References

References

Abu Bakar, S. N. H., Abu Hasan, H., Mohammad, A. W., Abdullah, S. R. S., Ngteni, R., & Yusof, K. M. M. (2020). Performance of a laboratory-scale moving bed biofilm reactor (MBBR) and its microbial diversity in palm oil mill effluent (POME) treatment. *Process Safety and Environmental Protection*, *142*, 325–335. https://doi.org/10.1016/j.psep.2020.05.004

Abzazou, T., Araujo, R. M., Auset, M., & Salvadó, H. (2016). Tracking and quantification of nitrifying bacteria in biofilm and mixed liquor of a partial nitrification MBBR pilot plant using fluorescence in situ hybridization. *Science of the Total Environment*, *541*, 1115–1123. https://doi.org/10.1016/j.scitotenv.2015.10.007

Adimalla, N., Qian, H., & Tiwari, D. M. (2021). Groundwater chemistry, distribution and potential health risk appraisal of nitrate enriched groundwater: A case study from the semi-urban region of South India. *Ecotoxicology and Environmental Safety*, *207*(126). https://doi.org/10.1016/j.ecoenv.2020.111277

Agarwal, M., Singh, M., & Hussain, J. (2019). Assessment of groundwater quality with special emphasis on nitrate contamination in parts of Gautam Budh Nagar district, Uttar Pradesh, India. *Acta Geochimica*, *38*(5), 703–717. https://doi.org/10.1007/s11631-018-00311-z

Ahada, C. P. S., & Suthar, S. (2018). Groundwater nitrate contamination and associated human health risk assessment in southern districts of Punjab, India. *Environmental Science and Pollution Research*, *25*(25), 25336–25347. https://doi.org/10.1007/s11356-018-2581-2

Ahmad, S., Singh, N., & Mazhar, S. N. (2020). Hydrochemical characteristics of the groundwater in Trans-Yamuna Alluvial aquifer, Palwal District, Haryana, India. *Applied Water Science*, *10*(2), 1–16. https://doi.org/10.1007/s13201-020-1150-2

Albertsen, M., Hansen, L. B. S., Saunders, A. M., Nielsen, P. H., & Nielsen, K. L. (2012). A metagenome of a full-scale microbial community carrying out enhanced biological phosphorus removal. *ISME Journal*, *6*(6), 1094–1106. https://doi.org/10.1038/ismej.2011.176

Albina, P., Durban, N., Bertron, A., Albrecht, A., Robinet, J. C., & Erable, B. (2019). Influence of hydrogen electron donor, alkaline ph, and high nitrate concentrations on microbial denitrification: A review. *International Journal of Molecular Sciences*, *20*(20). https://doi.org/10.3390/ijms20205163

Albuquerque, M. G. E., Carvalho, G., Kragelund, C., Silva, A. F., Barreto Crespo, M. T., Reis, M. A. M., & Nielsen, P. H. (2013). Link between microbial composition and carbon substrate-uptake preferences in a PHA-storing community. *ISME Journal*, *7*(1), 1–12. https://doi.org/10.1038/ismej.2012.74

Andalib, M., Nakhla, G., McIntee, E., & Zhu, J. (2011). Simultaneous denitrification and methanogenesis (SDM): Review of two decades of research. *Desalination*, Vol. 279, pp. 1–14. https://doi.org/10.1016/j.desal.2011.06.018

Andreou, L. V. (2013). Preparation of genomic DNA from bacteria. *Methods in Enzymology*, *529*, 143–151. https://doi.org/10.1016/B978-0-12-418687-3.00011-2

APHA, 1998. Standard Methods for the Examination of Water and Wastewater, 537 20th ed.United Book Press, USA.

