**Chapter 3**

**General**

Beagle, S. D. & Lockless, S. W. (2021). Unappreciated roles for K+ channels in bacterial physiology. *Trends in Microbiology* **29**(10), 942-950. <https://doi.org/10.1016/j.tim.2020.11.005>

Bobik, T. A. & Stewart, A. M. (2021). Selective molecular transport across the protein shells of bacterial microcompartments. *Current Opinion in Microbiology* **62**, 76-83. <https://doi.org/10.1016/j.mib.2021.05.006>

Stautz, J. *et al*. (2021). Molecular mechanisms for bacterial potassium homeostasis. *Journal of Molecular Biology* **433**(16), 166968. <https://doi.org/10.1016/j.jmb.2021.166968>

**Active transport**

Foreman, S. *et al*. (2021). Genetic and biochemical characterization of the Na+/H+ antiporters of *Pseudomonas aeruginosa*. *Journal of Bacteriology* **203**(18), e00284-21. <https://journals.asm.org/doi/abs/10.1128/JB.00284-21>

**ATP-binding cassette (ABC) pathway**

Segawa, T. *et al*. (2021). Two ABC transport systems carry out peptide uptake in *Enterococcus faecalis*: Their roles in growth and in uptake of sex pheromones. *Molecular Microbiology* **116**(2), 459-469. <https://doi.org/10.1111/mmi.14725>

Tsujikawa, Y. *et al*. (2021). Identification of genes encoding a novel ABC transporter in *Lactobacillus delbrueckii* for inulin polymers uptake. *Scientific Reports* **11**, 16007. <https://doi.org/10.1038/s41598-021-95356-1>

**Tripartite ATP-independent periplasmic (TRAP) transporters**

**Group translocation**

**Iron uptake and siderophores**

Albelda-Berenguer, M. *et al*. (2019). Siderophores: From natural roles to potential applications. *Advances in Applied Microbiology* **106**,193-225. <https://doi.org/10.1016/bs.aambs.2018.12.001>

Brown, J. B. *et al*. (2021). Ins and outs: Recent advancements in membrane protein-mediated prokaryotic ferrous iron transport. *Biochemistry* **60**(44), 3277-3291. <https://doi.org/10.1021/acs.biochem.1c00586>

Johnson, C. *et al*. (2021). Pathways of iron and sulfur acquisition, cofactor assembly, destination, and storage in diverse archaeal methanogens and alkanotrophs. *Journal of Bacteriology* **203**(17), e00117-21. <https://journals.asm.org/doi/abs/10.1128/JB.00117-21>

Josts, I. *et al*. (2021). Structural insights into a novel family of integral membrane siderophore reductases. *Proceedings of the National Academy of Sciences of the USA* **118**(34), e2101952118. <https://www.pnas.org/content/pnas/118/34/e2101952118.full.pdf>

Khasheii, B. *et al*. (2021). Siderophores: Importance in bacterial pathogenesis and applications in medicine and industry. *Microbiological Research* **250**, 126790. <https://doi.org/10.1016/j.micres.2021.126790>

Tamariz-Angeles, C. *et al*. (2021). Characterization of siderophore-producing microorganisms associated to plants from high-Andean heavy metal polluted soil from Callejón de Huaylas (Ancash, Perú). *Microbiological Research* **250**, 126811. <https://doi.org/10.1016/j.micres.2021.126811>

**TonB-dependent active transport across the outer membrane in Gram-negative bacteria**

Monge, E. C. & Gardner, J. G. (2021). Efficient chito-oligosaccharide utilization requires two TonB-dependent transporters and one hexosaminidase in *Cellvibrio japonicus*. *Molecular Microbiology* **116**(2), 366-380. <https://doi.org/10.1111/mmi.14717>

**Multidrug efflux pump**

Claxton, D. P. *et al*. (2021). Principles of alternating access in multidrug and toxin extrusion (MATE) transporters. *Journal of Molecular Biology* **433**(16), 166959. <https://doi.org/10.1016/j.jmb.2021.166959>

Kim, J. *et al*. (2021). Structural insights into transporter-mediated drug resistance in infectious diseases. *Journal of Molecular Biology* **433**(16), 167005. <https://doi.org/10.1016/j.jmb.2021.167005>

