/mBio.00867-21>

Kappler, U. *et al*. (2019). New insights into the molecular physiology of sulfoxide reduction in bacteria. *Advances in Microbial Physiology* **75**,1-51. <https://doi.org/10.1016/bs.ampbs.2019.05.001>

Li, X. *et al*. (2021). Molecular mechanisms of mycoredoxin-1 in resistance to oxidative stress in *Corynebacterium glutamicum*. *Journal of General & Applied Microbiology* **67**(1), 15-23. <https://doi.org/10.2323/jgam.2020.03.002>

Liu, Y. *et al*. (2021). A novel mycothiol-dependent thiol–disulfide reductase in *Corynebacterium glutamicum* involving oxidative stress resistance. *3 Biotech* **11**(8), 372. <https://doi.org/10.1007/s13205-021-02896-4>

Orench-Rivera, N. & Kuehn, M. J. (2021). Differential packaging into outer membrane vesicles upon oxidative stress reveals a general mechanism for cargo selectivity. *Frontiers in Microbiology* **12**, 1810. <https://www.frontiersin.org/article/10.3389/fmicb.2021.561863>

Su, T. *et al*. (2021). *Corynebacterium glutamicum* mycoredoxin 3 protects against multiple oxidative stresses and displays thioredoxin-like activity. *Journal of General & Applied Microbiology* **67**(4), 125-133. <https://doi.org/10.2323/jgam.2019.10.003>

**Nitrosative stress responses**

Carvalho, S. M. *et al*. (2021). *Staphylococcus aureus* flavohaemoglobin contributes to early stage biofilm development under nitrosative stress. *FEMS Microbiology Letters* **368**(18), fnab131. <https://doi.org/10.1093/femsle/fnab131>

Salas, A. *et al*. (2021). Bacterial nitric oxide metabolism: Recent insights in rhizobia. *Advances in Microbial Physiology* **78**,259-315. <https://doi.org/10.1016/bs.ampbs.2021.05.001>

**Heat shock**

Piróg, A. *et al*. (2021). Two bacterial small heat shock proteins, IbpA and IbpB, form a functional heterodimer. *Journal of Molecular Biology* **433**(15), 167054. <https://doi.org/10.1016/j.jmb.2021.167054>

Wickner, S. *et al*. (2021). The Bacterial Hsp90 Chaperone: Cellular Functions and Mechanism of Action. *Annual Review of Microbiology* **75**, 719-739. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-032421-035644>

**Cold shock**

Cardoza, E. & Singh, H. (in press). Involvement of CspC in response to diverse environmental stressors in *Escherichia coli*. *Journal of Applied Microbiology*. <https://doi.org/10.1111/jam.15219>

de la Garza-García, J. A. *et al*. (2021). Comparative genome-wide transcriptome analysis of *Brucella suis* and *Brucella microti* under acid stress at pH 4.5: Cold shock protein CspA and Dps are associated with acid resistance of *B. microti*. *Frontiers in Microbiology* **12**, 3770. <https://www.frontiersin.org/article/10.3389/fmicb.2021.794535>

Herrera, C. M. *et al*. (2021). Homeoviscous adaptation of the *Acinetobacter baumannii* outer membrane: alteration of lipooligosaccharide structure during cold stress. *mBio* **12**(4), e01295-21. <https://journals.asm.org/doi/abs/10.1128/mBio.01295-21>

Zhang, Y. & Gross, C. A. (2021). Cold shock response in bacteria. *Annual Review of Genetics* **55**, 377-400. <https://www.annualreviews.org/doi/abs/10.1146/annurev-genet-071819-031654>

**Quorum sensing**

Acet, Ö. *et al*. (2021). *N*-acyl homoserine lactone molecules assisted quorum sensing: effects consequences and monitoring of bacteria talking in real life. *Archives of Microbiology* **203**(7), 3739-3749. <https://doi.org/10.1007/s00203-021-02381-9>

Aframian, N. & Eldar, A. (2020). A Bacterial Tower of Babel: Quorum-Sensing Signaling Diversity and Its Evolution. *Annual Review of Microbiology* **74**, 587-606. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-012220-063740>

Barton, I. S. *et al*. (2021). Co-dependent and interdigitated: Dual quorum sensing systems regulate conjugative transfer of the Ti plasmid and the At megaplasmid in *Agrobacterium tumefaciens* 15955. *Frontiers in Microbiology* **11**, 3564. <https://www.frontiersin.org/article/10.3389/fmicb.2020.605896>

Deryabin, D. G. *et al*. (2021). Plant-derived inhibitors of density-dependent communication in bacteria: Diversity of structures, bioactivity mechanisms, and sources of origin. *Microbiology-Moscow* **90**(6), 702-720. <https://doi.org/10.1134/S0026261721060059>

Liu, Y. *et al*. (2021). Roles of autoinducer-2 mediated quorum sensing in wastewater treatment. *Water Science & Technology* **84**(4), 793-809. <https://doi.org/10.2166/wst.2021.278>

