

## DAFTAR PUSTAKA

- Abraham, W.R. 2011. Megacities as sources for pathogenic bacteria in rivers and their fate downstream. *International Journal of Microbiology*. 1(1): 1–13.
- Adegoke, A.A., Fatunla, O.K. & Okoh, A.I. 2020. Critical threat associated with carbapenem-resistant gram-negative bacteria: prioritizing water matrices in addressing total antibiotic resistance. *Annals of Microbiology*. 70(1): 1–13.
- Aendekerk, S., Ghysels, B., Cornelis, P. & Baysse, C. 2002. Characterization of a new efflux pump, MexGHI-OpmD, from *Pseudomonas aeruginosa* that confers resistance to vanadium. *Microbiology*. 148(8): 2371–2381.
- Ahmed, O.B. 2022. Detection of Antibiotic Resistance Genes in *Pseudomonas aeruginosa* by Whole Genome Sequencing. *Infection and Drug Resistance*. 15(1): 6703–6709.
- Alderton, I., Palmer, B.R., Heinemann, J.A., Pattis, I., Weaver, L., Gutiérrez-Ginés, M.J., Horswell, J. & Tremblay, L.A. 2021. The role of emerging organic contaminants in the development of antimicrobial resistance. *Emerging Contaminants*. 7(1): 160–171.
- Ana, K.M.S., Madriaga, J. & Espino, M.P. 2021.  $\beta$ -Lactam antibiotics and antibiotic resistance in Asian lakes and rivers: An overview of contamination, sources and detection methods. *Environmental Pollution*. 275(1): 116624–116637.
- Aslam, B., Khurshid, M., Arshad, M.I., Muzammil, S., Rasool, M., Yasmeen, N., Shah, T., Chaudhry, T.H., Rasool, M.H., Shahid, A., Xueshan, X. & Baloch, Z. 2021. Antibiotic Resistance: One Health One World Outlook. *Frontiers in Cellular and Infection Microbiology*. 11(November): 1–20.
- Baralla, E., Demontis, M.P., Dessì, F. & Varoni, M. V. 2021. An overview of antibiotics as emerging contaminants: Occurrence in bivalves as biomonitoring organisms. *Animals*. 11(11): 1–17.
- Bartley, P.S., Domitrovic, T.N., Moretto, V.T., Santos, C.S., Ponce-Terashima, R., Reis, M.G., Barbosa, L.M., Blanton, R.E., Bonomo, R.A. & Perez, F. 2019. Antibiotic resistance in enterobacteriaceae from surface waters in Urban Brazil highlights the risks of poor sanitation. *American Journal of Tropical Medicine and Hygiene*. 100(6): 1369–1377.
- Bisht, K., Moore, J.L., Caprioli, R.M., Skaar, E.P. & Wakeman, C.A. 2021. Impact of temperature-dependent phage expression on *Pseudomonas aeruginosa* biofilm formation. *npj Biofilms and Microbiomes*. 7(1): 1–9.
- Brunton, L.L. 2017. *Goodman & Gilman's: The Pharmacological Basis of Therapeutics*. 13th ed. New York: McGraw Hill.
- Cherak, Z., Loucif, L., Ben Khedher, M., Moussi, A., Benbouza, A., Baron, S.A. & Rolain, J.-M. 2021. MCR-5-Producing Colistin-Resistant *Cupriavidus gilardii* Strain from Well Water in Batna, Algeria. *mSphere*. 6(5): 1–6.

- Chuanchuen, R., Narasaki, C.T. & Schweizer, H.P. 2002. The MexJK efflux pump of *Pseudomonas aeruginosa* requires OprM for antibiotic efflux but not for efflux of triclosan. *Journal of Bacteriology*. 184(18): 5036–5044.
- De, R. 2021. Mobile Genetic Elements of *Vibrio cholerae* and the Evolution of Its Antimicrobial Resistance. *Frontiers in Tropical Diseases*. 2(1): 1–28.
- Dong, P., Cui, Q., Fang, T., Huang, Y. & Wang, H. 2019. Occurrence of antibiotic resistance genes and bacterial pathogens in water and sediment in urban recreational water. *Journal of Environmental Sciences (China)*. 77: 65–74.