Arya, S., Subramani, T., Vennila, G., & Roy, P. D. (2020). Groundwater vulnerability to pollution in the semi-arid Vattamalaikarai River Basin of south India thorough DRASTIC index evaluation. *Chemie Der Erde*, *80*(4), 125635. https://doi.org/10.1016/ j.chemer.2020.125635

Avisar, D., Kronfeld, J., & Talma, A. S. (2009). Amelioration of groundwater nitrate contamination following installation of a central sewage system in two Israeli villages. *Environmental Geology*, *58*(3), 515–520. https://doi.org/10.1007/s00254-008-1525-4

Aygun, A., Nas, B., & Berktay, A. (2008). Influence of high organic loading rates on COD removal and sludge production in moving bed biofilm reactor. *Environmental Engineering Science*, *25*(9), 1311–1316. https://doi.org/10.1089/ees.2007.0071

Ayub, R., Messier, K. P., Serre, M. L., & Mahinthakumar, K. (2019). Non-point source evaluation of groundwater nitrate contamination from agriculture under geologic uncertainty. *Stochastic Environmental Research and Risk Assessment*, *33*(4–6), 939–956. https://doi.org/10.1007/s00477-019-01669-z

Bachmann Pinto, H., Miguel de Souza, B., & Dezotti, M. (2018). Treatment of a pesticide industry wastewater mixture in a moving bed biofilm reactor followed by conventional and membrane processes for water reuse. *Journal of Cleaner Production*, *201*, 1061–1070. https://doi.org/10.1016/j.jclepro.2018.08.113

Back, J. O., Rivett, M. O., Hinz, L. B., Mackay, N., Wanangwa, G. J., Phiri, O. L., … Kalin, R. M. (2018). Risk assessment to groundwater of pit latrine rural sanitation policy in developing country settings. *Science of the Total Environment*, *613–614*, 592–610. https://doi.org/10.1016/j.scitotenv.2017.09.071

Bai, H., Liao, S., Wang, A., Huang, J., Shu, W., & Ye, J. (2019). High-efficiency inorganic nitrogen removal by newly isolated Pannonibacter phragmitetus B1. *Bioresource Technology*, *271*(June 2018), 91–99. https://doi.org/10.1016/j.biortech.2018.09.090

Bai, Y., Sun, Q., Zhao, C., Wen, D., & Tang, X. (2010). Bioaugmentation treatment for coking wastewater containing pyridine and quinoline in a sequencing batch reactor. *Applied Microbiology and Biotechnology*, *87*(5), 1943–1951. https://doi.org/10.1007/s00253-010-2670-8

Balamurugan, P., Kumar, P. S., Shankar, K., Nagavinothini, R., & Vijayasurya, K. (2020). Non-carcinogenic risk assessment of groundwater in southern part of Salem district in Tamilnadu, India. Journal of the Chilean Chemical Society, 65(1), 4697-4707. http://dx.doi.org/10.4067/S0717-97072020000104697

Bandyopadhyay, S., Schumann, P., & Das, S. K. (2013). Pannonibacter indica sp. nov., a highly arsenate-tolerant bacterium isolated from a hot spring in India. *Archives of Microbiology*, *195*(1), 1–8. https://doi.org/10.1007/s00203-012-0840-z

Banihani, Q., Sierra-Alvarez, R., & Field, J. A. (2009). Nitrate and nitrite inhibition of methanogenesis during denitrification in granular biofilms and digested domestic sludges. *Biodegradation*, *20*(6), 801–812. https://doi.org/10.1007/s10532-009-9268-9

Barberà, M. J., Mateo, E., Monkaityte, R., & Constantí, M. (2011). Biodegradation of methyl tert-butyl ether by newly identified soil microorganisms in a simple mineral solution. *World Journal of Microbiology and Biotechnology*, *27*(4), 813–821. https://doi.org/10.1007/s11274-010-0522-4

Barwal, A., & Chaudhary, R. (2014). To study the performance of biocarriers in moving bed biofilm reactor (MBBR) technology and kinetics of biofilm for retrofitting the existing aerobic treatment systems: A review. *Reviews in Environmental Science and Biotechnology*, Vol. 13, pp. 285–299. https://doi.org/10.1007/s11157-014-9333-7

Bassin, J. P., Kleerebezem, R., Rosado, A. S., Van Loosdrecht, M. C. M., & Dezotti, M. (2012). Effect of different operational conditions on biofilm development, nitrification, and nitrifying microbial population in moving-bed biofilm reactors. *Environmental Science and Technology*, *46*(3), 1546–1555. https://doi.org/10.1021/es203356z

Berg, I., Nilsson, P. P. R., Thor, S., & Hammarström, P. (2010). Efficient imaging of amyloid deposits in Drosophilamodels of human amyloidoses. *Nature Protocols*, *5*(5), 935–944. https://doi.org/10.1038/nprot.2010.41

