**Chapter 13**

**General**

**Survival and energy**

Noell, S. E. *et al*. (2023). A reduction of transcriptional regulation in aquatic oligotrophic microorganisms enhances fitness in nutrient-poor environments. *Microbiology & Molecular Biology Reviews* **87**(2), e00124-22. <https://journals.asm.org/doi/abs/10.1128/mmbr.00124-22>

Yin, L. *et al*. (2023). ATP is a major determinant of phototrophic bacterial longevity in growth arrest. *mBio* **14**(2), e03609-22. <https://journals.asm.org/doi/abs/10.1128/mbio.03609-22>

Yurimoto, H. & Sakai, Y. (2022). Interaction between C1-microorganisms and plants: contribution to the global carbon cycle and microbial survival strategies in the phyllosphere. *Bioscience, Biotechnology, & Biochemistry* **87**(1), 1-6. <https://doi.org/10.1093/bbb/zbac176>

**Carbohydrate reserve materials**

**Lipid reserve materials**

Aytar Celik, P. *et al*. (2023). A novel higher polyhydroxybutyrate producer *Halomonas halmophila* 18H with unique cell factory attributes. *Bioresource Technology* **372**, 128669. <https://doi.org/10.1016/j.biortech.2023.128669>

Mahato, R. P. *et al*. (2023). Production of polyhydroxyalkanoates from renewable resources: a review on prospects, challenges and applications. *Archives of Microbiology* **205**(5), 172. <https://doi.org/10.1007/s00203-023-03499-8>

Parveen, H. & Yazdani, S. S. (2021). Insights into cyanobacterial alkane biosynthesis. *Journal of Industrial Microbiology & Biotechnology* **49**(2), kuab075. <https://doi.org/10.1093/jimb/kuab075>

Xu, M. *et al*. (2022). Development and application of transcription terminators for polyhydroxylkanoates production in halophilic *Halomonas bluephagenesis* TD01. *Frontiers in Microbiology* **13**, 941306. <https://www.frontiersin.org/articles/10.3389/fmicb.2022.941306>

**Polypeptide reserve materials**

**Polyphosphate**

Geerlings, N. M. J. *et al*. (2022). Polyphosphate dynamics in cable bacteria. *Frontiers in Microbiology* **13**, 883807. <https://www.frontiersin.org/article/10.3389/fmicb.2022.883807>

Kim, G.-D. *et al*. (2023). Metabolic consequences of polyphosphate synthesis and imminent phosphate limitation. *mBio* **14**(3), e00102-23. <https://journals.asm.org/doi/abs/10.1128/mbio.00102-23>

Lv, H. *et al*. (2022). Polyphosphate kinase is required for the processes of virulence and persistence in *Acinetobacter baumannii*. *Microbiology Spectrum* **10**(4), e01230-22. <https://doi.org/10.1128/spectrum.01230-22>

Schroeder, W. L. *et al*. (2023). A detailed genome-scale metabolic model of *Clostridium thermocellum* investigates sources of pyrophosphate for driving glycolysis. *Metabolic Engineering* **77**, 306-322. <https://doi.org/10.1016/j.ymben.2023.04.003>

**Resting cells**

**Sporulation**

Corona Ramírez, A. *et al*. (2023). Multiple roads lead to Rome: unique morphology and chemistry of endospores, exospores, myxospores, cysts and akinetes in bacteria. *Microbiology* **169**(2), 0.001299. <https://doi.org/10.1099/mic.0.001299>

Gao, Y. *et al*. (2023). Bacterial spore germination receptors are nutrient-gated ion channels. *Science* **380**(6643), 387-391. <https://www.science.org/doi/abs/10.1126/science.adg9829>

Setlow, P. & Christie. G. (2023). New thoughts on an old topic: secrets of bacterial spore resistance slowly being revealed. *Microbiology & Molecular Biology Reviews* **87**(2), e00080-22. <https://journals.asm.org/doi/abs/10.1128/mmbr.00080-22>

Tobin, M. J. *et al*. (2023). Reconstituting spore cortex peptidoglycan biosynthesis reveals a deacetylase that catalyzes transamidation. *Biochemistry* **62**(8), 1342-1346. <https://doi.org/10.1021/acs.biochem.3c00100>

**Cysts**

Risser, D. D. (2023). Hormogonium development and motility in filamentous cyanobacteria. *Applied & Environmental Microbiology* **89**(6), e00392-23. <https://journals.asm.org/doi/abs/10.1128/aem.00392-23>