- Fabre, L., Ntrel, A.T., Yazidi, A., Leus, I. V., Weeks, J.W., Bhattacharyya, S., Ruickoldt, J., Rouiller, I., Zgurskaya, H.I. & Sygusch, J. 2021. A “Drug Sweeping” State of the TriABC Triclosan Efflux Pump from *Pseudomonas aeruginosa*. *Structure*. 29(3): 261–274.
- Grace, A., Sahu, R., Owen, D.R. & Dennis, V.A. 2022. *Pseudomonas aeruginosa* reference strains PAO1 and PA14: A genomic, phenotypic, and therapeutic review. *Frontiers in Microbiology*. 13(October): 1–15.
- Haddad, A., Jensen, V., Becker, T. & Häussler, S. 2009. The Pho regulon influences biofilm formation and type three secretion in *Pseudomonas aeruginosa*. *Environmental Microbiology Reports*. 1(6): 488–494.
- Hadi, M.P., Fadlillah, L.N., Widasmara, M.Y., Muziasari, W.I. & Subaryono, S. 2018. Potensi sumber bakteri resisten antibiotik berdasarkan kondisi kualitas air dan penggunaan lahan di Sungai Code, Yogyakarta: suatu tinjauan metodologis. *Jurnal Pengelolaan Lingkungan Berkelanjutan (Journal of Environmental Sustainability Management)*. 2(1): 88–100.
- Hamood, J.A.C., Dzvova, N., Kruczek, C. & Hamood, A.N. 2016. *In Vitro Analysis of Pseudomonas aeruginosa Virulence Using Conditions That Mimic the Environment at Specific Infection Sites*. Elsevier Inc.
- He, G.X., Kuroda, T., Mima, T., Morita, Y., Mizushima, T. & Tsuchiya, T. 2004. An H<sup>+</sup>-Coupled Multidrug Efflux Pump, PmpM, a Member of the MATE Family of Transporters, from *Pseudomonas aeruginosa*. *Journal of Bacteriology*. 186(1): 262–265.
- Hernández-Esquível, A.A., Castro-Mercado, E. & García-Pineda, E. 2021. Comparative Effects of *Azospirillum brasilense* Sp245 and *Pseudomonas aeruginosa* PAO1 Lipopolysaccharides on Wheat Seedling Growth and Peroxidase Activity. *Journal of Plant Growth Regulation*. 40(5): 1903–1911.
- Hoek, A.H.A.M.V., Mevius, D., Guerra, B., Mullany, P., Roberts, A.P. & Aarts, H.J.M. 2011. Acquired antibiotic resistance genes: An overview. *Frontiers in Microbiology*. 2(1): 1–27.
- Holmes, A.H., Moore, L.S.P., Sundsfjord, A., Steinbakk, M., Regmi, S., Karkey, A., Guerin, P.J. & Piddock, L.J. V. 2016. Understanding the mechanisms and drivers of antimicrobial resistance. *The Lancet*. 387(10014): 176–187.
- Huszczynski, S.M., Lam, J.S. & Khursigara, C.M. 2020. The role of *Pseudomonas*

- aeruginosa lipopolysaccharide in bacterial pathogenesis and physiology. *Pathogens*. 9(1): 1–22.
- Jurado, A., Bofill-Mas, S., Vázquez-Suñé, E., Pujades, E., Girones, R. & Rusiñol, M. 2019. Occurrence of pathogens in the river–groundwater interface in a losing river stretch (Besòs River Delta, Spain). *Science of the Total Environment*. 696(1): 1–8.
- Kavya, I.K., Kochhar, N., Ghosh, A., Shrivastava, S., Singh, V., Mondal, S., Kaur, K., James, A. & Kumar, M. 2023. Total Environment Research Themes Perspectives on systematic generation of antibiotic resistance with special emphasis on modern antibiotics. *Total Environment Research Themes*. 8(1): 100068–100089.