Zhao, J. *et al*. (2021). The structure of the *Aquifex aeolicus* MATE family multidrug resistance transporter and sequence comparisons suggest the existence of a new subfamily. *Proceedings of the National Academy of Sciences of the USA* **118**(46), e2107335118. <https://www.pnas.org/content/pnas/118/46/e2107335118.full.pdf>

**Protein translocation**

**General secretion pathway (GSP)**

**Twin-arginine translocation (TAT) pathway**

Panasia, G. *et al*. (2021). A complex of LaoA and LaoB acts as a Tat-dependent dehydrogenase for long-chain alcohols in *Pseudomonas aeruginosa*. *Applied & Environmental Microbiology* **87**(16), e00762-21. <https://journals.asm.org/doi/abs/10.1128/AEM.00762-21>

**Protein translocation through the ABC pathway**

**Protein translocation through the cell wall in Gram-positive bacteria**

**Protein translocation in Gram-negative bacteria**

Bryant, O. J. *et al*. (2021). Chaperone-mediated coupling of subunit availability to activation of flagellar Type III secretion. *Molecular Microbiology* **116**(2), 538-549. <https://doi.org/10.1111/mmi.14731>

Cover, T. L. (2021). Tracking bacterial effector protein delivery into host cells. *Molecular Microbiology* **116**(3), 724-728. <https://doi.org/10.1111/mmi.14784>

Diederichs, K. A. *et al*. (2021). Building better barrels – β-barrel biogenesis and insertion in bacteria and mitochondria. *Journal of Molecular Biology* **433**(16), 166894. <https://doi.org/10.1016/j.jmb.2021.166894>

Eckroat, T. J. *et al*. (2021). The type 9 secretion system is required for *Flavobacterium johnsoniae* biofilm formation. *Frontiers in Microbiology* **12**, 2482. <https://www.frontiersin.org/article/10.3389/fmicb.2021.660887>

Guérin, J. & Buchanan, S. K. (2021). Protein import and export across the bacterial outer membrane. *Current Opinion in Structural Biology* **69**, 55-62. <https://www.sciencedirect.com/science/article/pii/S0959440X21000452>

Guo, E. Z. & Galán, J. E. (2021). Cryo-EM structure of the needle filament tip complex of the *Salmonella* type III secretion injectisome. *Proceedings of the National Academy of Sciences of the USA* **118**(44), e2114552118. <https://www.pnas.org/content/pnas/118/44/e2114552118.full.pdf>

Le, N.-H. *et al*. (2021). Killing of Gram-negative and Gram-positive bacteria by a bifunctional cell wall-targeting T6SS effector. *Proceedings of the National Academy of Sciences of the USA* **118**(40), e2106555118. <https://www.pnas.org/content/pnas/118/40/e2106555118.full.pdf>

Wu, C.-F. *et al*. (2021). Diversification of the type VI secretion system in agrobacteria. *mBio* **12**(5), e01927-21. <https://journals.asm.org/doi/abs/10.1128/mBio.01927-21>

**Type VI secretion system**

Le, N.-H. *et al*. (2021). Killing of Gram-negative and Gram-positive bacteria by a bifunctional cell wall-targeting T6SS effector. *Proceedings of the National Academy of Sciences of the USA* **118**(40), e2106555118.

Zhu, L. *et al*. (2021). T6SS translocates a micropeptide to suppress STING-mediated innate immunity by sequestering manganese. *Proceedings of the National Academy of Sciences of the USA* **118**(42), e2103526118. <https://www.pnas.org/content/pnas/118/42/e2103526118.full.pdf>

**Type VII secretion system**

Bowman, L. & Palmer, T. (2021). The type VII secretion system of *Staphylococcus*. *Annual Review of Microbiology* **75**, 471-494. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-012721-123600>

Bunduc, C. M. *et al*. (2020). Structure and function of the mycobacterial type VII secretion systems. *Annual Review of Microbiology* **74**, 315-335. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-012420-081657>

Rivera-Calzada, A. *et al*. (2021). Type VII secretion systems: structure, functions and transport models. *Nature Reviews Microbiology* **19**(9), 567-584. <https://doi.org/10.1038/s41579-021-00560-5>

**Export of polysaccharides and components of surface structures**

**Protein secretion in Archaea**

**Metallochaperones**

Park, Y. J. *et al*. (2021). Characterization of a copper-chelating natural product from the methanotroph *Methylosinus* sp. LW3. *Biochemistry* **60**(38), 2845-2850. <https://doi.org/10.1021/acs.biochem.1c00443>