Bering, S., Mazur, J., Tarnowski, K., Janus, M., Mozia, S., & Morawski, A. W. (2018). The application of moving bed bio-reactor (MBBR) in commercial laundry wastewater treatment. *Science of the Total Environment*, *627*, 1638–1643. https://doi.org/10.1016/j.scitotenv.2018.02.029

Bhatnagar, A., & Sillanpää, M. (2011). A review of emerging adsorbents for nitrate removal from water. *Chemical Engineering Journal*, Vol. 168, pp. 493–504. https://doi.org/10.1016/j.cej.2011.01.103

Bhattacharya, R., & Mazumder, D. (2021). Simultaneous nitrification and denitrification in moving bed bioreactor and other biological systems. *Bioprocess and Biosystems Engineering*, Vol. 44, pp. 635–652. https://doi.org/10.1007/s00449-020-02475-6

Bill, K. A., Bott, C. B., & Murthy, S. N. (2009). Evaluation of alternative electron donors for denitrifying moving bed biofilm reactors (MBBRs). *Water Science and Technology*, *60*(10), 2647–2657. https://doi.org/10.2166/wst.2009.622

Biswas, K., Taylor, M. W., & Turner, S. J. (2014). Successional development of biofilms in moving bed biofilm reactor (MBBR) systems treating municipal wastewater. *Applied Microbiology and Biotechnology*, *98*(3), 1429–1440. https://doi.org/10.1007/s00253-013-5082-8

Boolchandani, M., D'Souza, A. W., & Dantas, G. (2019). Sequencing-based methods and resources to study antimicrobial resistance. *Nature Reviews Genetics*, Vol. 20, pp. 356–370. https://doi.org/10.1038/s41576-019-0108-4

Bouchez, T., Patureau, D., Dabert, P., Juretschko, S., Doré, J., Delgenès, P., … Wagner, M. (2000). Ecological study of a bioaugmentation failure. *Environmental Microbiology*, *2*(2), 179–190. https://doi.org/10.1046/j.1462-2920.2000.00091.x

Briki, M., Zhu, Y., Gao, Y., Shao, M., Ding, H., & Ji, H. (2017). Distribution and health risk assessment to heavy metals near smelting and mining areas of Hezhang, China. *Environmental Monitoring and Assessment*, *189*(9). https://doi.org/10.1007/s10661-017-6153-6

Brindha, K., Renganayaki, S. P., & Elango, L. (2017). Sources, toxicological effects and removal techniques of nitrates in groundwater: An overview. *Indian Journal of Environmental Protection*, *37*(8), 667–700.

Bucci, P., Coppotelli, B., Morelli, I., Zaritzky, N., & Caravelli, A. (2021). Heterotrophic nitrification-aerobic denitrification performance in a granular sequencing batch reactor supported by next generation sequencing. *International Biodeterioration and Biodegradation*, *160*(April), 105210. https://doi.org/10.1016/j.ibiod.2021.105210

Bucci, P., Coppotelli, B., Morelli, I., Zaritzky, N., & Caravelli, A. (2020). Simultaneous heterotrophic nitrification and aerobic denitrification of wastewater in granular reactor: Microbial composition by next generation sequencing analysis. *Journal of Water Process Engineering*, *36*(April). https://doi.org/10.1016/j.jwpe.2020.101254

Bungay III, H. R., & Serafica, G. C. (1999). U.S. Patent No. 5,955,326. Washington, DC: U.S. Patent and Trademark Office.