Matthews, K. R. (2021). Trypanosome signaling—Quorum sensing. *Annual Review of Microbiology* **75**, 495-514. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-020321-115246>

Meng, F. *et al*. (2021). Acetate and auto-inducing peptide are independent triggers of quorum sensing in *Lactobacillus plantarum*. *Molecular Microbiology* **116**(1), 298-310. <https://doi.org/10.1111/mmi.14709>

Morohoshi, T. *et al*. (2021). Comparative genome analysis reveals the presence of multiple quorum-sensing systems in plant pathogenic bacterium, *Erwinia rhapontici*. *Bioscience, Biotechnology, & Biochemistry* **85**(8), 1910-1914. <https://doi.org/10.1093/bbb/zbab104>

Narla, A. V. *et al*. (2021). A biophysical limit for quorum sensing in biofilms. *Proceedings of the National Academy of Sciences of the USA* **118**(21), e2022818118. <https://www.pnas.org/content/pnas/118/21/e2022818118.full.pdf>

Rahbari, K. M. *et al*. (2021). A *Streptococcus* quorum sensing system enables suppression of innate immunity. *mBio* **12**(3), e03400-20. <https://journals.asm.org/doi/abs/10.1128/mBio.03400-20>

Ruiz, A. *et al*. (2021). The architecture of a mixed fungal–bacterial biofilm is modulated by quorum-sensing signals. *Environmental Microbiology* **23**(5), 2433-2447. <https://doi.org/10.1111/1462-2920.15444>

Sun, X. *et al*. (2021). The *abaI/abaR* quorum sensing system effects on pathogenicity in *Acinetobacter baumannii*. *Frontiers in Microbiology* **12**, 1791. <https://www.frontiersin.org/article/10.3389/fmicb.2021.679241>

Wu, S. *et al*. (2021). Vertical and horizontal quorum-sensing-based multicellular communications. *Trends in Microbiology* **29**(12), 1130-1142. <https://doi.org/10.1016/j.tim.2021.04.006>

Zhao, Y. et al. (2021). Comprehensive succinylome profiling reveals the pivotal role of lysine succinylation in energy metabolism and quorum sensing of *Staphylococcus epidermidis*. *Frontiers in Microbiology* **11**, 3556. <https://www.frontiersin.org/article/10.3389/fmicb.2020.632367>

**Osmotic stress**

Evstigneeva, S. S. *et al*. (2021). Response of bacteria to mechanical stimuli. *Microbiology-Moscow* **90**(5), 558-568. <https://doi.org/10.1134/S0026261721050052>

Ulrych, A. *et al*. (2021). Cell wall atress atimulates the activity of the protein kinase StkP of *Streptococcus pneumoniae*, leading to multiple phosphorylation. *Journal of Molecular Biology* **433**(24), 167319. <https://doi.org/10.1016/j.jmb.2021.167319>

Ultee, E. *et al*. (2021). Formation of wall-less cells in *Kitasatospora viridifaciens* requires cytoskeletal protein FilP in oxygen-limiting conditions. *Molecular Microbiology* **115**(6), 1181-1190. <https://doi.org/10.1111/mmi.14662>

**Two-component systems**

Barrientos, L. *et al*. (2021). Assembling the current pieces: The puzzle of RNA-mediated regulation in *Staphylococcus aureus*. *Frontiers in Microbiology* **12**, 2063. <https://www.frontiersin.org/article/10.3389/fmicb.2021.706690>

Dhaked, H. P. S. *et al*. (2021). Redox sensing modulates the activity of the ComE response regulator of *Streptococcus mutans*. *Journal of Bacteriology* **203**(23), e00330-21. <https://journals.asm.org/doi/abs/10.1128/JB.00330-21>

Gohari, I. M. *et al*. (2021). Identifying the basis for VirS/VirR two-component regulatory system control of *Clostridium perfringens* beta-toxin production. *Journal of Bacteriology* **203**(18), e00279-21. <https://journals.asm.org/doi/abs/10.1128/JB.00279-21>

Groisman, E. A. *et al*. (2021). How the PhoP/PhoQ system controls virulence and Mg2+ homeostasis: lessons in signal transduction, pathogenesis, physiology, and evolution. *Microbiology & Molecular Biology Reviews* **85**(3), e00176-20. <https://journals.asm.org/doi/abs/10.1128/MMBR.00176-20>

He, L.-Y. *et al*. (2021). The role and regulatory network of the CiaRH two-component system in streptococcal species. *Frontiers in Microbiology* **12**, 1888. <https://www.frontiersin.org/article/10.3389/fmicb.2021.693858>

Marunga, J. *et al*. (2021). Mutations in the two-component GluS-GluR regulatory system confer resistance to β-lactam antibiotics in *Burkholderia glumae*. *Frontiers in Microbiology* **12**, 2069. <https://www.frontiersin.org/article/10.3389/fmicb.2021.721444>

Marunga, J. *et al*. (2021). Identification of a genetically linked but functionally independent two-component system important for cell division of the rice pathogen *Burkholderia glumae*. *Frontiers in Microbiology* **12**, 1735. <https://www.frontiersin.org/article/10.3389/fmicb.2021.700333>