- Kawalek, A., Modrzejewska, M., Zieniuk, B., Bartosik, A.A. & Jagura-Burdzy, G. 2019. Interaction of ArmZ with the DNA-Binding Domain of MexZ Induces Expression of mexXY Multidrug Efflux Pump Genes and Antimicrobial Resistance in *Pseudomonas aeruginosa*. *Antimicrobial Agents and Chemotherapy*. 63(12): 1–16.
- Klein, E.Y., Van Boeckel, T.P., Martinez, E.M., Pant, S., Gandra, S., Levin, S.A., Goossens, H. & Laxminarayan, R. 2018. Global increase and geographic convergence in antibiotic consumption between 2000 and 2015. *Proceedings of the National Academy of Sciences of the United States of America*. 115(15): 3463–3470.
- Köhler, T., Michéa-Hamzehpour, M., Henze, U., Gotoh, N., Curty, L.K. & Pechère, J.C. 1997. Characterization of MexE-MexF-OprN, a positively regulated multidrug efflux system of *Pseudomonas aeruginosa*. *Molecular Microbiology*. 23(2): 345–354.
- Koonin, E. V. & Wolf, Y.I. 2008. Genomics of bacteria and archaea: The emerging dynamic view of the prokaryotic world. *Nucleic Acids Research*. 36(21): 6688–6719.
- Kurniawan. 2019. *Dasar-Dasar Analisis Kualitas Lingkungan*. Jakarta: Wineka Media.
- Kusi, J., Ojewole, C.O., Ojewole, A.E. & Nwi-Mozu, I. 2022. Antimicrobial Resistance Development Pathways in Surface Waters and Public Health Implications. *Antibiotics*. 11(6): 1–22.
- Larsson, D.G.J. & Flach, C.F. 2022. Antibiotic resistance in the environment. *Nature Reviews Microbiology*. 20(5): 257–269.
- Lee, J., Beck, K. & Bürgmann, H. 2022. Wastewater bypass is a major temporary point-source of antibiotic resistance genes and multi-resistance risk factors in a Swiss river. *Water Research*. 208(1): 117827–117839.
- Lee, J.Y. & Ko, K.S. 2014. Mutations and expression of PmrAB and PhoPQ related with colistin resistance in *Pseudomonas aeruginosa* clinical isolates. *Diagnostic Microbiology and Infectious Disease*. 78(3): 271–276.

- Lewenza, S., Abboud, J., Poon, K., Kobryn, M., Humplik, I., Bell, J.R., Mardan, L. & Reckseidler-Zenteno, S. 2018. *Pseudomonas aeruginosa* displays a dormancy phenotype during long-term survival in water. *PLoS ONE*. 13(9): 1–19.
- Li, Y., Mima, T., Komori, Y., Morita, Y., Kuroda, T., Mizushima, T. & Tsuchiya, T. 2003. A new member of the tripartite multidrug efflux pumps, MexVW-OprM, in *Pseudomonas aeruginosa*. *Journal of Antimicrobial Chemotherapy*. 52(4): 572–575.
- Liao, C., Huang, X., Wang, Q., Yao, D. & Lu, W. 2022. Virulence Factors of *Pseudomonas Aeruginosa* and Antivirulence Strategies to Combat Its Drug Resistance. *Frontiers in Cellular and Infection Microbiology*. 12(July): 1–17.
- Limato, R., Lazarus, G., Dernison, P., Mudia, M., Alamanda, M., Nelwan, E.J., Sinto, R., Karuniawati, A., Rogier van Doorn, H. & Hamers, R.L. 2022. Optimizing antibiotic use in Indonesia: A systematic review and evidence synthesis to inform opportunities for intervention. *The Lancet Regional Health - Southeast Asia*. 2(6): 1–23.
- Lin, J. & Cheng, J. 2019. Quorum Sensing in *Pseudomonas aeruginosa* and Its Relationship to Biofilm Development. *ACS Symposium Series*. 1323(1): 1–16.
- Lorusso, A.B., Carrara, J.A., Barroso, C.D.N., Tuon, F.F. & Faoro, H. 2022. Role of Efflux Pumps on Antimicrobial Resistance in *Pseudomonas aeruginosa*. *International Journal of Molecular Sciences*. 23(24): 1–10.