Cai, C., Hu, S., Guo, J., Shi, Y., Xie, G. J., & Yuan, Z. (2015). Nitrate reduction by denitrifying anaerobic methane oxidizing microorganisms can reach a practically useful rate. *Water Research*, *87*, 211–217. https://doi.org/10.1016/j.watres.2015.09.026

Casas, M. E., Chhetri, R. K., Ooi, G., Hansen, K. M. S., Litty, K., Christensson, M., … Bester, K. (2015). Biodegradation of pharmaceuticals in hospital wastewater by staged Moving Bed Biofilm Reactors (MBBR). *Water Research*, *83*, 293–302. https://doi.org/10.1016/j.watres.2015.06.042

Chakravarthy, S. S., Pande, S., Kapoor, A., & Nerurkar, A. S. (2011). Comparison of denitrification between paracoccus sp. and diaphorobacter sp. *Applied Biochemistry and Biotechnology*, *165*(1), 260–269. https://doi.org/10.1007/s12010-011-9248-5

Chamorro, S., Vergara, J. P., Jarpa, M., Hernandez, V., Becerra, J., & Vidal, G. (2016). Removal of stigmasterol from Kraft mill effluent by aerobic biological treatment with steroidal metabolite detection. *Journal of Environmental Science and Health - Part A Toxic/Hazardous Substances and Environmental Engineering*, *51*(12), 1012–1017. https://doi.org/10.1080/10934529.2016.1198190

Chandra, R., Raj, A., Purohit, H. J., & Kapley, A. (2007). Characterisation and optimisation of three potential aerobic bacterial strains for kraft lignin degradation from pulp paper waste. *Chemosphere*, *67*(4), 839–846. https://doi.org/10.1016/j.chemosphere.2006.10.011

Chang, C. Y., Tanong, K., Xu, J., & Shon, H. (2011). Microbial community analysis of an aerobic nitrifying-denitrifying MBR treating ABS resin wastewater. *Bioresource Technology*, *102*(9), 5337–5344. https://doi.org/10.1016/j.biortech.2010.12.045

Chao, Y., Mao, Y., Yu, K., & Zhang, T. (2016). Novel nitrifiers and comammox in a full-scale hybrid biofilm and activated sludge reactor revealed by metagenomic approach. *Applied Microbiology and Biotechnology*, *100*(18), 8225–8237. https://doi.org/10.1007/s00253-016-7655-9

Chapman, M. R., Robinson, L. S., Pinkner, J. S., Roth, R., Heuser, J., Hammar, M., … Hultgren, S. J. (2002). Role of Escherichia coli curli operons in directing amyloid fiber formation. *Science*, *295*(5556), 851–855. https://doi.org/10.1126/science.1067484

Chen, C. Y., & Chen, S. D. (2000). Biofilm characteristics in biological denitrification biofilm reactors. *Water Science and Technology*, *41*(4–5), 147–154. https://doi.org/10.2166/wst.2000.0438

Chen, H., Li, A., Wang, Q., Cui, D., Cui, C., & Ma, F. (2018). Nitrogen removal performance and microbial community of an enhanced multistage A/O biofilm reactor treating low-strength domestic wastewater. *Biodegradation*, *29*(3), 285–299. https://doi.org/10.1007/s10532-018-9829-x

Chen, S., Sun, D., & Chung, J. S. (2007). Treatment of pesticide wastewater by moving-bed biofilm reactor combined with Fenton-coagulation pretreatment. *Journal of Hazardous Materials*, *144*(1–2), 577–584. https://doi.org/10.1016/j.jhazmat.2006.10.075

Chen, Y., Shao, Z., Kong, Z., Gu, L., Fang, J., & Chai, H. (2020). Study of pyrite based autotrophic denitrification system for low-carbon source stormwater treatment. *Journal of Water Process Engineering*, *37*(March). https://doi.org/10.1016/j.jwpe.2020.101414

Cheng, K. C., Catchmark, J. M., & Demirci, A. (2009). Enhanced production of bacterial cellulose by using a biofilm reactor and its material property analysis. *Journal of Biological Engineering*, *3*, 1–10. https://doi.org/10.1186/1754-1611-3-12

Cheng, K. C., Lin, J. T., Wu, J. Y., & Liu, W. H. (2010). Isoflavone conversion of black soybean by immobilized rhizopus spp. *Food Biotechnology*, *24*(4), 312–331. https://doi.org/10.1080/08905436.2010.524459

Cheng, X. Y., Tian, X. L., Wang, Y. S., Lin, R. M., Mao, Z. C., Chen, N., & Xie, B. Y. (2013). Metagenomic analysis of the pinewood nematode microbiome reveals a symbiotic relationship critical for xenobiotics degradation. *Scientific Reports*, *3*, 1–10. https://doi.org/10.1038/srep01869