Shprung, T. *et al*. (2021). Opposing effects of PhoPQ and PmrAB on the properties of *Salmonella enterica* serovar Typhimurium: Implications on resistance to antimicrobial peptides. *Biochemistry* **60**(39), 2943-2955. <https://doi.org/10.1021/acs.biochem.1c00287>

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>

Zhou, Y. *et al*. (2021). A novel PilR/PilS two-component system regulates necrotic enteritis pilus production in *Clostridium perfringens*. *Journal of Bacteriology* **203**(17), e00096-21. <https://journals.asm.org/doi/abs/10.1128/JB.00096-21>

**Chemotaxis**

Chang, Y. *et al*. (2021). Structural basis of bacterial flagellar motor rotation and switching. *Trends in Microbiology* **29**(11), 1024-1033. <https://doi.org/10.1016/j.tim.2021.03.009>

Colin, R. *et al*. (2021). Multiple functions of flagellar motility and chemotaxis in bacterial physiology. *FEMS Microbiology Reviews* **45**(6), fuab038. <https://doi.org/10.1093/femsre/fuab038>

Lin, T.-S. *et al*. (2021). Stator dynamics depending on sodium concentration in sodium-driven bacterial flagellar motors. *Frontiers in Microbiology* **12**, 3431. <https://www.frontiersin.org/article/10.3389/fmicb.2021.765739>

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>

Umrekar, T. R. *et al*. (2021). Evolution of archaellum rotation involved invention of a stator complex by duplicating and modifying a core component. *Frontiers in Microbiology* **12**, 3435. <https://www.frontiersin.org/article/10.3389/fmicb.2021.773386>

**Adaptive mutation**

Zheng, Y. *et al*. (2021). Genetic diversity for accelerating microbial adaptive laboratory evolution. *ACS Synthetic Biology* **10**(7), 1574-1586. <https://doi.org/10.1021/acssynbio.0c00589>

**Enzyme activity modulation and metabolic flux**

Chapot-Chartier, M.-P. & Buddelmeijer, N. (2021). Post-translational modifications in bacteria – The dynamics of bacterial physiology. *Research in Microbiology* **172**(7), 103887. <https://doi.org/10.1016/j.resmic.2021.103887>

Dash, A. *et al*. (2021). Protein acetyltransferases mediate bacterial adaptation to a diverse environment. *Journal of Bacteriology* **203**(19), e00231-21. <https://journals.asm.org/doi/abs/10.1128/JB.00231-21>

Garcia-Garcia, T. *et al*. (2021). Ser/Thr kinase-dependent phosphorylation of the peptidoglycan hydrolase CwlA controls Its export and modulates cell division in *Clostridioides difficile*. *mBio* **12**(3), e00519-21. <https://journals.asm.org/doi/abs/10.1128/mBio.00519-21>

Jeter, V. L. *et al*. (2021). Sirtuin-dependent reversible lysine acetylation controls the activity of acetyl coenzyme A synthetase in *Campylobacter jejuni*. *Journal of Bacteriology* **203**(20), e00333-21. <https://journals.asm.org/doi/abs/10.1128/JB.00333-21>

Liu, M. *et al*. (2021). Bacterial protein acetylation and its role in cellular physiology and metabolic regulation. *Biotechnology Advances* **53**, 107842. <https://doi.org/10.1016/j.biotechadv.2021.107842>

Wang, J. *et al*. (2021). Protein acetylation and deacetylation in plant-pathogen interactions. *Environmental Microbiology* **23**(9), 4841-4855. <https://doi.org/10.1111/1462-2920.15725>

Zhang, A. *et al*. (2021). Overview of protein phosphorylation in bacteria with a main focus on unusual protein kinases in *Bacillus subtilis*. *Research in Microbiology* **172**(7), 103871. <https://doi.org/10.1016/j.resmic.2021.103871>

**Metabolic regulation and growth**

Abram, F. *et al*. (2021). Evolutionary trade-offs between growth and survival: The delicate balance between reproductive success and longevity in bacteria. *Advances in Microbial Physiology* **79**,133-162. <https://doi.org/10.1016/bs.ampbs.2021.07.002>

Gallay, C. *et al*. (2021). CcrZ is a pneumococcal spatiotemporal cell cycle regulator that interacts with FtsZ and controls DNA replication by modulating the activity of DnaA. *Nature Microbiology* **6**(9), 1175-1187. <https://doi.org/10.1038/s41564-021-00949-1>

Mueller, E. A. *et al*. (2021). The active repertoire of *Escherichia coli* peptidoglycan amidases varies with physiochemical environment. *Molecular Microbiology* **116**(1), 311-328. <https://doi.org/10.1111/mmi.14711>

**Secondary metabolites and fermentation**

Schoenborn, A. A. *et al*. (2021). Defining the expression, production, and signaling roles of specialized metabolites during *Bacillus subtilis* differentiation. *Journal of Bacteriology* **203**(22), e00337-21.<https://journals.asm.org/doi/abs/10.1128/JB.00337-21>