- Lusiana, N. & Rahadi, B. 2018. Prediksi Distribusi Pencemaran Air Sungai Das Brantas Hulu Kota Batu Pada Musim Hujan Dan Kemarau Menggunakan Metode Spasial Inverse Distance Weighted. *ECOTROPHIC : Jurnal Ilmu Lingkungan (Journal of Environmental Science)*. 12(2): 212.
- Mahrus, I.H., Widyorini, N. & Taufani, W.T. 2019. Analisis Kelimpahan Bakteri di Perairan Bermangrove dan Tidak Bermangrove di Perairan Pantai Ujung Piring, Jepara. *Journal of Maquares*. 8(4): 265–274.
- Mancuso, G., Midiri, A., Gerace, E. & Biondo, C. 2021. Bacterial Antibiotic Resistance: The Most Critical Pathogens. *Pathogens*. 10(10): 1310.
- Masuda, N., Gotoh, N., Ohya, S. & Nishino, T. 1996. Quantitative correlation between susceptibility and OprJ production in NfxB mutants of *Pseudomonas aeruginosa*. *Antimicrobial Agents and Chemotherapy*. 40(4): 909–913.
- Masuda, N., Sakagawa, E., Ohya, S., Gotoh, N., Tsujimoto, H. & Nishino, T. 2000. Substrate specificities of MexAB-OprM, MexCD-OprJ, and MexXY-OprM efflux pumps in *Pseudomonas aeruginosa*. *Antimicrobial Agents and Chemotherapy*. 44(12): 3322–3327.
- Mima, T., Kohira, N., Li, Y., Sekiya, H., Ogawa, W., Kuroda, T. & Tsuchiya, T. 2009. Gene cloning and characteristics of the RND-type multidrug efflux pump MuxABC-OpmB possessing two RND components in *Pseudomonas aeruginosa*. *Microbiology*. 155(11): 3509–3517.

- Mosaka, T.B.M., Unuofin, J.O., Daramola, M.O., Tizaoui, C. & Iwarere, S.A. 2023. Inactivation of antibiotic-resistant bacteria and antibiotic-resistance genes in wastewater streams: Current challenges and future perspectives. *Frontiers in Microbiology*. 13(1): 1–21.
- Mou, R., Bai, F., Duan, Q., Wang, X., Xu, H., Bai, Y., Zhang, X., Jin, S. & Qiao, M. 2011. Mutation of pfm affects the adherence of *Pseudomonas aeruginosa* to host cells and the quorum sensing system. *FEMS Microbiology Letters*. 324(2): 173–180.
- Muurinen, J., Muziasari, W.I., Hultman, J., Pärnänen, K., Narita, V., Lyra, C., Fadlillah, L.N., Rizki, L.P., Nurmi, W., Tiedje, J.M., Dwiprahasto, I., Hadi, P. & Virta, M.P.J. 2022. Antibiotic Resistomes and Microbiomes in the Surface Water along the Code River in Indonesia Reflect Drainage Basin Anthropogenic Activities. *Environmental Science and Technology*. 56(21): 14994–15006.
- O'Neill, J. 2016. Tackling drug-resistant infections globally. *Archives of Pharmacy Practice*. 7(3): 110.
- Palme, J.B., Boulund, F., Fick, J., Kristiansson, E. & Joakim Larsson, D.G. 2014. Shotgun metagenomics reveals a wide array of antibiotic resistance genes and mobile elements in a polluted lake in India. *Frontiers in Microbiology*. 5(1): 1–14.
- PAMKI. 2023. *Pola Patogen dan Antibiogram di Indonesia Tahun 2022*. Jakarta: PAMKI.
- Pancu, D.F., Scurtu, A., Macaso, I.G., Marti, D., Mioc, M., Soica, C., Coricovac, D., Horhat, D., Poenaru, M. & Dehelean, C. 2021. Antibiotics: Conventional therapy and natural compounds with antibacterial activity—a pharmacotoxicological screening. *Antibiotics*. 10(4).
- Pang, Z., Raudonis, R., Glick, B.R., Lin, T.J. & Cheng, Z. 2019. Antibiotic resistance in *Pseudomonas aeruginosa*: mechanisms and alternative therapeutic strategies. *Biotechnology Advances*. 37(1): 177–192.