Chu, L., & Wang, J. (2013). Denitrification performance and biofilm characteristics using biodegradable polymers PCL as carriers and carbon source. *Chemosphere*, *91*(9), 1310–1316. https://doi.org/10.1016/j.chemosphere.2013.02.064

Chu, L., Wang, J., Quan, F., Xing, X. H., Tang, L., & Zhang, C. (2014). Modification of polyurethane foam carriers and application in a moving bed biofilm reactor. *Process Biochemistry*, *49*(11), 1979–1982. https://doi.org/10.1016/j.procbio.2014.07.018

Comett, I., González-Martínez, S., & Wilderer, P. (2004). Treatment of leachate from the anaerobic fermentation of solid wastes using two biofilm support media. *Water Science and Technology*, *49*(11–12), 287–294. https://doi.org/10.2166/wst.2004.0863

Costa, D. D., Gomes, A. A., Fernandes, M., Lopes da Costa Bortoluzzi, R., Magalhães, M. de L. B., & Skoronski, E. (2018). Using natural biomass microorganisms for drinking water denitrification. *Journal of Environmental Management*, *217*, 520–530. https://doi.org/10.1016/j.jenvman.2018.03.120

Cua, L. S., & Stein, L. Y. (2011). Effects of nitrite on ammonia-oxidizing activity and gene regulation in three ammonia-oxidizing bacteria. *FEMS Microbiology Letters*, *319*(2), 169–175. https://doi.org/10.1111/j.1574-6968.2011.02277.x

Cui, B., Liu, X., Yang, Q., Li, J., Zhou, X., & Peng, Y. (2017). Achieving partial denitrification through control of biofilm structure during biofilm growth in denitrifying biofilter. *Bioresource Technology*, *238*, 223–231. https://doi.org/10.1016/j.biortech.2017.04.034

Cui, Y. X., Guo, G., Biswal, B. K., Chen, G. H., & Wu, D. (2019). Investigation on sulfide-oxidizing autotrophic denitrification in moving-bed biofilm reactors: An innovative approach and mechanism for the process start-up. *International Biodeterioration and Biodegradation*, *140*(March), 90–98. https://doi.org/10.1016/j.ibiod.2019.03.016

Cyplik, P., Juzwa, W., Marecik, R., Powierska-Czarny, J., Piotrowska-Cyplik, A., Czarny, J., … Chrzanowski, Ł. (2013). Denitrification of industrial wastewater: Influence of glycerol addition on metabolic activity and community shifts in a microbial consortium. *Chemosphere*, *93*(11), 2823–2831. https://doi.org/10.1016/j.chemosphere.2013.09.083

Dadrasnia, A., Azirun, M. S., & Ismail, S. B. (2017). Optimal reduction of chemical oxygen demand and NH3-N from landfill leachate using a strongly resistant novel Bacillus salmalaya strain. *BMC Biotechnology*, *17*(1), 1–9. https://doi.org/10.1186/s12896-017-0395-9

Daija, L., Selberg, A., Rikmann, E., Zekker, I., Tenno, T., & Tenno, T. (2016). The influence of lower temperature, influent fluctuations and long retention time on the performance of an upflow mode laboratory-scale septic tank. *Desalination and Water Treatment*, *57*(40), 18679–18687. https://doi.org/10.1080/19443994.2015.1094421

Davies, D. G., Parsek, M. R., Pearson, J. P., Iglewski, B. H., Costerton, J. W., & Greenberg, E. P. (1998). The involvement of cell-to-cell signals in the development of a bacterial biofilm. *Science*, *280*(5361), 295–298. https://doi.org/10.1126/science.280.5361.295

Delmont, T. O., Prestat, E., Keegan, K. P., Faubladier, M., Robe, P., Clark, I. M., … Vogel, T. M. (2012). Structure, fluctuation and magnitude of a natural grassland soil metagenome. *ISME Journal*, *6*(9), 1677–1687. https://doi.org/10.1038/ismej.2011.197

Deng, L., Guo, W., Ngo, H. H., Zhang, X., Wang, X. C., Zhang, Q., & Chen, R. (2016). New functional biocarriers for enhancing the performance of a hybrid moving bed biofilm reactor-membrane bioreactor system. *Bioresource Technology*, *208*, 87–93. https://doi.org/10.1016/j.biortech.2016.02.057