Zeng, X. & Zhang, C.-C. (2022). The making of a heterocyst in cyanobacteria. *Annual Review of Microbiology* **76**, 597-618. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-041320-093442>

**Viable but non-culturable (VBNC) cells**

Cai, J. *et al*. (2023). Identification of determinants for entering into a viable but nonculturable state in *Vibrio alginolyticus* by Tn-seq. *Applied Microbiology & Biotechnology* **107**(5), 1813-1827. <https://doi.org/10.1007/s00253-023-12376-9>

Liu, B. *et al*. (2023). Direct ferrous sulfate exposure facilitates the VBNC state formation rather than ferroptosis in *Listeria monocytogenes*. *Microbiological Research* **269**, 127304. <https://doi.org/10.1016/j.micres.2023.127304>

Liu, J. *et al*. (in press). Viable but nonculturable (VBNC) state, an underestimated and controversial microbial survival strategy. *Trends in Microbiology*. <https://doi.org/10.1016/j.tim.2023.04.009>

Prosdocimi, E. M. *et al*. (2023). Cell phenotype changes and oxidative stress response in Vibrio spp. induced into viable but non-culturable (VBNC) state. *Annals of Microbiology* **73**(1), 1. <https://doi.org/10.1186/s13213-022-01703-6>

Qi, Z. *et al*. (2023). Glyoxylate cycle maintains the metabolic homeostasis of *Pseudomonas aeruginosa* in viable but nonculturable state induced by chlorine stress. *Microbiological Research* **270**, 127341. <https://doi.org/10.1016/j.micres.2023.127341>

Zhang, J. & Lu, X. (2023). Susceptibility of *Campylobacter jejuni* to stressors in agrifood systems and induction of a viable-but-nonculturable state. *Applied & Environmental Microbiology* **89**(5), e00096-23. <https://journals.asm.org/doi/abs/10.1128/aem.00096-23>

**Persister cells**

Fang, X. & Allison, K. R. (2023). Resuscitation dynamics reveal persister partitioning after antibiotic treatment. *Molecular Systems Biology* **19**(4), e11320. <https://doi.org/10.15252/msb.202211320>

Hastings, C. J. *et al*. (2023). Immune response modulation by *Pseudomonas aeruginosa* persister cells. *mBio* **14**(2), e00056-23. <https://journals.asm.org/doi/abs/10.1128/mbio.00056-23>

Jiang, G. *et al*. (2023). Proteomic analysis of the initial wake up of *Vibrio splendidus* persister cells. *World Journal of Microbiology & Biotechnology* **39**(5), 116. <https://doi.org/10.1007/s11274-023-03559-7>

Li, Y. *et al*. (2023). Exogenous adenosine and/or guanosine enhances tetracycline sensitivity of persister cells. *Microbiological Research* **270**, 127321.

Lv, H. *et al*. (2022). Polyphosphate kinase is required for the processes of virulence and persistence in *Acinetobacter baumannii*. *Microbiology Spectrum* **10**(4), e01230-22. <https://doi.org/10.1128/spectrum.01230-22>

Schmitt, B. L. *et al*. (2023). Increased *ompW* and *ompA* expression and higher virulence of *Acinetobacter baumannii* persister cells. *BMC Microbiology* **23**(1), 157. <https://doi.org/10.1186/s12866-023-02904-y>

Shi, X. *et al*. (2023). *Mycobacterium tuberculosis* Rv1324 protein contributes to mycobacterial persistence and causes pathological lung injury in mice by inducing ferroptosis. *Microbiology Spectrum* **11**(1), e02526-22. <https://journals.asm.org/doi/abs/10.1128/spectrum.02526-22>

Shi, X. & Zarkan, A. (2022). Bacterial survivors: evaluating the mechanisms of antibiotic persistence. *Microbiology* **168**(12), 0.001266. <https://doi.org/10.1099/mic.0.001266>

Su, X. *et al*. (2023). Resuscitation-promoting factor accelerates enrichment of highly active tetrachloroethene/polychlorinated biphenyl-dechlorinating cultures. *Applied & Environmental Microbiology* **89**(1), e01951-22. <https://journals.asm.org/doi/abs/10.1128/aem.01951-22>

Wu, N. *et al*. (2023). Polynucleotide phosphorylase mediates a new mechanism of persister formation in *Escherichia coli*. *Microbiology Spectrum* **11**(1), e01546-22. <https://journals.asm.org/doi/abs/10.1128/spectrum.01546-22>