- Partridge, S.R., Kwong, S.M., Firth, N. & Jensen, S.O. 2018. Mobile genetic elements associated with antimicrobial resistance. *Clinical Microbiology Reviews*. 31(4): 1–61.
- Periasamy, S., Nair, H.A.S., Lee, K.W.K., Ong, J., Goh, J.Q.J., Kjelleberg, S. & Rice, S.A. 2015. *Pseudomonas aeruginosa* PAO1 exopolysaccharides are important for mixed species biofilm community development and stress tolerance. *Frontiers in Microbiology*. 6(1): 1–10.
- Poole, K. 2011. *Pseudomonas aeruginosa*: Resistance to the max. *Frontiers in Microbiology*. 2(1): 1–13.
- Porooshat, D. 2019. Antimicrobial Resistance: Implications and Costs. *Infection and Drug Resistance*. 12(1): 3903–3910.
- Purcell, A. & Poole, K. 2013. The NfxB repressor of the mexCD-oprJ multidrug

- efflux operon of *Pseudomonas aeruginosa*. *Microbiology (United Kingdom)*. 159(1): 2058–2073.
- Qin, S., Xiao, W., Zhou, C., Pu, Q., Deng, X., Lan, L., Liang, H., Song, X. & Wu, M. 2022. *Pseudomonas aeruginosa*: pathogenesis, virulence factors, antibiotic resistance, interaction with host, technology advances and emerging therapeutics. *Signal Transduction and Targeted Therapy*. 7(1): 1–27.
- Quince, C., Walker, A.W., Simpson, J.T., Loman, N.J. & Segata, N. 2017. Shotgun metagenomics, from sampling to analysis. *Nature Biotechnology*. 35(9): 833–844.
- Reygaert, W.C. 2018. An overview of the antimicrobial resistance mechanisms of bacteria. *AIMS Microbiology*. 4(3): 482–501.
- Reynolds, D. & Kollef, M. 2021. The Epidemiology and Pathogenesis and Treatment of *Pseudomonas aeruginosa* Infections: An Update. *Drugs*. 81(18): 2117–2131.
- Rini, C.S. & Rochmah, J. 2020. *Bakteriologi Dasar*. Sidoarjo: UMSIDA Press.
- Rokhmani, Riwidharso, E. & Utami, P. 2019. Kekayaan Spesies Ektoparasit Pada Ikan Brek (*Puntius orphoides*) Hasil Tangkapan Di Sungai Banjaran Purwokerto Banyumas. *Artikel Pemakalah Paralel*. 3(1): 402–406.
- Sakhtah, H., Koyama, L., Zhang, Y., Morales, D.K., Fields, B.L., Price-Whelan, A., Hogan, D.A., Shepard, K. & Dietrich, L.E.P. 2016. The *Pseudomonas aeruginosa* efflux pump MexGHI-OpmD transports a natural phenazine that controls gene expression and biofilm development. *Proceedings of the National Academy of Sciences of the United States of America*. 113(25): E3538–E3547.
- Sanabria, A.M., Janice, J., Hjerde, E., Simonsen, G.S. & Hanssen, A.M. 2021. Shotgun-metagenomics based prediction of antibiotic resistance and virulence determinants in *Staphylococcus aureus* from periprosthetic tissue on blood culture bottles. *Scientific Reports*. 11(1): 1–13.
- Scoffone, V.C., Trespidi, G., Barbieri, G., Irudal, S., Perrin, E. & Buroni, S. 2021. Role of *rnd* efflux pumps in drug resistance of cystic fibrosis pathogens. *Antibiotics*. 10(7): 1–25.
- Sekiya, H., Mima, T., Morita, Y., Kuroda, T., Mizushima, T. & Tsuchiya, T. 2003. Functional cloning and characterization of a multidrug efflux pump, MexHI-OpmD, from a *Pseudomonas aeruginosa* mutant. *Antimicrobial Agents and Chemotherapy*. 47(9): 2990–2992.
- Sendi, L.Y., Rizka, N.A. & Mutiara, T. 2021. Faktor-faktor Yang Mempengaruhi Pengetahuan Dan Perilaku Penggunaan Antibiotika Pada Mahasiswa Farmasi UMM. *Pharmaceutical Journal of Indonesia*. 6(2): 119–123.