Deng, Q., Su, C., Lu, X., Chen, W., Guan, X., Chen, S., & Chen, M. (2020). Performance and functional microbial communities of denitrification process of a novel MFC-granular sludge coupling system. *Bioresource Technology*, *306*(January), 123173. https://doi.org/10.1016/j.biortech.2020.123173

Derakhshan, Z., Mahvi, A. H., Ehrampoush, M. H., Ghaneian, M. T., Yousefinejad, S., Faramarzian, M., … Fallahzadeh, H. (2018). Evaluation of kenaf fibers as moving bed biofilm carriers in algal membrane photobioreactor. *Ecotoxicology and Environmental Safety*, *152*(January), 1–7. https://doi.org/10.1016/j.ecoenv.2018.01.024

Derilus, D., Forestil, A., Fortuné, J., Polyanska, O., Louime, C., Gervais, G., & Massey, S. E. (2019). Functional Metagenomics Characterization of an Anaerobic Saltwater Bioreactor. *Journal of Renewable Energy*, *2019*, 1–15. https://doi.org/10.1155/2019/4527628

Dezotti, M., Lippel, G., & Bassin, J. P. (2018). Advanced Biological Processes Dezotti, M., Lippel, G., Bassin, J.P., 2018. Advanced Biological Processes for Wastewater Treatment, Advanced Biological Processes for Wastewater Treatment. https://doi.org/10.1007/978-3-319-58835-3for Wastewater Treatment. In *Advanced Biological Processes for Wastewater Treatment*.

Dhamole, P. B., Nair, R. R., D'Souza, S. F., & Lele, S. S. (2007). Denitrification of high strength nitrate waste. *Bioresource Technology*, *98*(2), 247–252. https://doi.org/ 10.1016/j.biortech.2006.01.019

Dhamole, P. B., Nair, R. R., D'souza, S. F., & Lele, S. S. (2008). Denitrification of highly alkaline nitrate waste using adapted sludge. *Applied Biochemistry and Biotechnology*, *151*(2–3), 433–440. https://doi.org/10.1007/s12010-008-8211-6

Ding, X., Wei, D., Guo, W., Wang, B., Meng, Z., Feng, R., … Wei, Q. (2019). Biological denitrification in an anoxic sequencing batch biofilm reactor: Performance evaluation, nitrous oxide emission and microbial community. *Bioresource Technology*, *285*(February). https://doi.org/10.1016/j.biortech.2019.121359

Doederer, K., Gale, D., & Keller, J. (2019). Effective removal of MIB and geosmin using MBBR for drinking water treatment. *Water Research*, *149*, 440–447. https://doi.org/10.1016/j.watres.2018.11.034

Dong, H., Jiang, X., Sun, S., Fang, L., Wang, W., Cui, K., Fu, P. (2019). A cascade of a denitrification bioreactor and an aerobic biofilm reactor for heavy oil refinery wastewater treatment. *RSC Advances*, *9*(13), 7495–7504. https://doi.org/10.1039/C8RA10510C

Dong, Z., Lu, M., Huang, W., & Xu, X. (2011). Treatment of oilfield wastewater in moving bed biofilm reactors using a novel suspended ceramic biocarrier. *Journal of Hazardous Materials*, *196*, 123–130. https://doi.org/10.1016/j.jhazmat.2011.09.001

Dridge, E. J., Watts, C. A., Jepson, B. J. N., Line, K., Santini, J. M., Richardson, D. J., & Butler, C. S. (2007). Investigation of the redox centres of periplasmic selenate reductase from Thauera selenatis by EPR spectroscopy. *Biochemical Journal*, *408*(1), 19–28. https://doi.org/10.1042/BJ20070669

Du, R., Cao, S., Li, B., Zhang, H., Li, X., Zhang, Q., & Peng, Y. (2019). Step-feeding organic carbon enhances high-strength nitrate and ammonia removal via DEAMOX process. *Chemical Engineering Journal*, Vol. 360, pp. 501–510. https://doi.org/10.1016/j.cej.2018.12.011