[**Nanobacteria**](https://doi.org/10.1038/s41586-022-05444-z)

Seymour, C. O. *et al*. (2023). Hyperactive nanobacteria with host-dependent traits pervade Omnitrophota. *Nature Microbiology* **8**(4), 727-744. <https://doi.org/10.1038/s41564-022-01319-1>

Volland, J.-M. (2023). Small cells with big secrets. *Nature Reviews Microbiology* **21**(7), 414-414. <https://doi.org/10.1038/s41579-023-00903-4>

Zhao, R. *et al*. (2022). Occurrence, diversity, and genomes of "*Candidatus* Patescibacteria" along the early diagenesis of marine sediments. *Applied & Environmental Microbiology* **88**(24), e01409-22. <https://journals.asm.org/doi/abs/10.1128/aem.01409-22>

**Programmed cell death**

Gao, J. *et al*. (2023). When ferroptosis meets pathogenic infections. *Trends in Microbiology* **31**(5), 468-479. <https://doi.org/10.1016/j.tim.2022.11.006>

Wang, M. *et al*. (2023). NAD+ depletion and defense in bacteria. *Trends in Microbiology* **31**(5), 435-438. <https://doi.org/10.1016/j.tim.2022.06.002>

**Toxin-antitoxin systems**

Mahmoudi, M. *et al*. (2022). *relBE* toxin-antitoxin system as a reliable anti-biofilm target in *Pseudomonas aeruginosa*. *Journal of Applied Microbiology* **133**, 683-695. <https://doi.org/10.1111/jam.15585>

Srikant, S. *et al*. (2022). The evolution of a counter-defense mechanism in a virus constrains its host range. *Elife* **11**, 79549. <https://doi.org/10.7554/eLife.79549>

**Bacterial immune systems**

Aël, H. (2023). Antiphage small molecules produced by bacteria – beyond protein-mediated defenses. *Trends in microbiology* **31**(1), 92-106. <https://dx.doi.org/10.1016/j.tim.2022.08.001>

Aframian, N. & A. Eldar (in press). Abortive infection antiphage defense systems: separating mechanism and phenotype. *Trends in Microbiology*. <https://doi.org/10.1016/j.tim.2023.05.002>

Chen, Y. *et al*. (2023). The abortive infection functions of CRISPR-Cas and Argonaute. *Trends in Microbiology* **31**(4), 405-418. <https://doi.org/10.1016/j.tim.2022.11.005>

Duncan-Lowey, B. *et al*. (2023). Cryo-EM structure of the RADAR supramolecular anti-phage defense complex. *Cell* **186**(5), 987-998.e915. <https://doi.org/10.1016/j.cell.2023.01.012>

Gao, Y. *et al*. (2023). Molecular basis of RADAR anti-phage supramolecular assemblies. *Cell* **186**(5), 999-1012.e1020. <https://doi.org/10.1016/j.cell.2023.01.026>

Garrett, S. C. *et al*. (2023). Investigation of CRISPR-independent phage resistance mechanisms reveals a role for FtsH in phage sdsorption to *Streptococcus thermophilus*. *Journal of Bacteriology* **205**(6), e00482-22. <https://journals.asm.org/doi/abs/10.1128/jb.00482-22>

Huiting, E. *et al*. (2023). Bacteriophages inhibit and evade cGAS-like immune function in bacteria. *Cell* **186**(4), 864-876.e821. <https://doi.org/10.1016/j.cell.2022.12.041>

Hwang, S. & Maxwell, K. L. (2023). Diverse mechanisms of CRISPR-Cas9 inhibition by type II anti-CRISPR proteins. *Journal of Molecular Biology* **435**(7), 168041. <https://doi.org/10.1016/j.jmb.2023.168041>

Hwang, S. *et al*. (2023). Anti-CRISPR protein AcrIIC5 inhibits CRISPR-Cas9 by occupying the target DNA binding pocket. *Journal of Molecular Biology* **435**(7), 167991. <https://doi.org/10.1016/j.jmb.2023.167991>

Kibby, E. M. *et al*. (2023). Bacterial NLR-related proteins protect against phage. *Cell* **186**(11): 2410-2424.e2418. <https://doi.org/10.1016/j.cell.2023.04.015>

Kraus, C. & Sontheimer, E. J. (2023). Applications of anti-CRISPR proteins in genome editing and biotechnology. *Journal of Molecular Biology* **435**(13), 168120. <https://doi.org/10.1016/j.jmb.2023.168120>

