**Chapter 3**

**General**

Chang, J. C. *et al*. (2022). Quorum sensing regulation of a major facilitator superfamily transporter affects multiple streptococcal virulence factors. *Journal of Bacteriology* **204**(9), e00176-22. <https://journals.asm.org/doi/abs/10.1128/jb.00176-22>

**Active transport**

Khazaal, S. *et al*. (2022). *Streptococcus agalactiae* imports spermidine by a member of the amino acid/polyamine antiporter family to endure citric acid stress at the vaginal pH. *Microbiology* **168**(8), 0.001219. <https://doi.org/10.1099/mic.0.001219>

Meißner, J. *et al*. (2022). How to deal with toxic amino acids: the bipartite AzlCD complex exports histidine in *Bacillus subtilis*. *Journal of Bacteriology* **204**(12), e00353-22. <https://journals.asm.org/doi/abs/10.1128/jb.00353-22>

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

Ekiert, D. C. *et al*. (2022). Structure and mechanism of the bacterial lipid ABC transporter, MlaFEDB. *Current Opinion in Structural Biology* **76**, 102429. <https://doi.org/10.1016/j.sbi.2022.102429>

Okada, U. & Murakami S. (2022). Structural and functional characteristics of the tripartite ABC transporter. *Microbiology* **168**(11), 0.001257. <https://doi.org/10.1099/mic.0.001257>

Sedzicki, J. *et al*. (2022). Mechanism of cyclic β-glucan export by ABC transporter Cgt of *Brucella*. *Nature Structural & Molecular Biology* **29**(12), 1170-1177. <https://doi.org/10.1038/s41594-022-00868-7>

Yan, F. *et al*. (2022). Deciphering cellodextrin and glucose uptake in *Clostridium thermocellum*. *mBio* **13**(5), e01476-22. <https://journals.asm.org/doi/abs/10.1128/mbio.01476-22>

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

**Group translocation**

**Iron uptake and siderophores**

Braun, V. *et al*. (2022). Transcription regulation of iron carrier transport genes by ECF sigma factors through signaling from the cell surface into the cytoplasm. *FEMS Microbiology Reviews* **46**(4), fuac010. <https://doi.org/10.1093/femsre/fuac010>

Conrad, R. A. *et al*. (2022). Siderophores produced by the fish pathogen *Flavobacterium columnare* strain MS-FC-4 are not essential for its virulence. *Applied & Environmental Microbiology* **88**(17), e00948-22. <https://journals.asm.org/doi/abs/10.1128/aem.00948-22>

Djoko, K. & Cavet, J. (2022). Perspectives on metals in microbiology. *Microbiology* **168**(7), 0.001215. <https://doi.org/10.1099/mic.0.001215>

Fujitani, Y. *et al*. (2022). A periplasmic lanthanide mediator, lanmodulin, in *Methylobacterium aquaticum* strain 22A. *Frontiers in Microbiology* **13**, 921636. <https://www.frontiersin.org/articles/10.3389/fmicb.2022.921636>

Juma, P. O. *et al*. (2022). Siderophore for lanthanide and iron uptake for methylotrophy and plant growth promotion in *Methylobacterium aquaticum* strain 22A. *Frontiers in Microbiology* **13**, 921635. <https://www.frontiersin.org/articles/10.3389/fmicb.2022.921635>

Sun, X. *et al*. (2022). High bacterial diversity and siderophore-producing bacteria collectively suppress *Fusarium oxysporum* in maize/faba bean intercropping. *Frontiers in Microbiology* **13**, 972587. <https://www.frontiersin.org/articles/10.3389/fmicb.2022.972587>

Zha, F. *et al*. (2022). Stringent starvation protein SspA and Iron starvation sigma factor PvdS coordinately regulate iron uptake and prodiginine biosynthesis in *Pseudoalteromonas* sp. R3. *Applied & Environmental Microbiology* **88**(22), e01164-22. <https://journals.asm.org/doi/abs/10.1128/aem.01164-22>

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

**Multidrug efflux pump**

Goetz, J. A. *et al*. (2022). Exploring functional interplay amongst *Escherichia coli* efflux pumps. *Microbiology* **168**(11), 0.001261. <https://doi.org/10.1099/mic.0.001261>

**Protein translocation**

**General secretion pathway (GSP)**

Pakharukova, N. *et al*. (2022). Archaic chaperone–usher pili self-secrete into superelastic zigzag springs. *Nature* **609**(7926), 335-340. <https://doi.org/10.1038/s41586-022-05095-0>

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

Rogers, A. R. *et al*. (2022). Envelope stress activates expression of the twin arginine translocation (Tat) system in *Salmonella*. *Microbiology Spectrum* **10**(5), e01621-22. <https://journals.asm.org/doi/abs/10.1128/spectrum.01621-22>

**Protein translocation through the ABC pathway**

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

Ramirez, N. A. *et al*. (2022). A conserved signal-peptidase antagonist modulates membrane homeostasis of actinobacterial sortase critical for surface morphogenesis. *Proceedings of the National Academy of Sciences of the USA* **119**(28), e2203114119. <https://www.pnas.org/doi/abs/10.1073/pnas.2203114119>

**Protein translocation in Gram-negative bacteria**

Bergeron, J. R. C. & Marlovits, T. C. (2022). Cryo-EM of the injectisome and type III secretion systems. *Current Opinion in Structural Biology* **75**, 102403. <https://doi.org/10.1016/j.sbi.2022.102403>

Doyle, M. T. & Bernstein, H. D. (2022). Function of the Omp85 superfamily of outer membrane protein assembly factors and polypeptide transporters. *Annual Review of Microbiology* **76**, 259-279. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-033021-023719>

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>

Teulet, A. *et al*. (2022). The versatile roles of type III secretion systems in rhizobia-legume symbioses. *Annual Review of Microbiology* **76**, 45-65. <https://www.annualreviews.org/doi/abs/10.1146/annurev-micro-041020-032624>

Zeng, Z. X. *et al*. (2022). Secreted in a type III secretion system-dependent manner, EsaH and EscE are the cochaperones of the T3SS needle protein EsaG of *Edwardsiella piscicida*. *mBio* **13**(4), e01250-22. <https://journals.asm.org/doi/abs/10.1128/mbio.01250-22>

**Type VI secretion system**

Suria, A. M. *et al*. (2022). Prevalence and diversity of type VI secretion systems in a model beneficial symbiosis. *Frontiers in Microbiology* **13**, 988044. <https://www.frontiersin.org/articles/10.3389/fmicb.2022.988044>

**Type VII secretion system**

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

Saïdi, F. *et al*. (2022). Bacterial outer membrane polysaccharide export (OPX) proteins occupy three structural classes with selective β-barrel porin requirements for polymer secretion. *Microbiology Spectrum* **10**(5), e01290-22. <https://journals.asm.org/doi/abs/10.1128/spectrum.01290-22>

Watkins, D. W. *et al*. (2022). A bacterial secretosome for regulated envelope biogenesis and quality control? *Microbiology* **168**(10), 0.001255. <https://doi.org/10.1099/mic.0.001255>

**Protein secretion in Archaea**

**Metallochaperones**