Dubbels, B. L., Sayavedra-Soto, L. A., Bottomley, P. J., & Arp, D. J. (2009). Thauera butanivorans sp. nov., a C2-C9 alkane-oxidizing bacterium previously referred to as "Pseudomonas butanovora." *International Journal of Systematic and Evolutionary Microbiology*, *59*(7), 1576–1578. https://doi.org/10.1099/ijs.0.000638-0

Dupla, M., Comeau, Y., Parent, S., Villemur, R., & Jolicoeur, M. (2006). Design optimization of a self-cleaning moving-bed bioreactor for seawater denitrification. *Water Research*, *40*(2), 249–258. https://doi.org/10.1016/j.watres.2005.10.029

Duque, A. F., Bessa, V. S., Carvalho, M. F., & Castro, P. M. L. (2011). Bioaugmentation of a rotating biological contactor for degradation of 2-fluorophenol. *Bioresource Technology*, *102*(19), 9300–9303. https://doi.org/10.1016/j.biortech.2011.07.003

Dutta, M., Khare, P., Chakravarty, S., Saikia, D., & Saikia, B. K. (2018). Physico-chemical and elemental investigation of aqueous leaching of high sulfur coal and mine overburden from Ledo coalfield of Northeast India. International Journal of Coal Science & Technology, 5(3), 265-281. https://doi.org/10.1007/s40789-018-0210-9

El Fantroussi, S., & Agathos, S. N. (2005). Is bioaugmentation a feasible strategy for pollutant removal and site remediation? *Current Opinion in Microbiology*, *8*(3), 268–275. https://doi.org/10.1016/j.mib.2005.04.011

El Ouardi, M., Qourzal, S., Alahiane, S., Assabbane, A., & Douch, J. (2015). Effective Removal of Nitrates Ions from Aqueous Solution Using New Clay as Potential Low-Cost Adsorbent. *Journal of Encapsulation and Adsorption Sciences*, *05*(04), 178–190. https://doi.org/10.4236/jeas.2015.54015

Eldyasti, A., Nakhla, G., & Zhu, J. (2013). Impact of calcium on biofilm morphology, structure, detachment and performance in denitrifying fluidized bed bioreactors (DFBBRs). *Chemical Engineering Journal*, *232*, 183–195. https://doi.org/10.1016/j.cej.2013.07.084

Epsztein, R., Nir, O., Lahav, O., & Green, M. (2015). Selective nitrate removal from groundwater using a hybrid nanofiltration-reverse osmosis filtration scheme. *Chemical Engineering Journal*, *279*, 372–378. https://doi.org/10.1016/j.cej.2015.05.010

Erisman, J. W., Bleeker, A., Galloway, J., & Sutton, M. S. (2007). Reduced nitrogen in ecology and the environment. *Environmental Pollution*, Vol. 150, pp. 140–149. https://doi.org/10.1016/j.envpol.2007.06.033

Falås, P., Baillon-Dhumez, A., Andersen, H. R., Ledin, A., & La Cour Jansen, J. (2012). Suspended biofilm carrier and activated sludge removal of acidic pharmaceuticals. *Water Research*, *46*(4), 1167–1175. https://doi.org/10.1016/j.watres.2011.12.003

Fang, H., Zhang, H., Han, L., Mei, J., Ge, Q., Long, Z., & Yu, Y. (2018). Exploring bacterial communities and biodegradation genes in activated sludge from pesticide wastewater treatment plants via metagenomic analysis. *Environmental Pollution*, *243*, 1206–1216. https://doi.org/10.1016/j.envpol.2018.09.080

Feng, L. J., Xu, J., Xu, X. Y., Zhu, L., Xu, J., Ding, W., & Luan, J. (2012). Enhanced biological nitrogen removal via dissolved oxygen partitioning and step feeding in a simulated river bioreactor for contaminated source water remediation. *International Biodeterioration and Biodegradation*, *71*, 72–79. https://doi.org/10.1016/j.ibiod.2011.12.016

Feng, L., Yang, J., Yu, H., Lan, Z., Ye, X., Yang, G., … Zhou, J. (2020a). Response of denitrifying community, denitrification genes and antibiotic resistance genes to oxytetracycline stress in polycaprolactone supported solid-phase denitrification reactor. *Bioresource Technology*, *308*(January), 123274. https://doi.org/10.1016/j.biortech.2020.123274