Li, J. *et al*. (2023). Establishment of CRISPR-Cas9 system in *Bifidobacteria animalis* AR668. *Microbial Cell Factories* **22**, 112. <https://doi.org/10.1186/s12934-023-02094-2>

Makarova, K. S. *et al*. (2023). In silico approaches for prediction of anti-CRISPR proteins. *Journal of Molecular Biology* **435**(7), 168036. <https://doi.org/10.1016/j.jmb.2023.168036>

Marino, N. D. (2023). Phage against the machine: discovery and mechanism of type V anti-CRISPRs. *Journal of Molecular Biology* **435**(7), 168054. <https://doi.org/10.1016/j.jmb.2023.168054>

Oyejobi, G. K. *et al*. (2023). Phage-bacterial evolutionary interactions: experimental models and complications. *Critical Reviews in Microbiology* **49**(2), 283-296. <https://doi.org/10.1080/1040841X.2022.2052793>

Pons, B. J. *et al*. (2023). Ecology and evolution of phages encoding anti-CRISPR proteins. *Journal of Molecular Biology* **435**(7), 167974. <https://doi.org/10.1016/j.jmb.2023.167974>

Stokar-Avihail, A. *et al*. (2023). Discovery of phage determinants that confer sensitivity to bacterial immune systems. *Cell* **186**(9), 1863-1876.e1816. <https://doi.org/10.1016/j.cell.2023.02.029>

Tesson, F. & Bernheim, A. (2023). Synergy and regulation of antiphage systems: toward the existence of a bacterial immune system? *Current Opinion in Microbiology* **71**, 102238. <https://doi.org/10.1016/j.mib.2022.102238>

Vanderwal, A. R. *et al*. (2023). Csx28 is a membrane pore that enhances CRISPR-Cas13b-dependent antiphage defense. *Science* **380**(6643), 410-415. <https://www.science.org/doi/abs/10.1126/science.abm1184>

Williams, M. C. *et al*. (2023). Restriction endonuclease cleavage of phage DNA enables resuscitation from Cas13-induced bacterial dormancy. *Nature Microbiology* **8**(3), 400-409. <https://doi.org/10.1038/s41564-022-01318-2>

Wohlfarth, J. C. *et al*. (2023). L-form conversion in Gram-positive bacteria enables escape from phage infection. *Nature Microbiology* **8**(3), 387-399. <https://doi.org/10.1038/s41564-022-01317-3>

Yin, P. *et al*. (2023). Non-canonical inhibition strategies and structural basis of anti-CRISPR proteins targeting type I CRISPR-Cas systems. *Journal of Molecular Biology* **435**(7), 167996. <https://doi.org/10.1016/j.jmb.2023.167996>

Zakrzewska, M. & Burmistrz, M. (2023). Mechanisms regulating the CRISPR-Cas systems. *Frontiers in Microbiology* **14**, 1060337. <https://www.frontiersin.org/articles/10.3389/fmicb.2023.1060337>

**Bacterial argonaute**

Chen, Y. *et al*. (2023). The abortive infection functions of CRISPR-Cas and Argonaute. *Trends in Microbiology* **31**(4), 405-418. <https://doi.org/10.1016/j.tim.2022.11.005>

Koopal, B. *et al*. (2023). A long look at short prokaryotic Argonautes. *Trends in Cell Biology* **33**(7), 605-618. <https://doi.org/10.1016/j.tcb.2022.10.005>

Li, Y. *et al*. (2023). Comparison of CRISPR/Cas and Argonaute for nucleic acid tests. *Trends in Biotechnology* **41**(5), 595-599. <https://doi.org/10.1016/j.tibtech.2022.11.002>

Olina, A. *et al*. (2023). Bacterial argonaute proteins aid cell division in the presence of topoisomerase inhibitors in *Escherichia coli*. *Microbiology Spectrum* **11**(3), e04146-22. <https://journals.asm.org/doi/abs/10.1128/spectrum.04146-22>

Qin, Y. *et al*. (2022). Emerging Argonaute-based nucleic acid biosensors. *Trends in Biotechnology* **40**(8), 910-914. <https://doi.org/10.1016/j.tibtech.2022.03.006>

**Competence**

Sharma, D. K. *et al*. (2023). Biochemical properties and roles of DprA protein in bacterial natural transformation, virulence, and pilin variation. *Journal of Bacteriology* **205**(2), e00465-22. <https://journals.asm.org/doi/abs/10.1128/jb.00465-22>