- Seo, H. & Kim, K.-J. 2018. Structural insight into molecular mechanism of cytokinin activating protein from *Pseudomonas aeruginosa* PAO1. *Environmental Microbiology*. 20(9): 3214–3223.

- Sharpton, T.J. 2014. An introduction to the analysis of shotgun metagenomic data. *Frontiers in Plant Science*. 5(1): 1–14.
- Shintani, M. 2017. The behavior of mobile genetic elements (MGEs) in different environments. *Bioscience, Biotechnology and Biochemistry*. 81(5): 854–862.
- Shintani, M. & Nojiri, H. 2013. *Management of Microbial Resources in the Environment*. Dordrecht: Springer.
- SNI. 2008. *Pengambilan Muatan Sedimen*. Jakarta: BSN.
- Starr, L.M., Fruci, M. & Poole, K. 2012. Pentachlorophenol induction of the pseudomonas aeruginosa mexAB-oprM efflux operon: Involvement of repressors NalC and MexR and the antirepressor ArmR. *PLoS ONE*. 7(2): 1–9.
- Topalova, P.Z.G., May, A.P. & Sousa, M.C. 2005. Structure and Mechanism of ArnA: Conformational Change Implies Ordered Dehydrogenase Mechanism in Key Enzyme for Polymyxin Resistance. *Structure*. 13(6): 929–942.
- Van, T.T.H., Yidana, Z., Smooker, P.M. & Coloe, P.J. 2020. Antibiotic use in food animals worldwide, with a focus on Africa: Pluses and minuses. *Journal of Global Antimicrobial Resistance*. 20: 170–177.
- Vascarya, C., Susanti, R. & Nurmainah. 2016. Evaluasi Penggunaan Antibiotika Berdasarkan Metode Prescribed Daily Dose ( PDD ) Pada Anak Di Rawat Inap Puskesmas Siantan Hilir Pontianak Periode Juli – Desember 2016. *Jurnal Mahasiswa Fakultas Kedokteran UNTAN*. 3(1): 1–11.
- Vincy, M. V., Brilliant, R. & Pradeepkumar, A.P. 2017. Prevalence of indicator and pathogenic bacteria in a tropical river of Western Ghats, India. *Applied Water Science*. 7(2): 833–844.
- Wickramage, I., Spigaglia, P. & Sun, X. 2021. Mechanisms of antibiotic resistance of Clostridioides difficile. *Journal of Antimicrobial Chemotherapy*. 76(12): 3077–3090.
- Yamamoto, K., Kusada, H., Kamagata, Y. & Tamaki, H. 2021. Parallel evolution of enhanced biofilm formation and phage-resistance in pseudomonas aeruginosa during adaptation process in spatially heterogeneous environments. *Microorganisms*. 9(3): 1–14.
- Yan, Y., Yao, X., Li, H., Zhou, Z., Huang, W., Stratton, C.W., Lu, C.D. & Tang, Y.W. 2014. A novel Pseudomonas aeruginosa strain with an oprD mutation in relation to a nosocomial respiratory infection outbreak in an intensive care unit. *Journal of Clinical Microbiology*. 52(12): 4388–4390.
- Zalewska, M., Błażejewska, A., Czapko, A. & Popowska, M. 2021. Antibiotics and Antibiotic Resistance Genes in Animal Manure – Consequences of Its Application in Agriculture. *Frontiers in Microbiology*. 12(1): 1–21.
- Zhang, Y.-J., Hu, H.-W., Chen, Q.-L., Singh, B.K., Yan, H., Chen, D. & He, J.-Z. 2019. Transfer of antibiotic resistance from manure-amended soils to vegetable microbiomes. *Environment international*. 130(1): 1–10.

Zheng, D., Bergen, P.J., Landersdorfer, C.B. & Hirsch, E.B. 2022. Differences in Fosfomycin Resistance Mechanisms between *Pseudomonas aeruginosa* and Enterobacterales. *Antimicrobial Agents and Chemotherapy*. 66(2): 1–12.