Feng, W., Wang, C., Lei, X., Wang, H., & Zhang, X. (2020b). Distribution of nitrate content in groundwater and evaluation of potential health risks: A case study of rural areas in Northern China. *International Journal of Environmental Research and Public Health*, *17*(24), 1–14. https://doi.org/10.3390/ijerph17249390

Fernandez, M., Pereira, P. P., Agostini, E., & González, P. S. (2019). How the bacterial community of a tannery effluent responds to bioaugmentation with the consortium SFC 500-1. Impact of environmental variables. *Journal of Environmental Management*, *247*(March), 46–56. https://doi.org/10.1016/j.jenvman.2019.06.055

Ferrai, M., Guglielmi, G., & Andreottola, G. (2010). Modelling respirometric tests for the assessment of kinetic and stoichiometric parameters on MBBR biofilm for municipal wastewater treatment. Environmental Modelling & Software, 25(5), 626-632. https://doi.org/10.1016/j.envsoft.2009.05.005

Flemming, H. C., & Wingender, J. (2010). The biofilm matrix. *Nature Reviews Microbiology*, Vol. 8, pp. 623–633. https://doi.org/10.1038/nrmicro2415

Flemming, H. C., Wingender, J., Szewzyk, U., Steinberg, P., Rice, S. A., & Kjelleberg, S. (2016). Biofilms: An emergent form of bacterial life. *Nature Reviews Microbiology*, Vol. 14, pp. 563–575. https://doi.org/10.1038/nrmicro.2016.94

Fletcher, M. (1988). Effects of electrolytes on attachment of aquatic bacteria to solid surfaces. *Estuaries*, *11*(4), 226–230. https://doi.org/10.2307/1352008

Flores, A., Nisola, G. M., Cho, E., Gwon, E. M., Kim, H., Lee, C., … Chung, W. J. (2007). Bioaugmented sulfur-oxidizing denitrification system with Alcaligenes defragrans B21 for high nitrate containing wastewater treatment. *Bioprocess and Biosystems Engineering*, *30*(3), 197–205. https://doi.org/10.1007/s00449-007-0115-2

Franco, A., Roca, E., & Lema, J. M. (2006). Granulation in high-load denitrifying upflow sludge bed (USB) pulsed reactors. *Water Research*, *40*(5), 871–880. https://doi.org/10.1016/j.watres.2005.11.044

Frings, C. S., & Dunn, R. T. (1970). A colorimetric method for determination of total serum lipids based on the sulfo-phospho-vanillin reaction. *American Journal of Clinical Pathology*, *53*(1), 89–91. https://doi.org/10.1093/ajcp/53.1.89

Fu, G., Wu, J., Han, J., Zhao, L., Chan, G., & Leong, K. (2020). Effects of substrate type on denitrification efficiency and microbial community structure in constructed wetlands. *Bioresource Technology*, *307*(January). https://doi.org/10.1016/j.biortech.2020.123222

Gamble, T. N., Betlach, M. R., & Tiedje, J. M. (1977). Numerically dominant denitrifying bacteria from world soils. *Applied and Environmental Microbiology*, *33*(4), 926–939. https://doi.org/10.1128/aem.33.4.926-939.1977

Gan, Y., Zhao, Q., & Ye, Z. (2019). Denitrification performance and microbial diversity of immobilized bacterial consortium treating nitrate micro-polluted water. *Bioresource Technology*, *281*(February), 351–358. https://doi.org/10.1016/j.biortech.2019.02.111

Gao, L., Han, F., Zhang, X., Liu, B., Fan, D., Sun, X., … Wei, D. (2020a). Simultaneous nitrate and dissolved organic matter removal from wastewater treatment plant effluent in a solid-phase denitrification biofilm reactor. *Bioresource Technology*, *314*(April), 123714. https://doi.org/10.1016/j.biortech.2020.123714

Gao, S., Li, C., Jia, C., Zhang, H., Guan, Q., Wu, X., … Lv, M. (2020b). Health risk assessment of groundwater nitrate contamination: a case study of a typical karst hydrogeological unit in East China. *Environmental Science and Pollution Research*, *27*(9), 9274–9287. https://doi.org/10.1007/s11356-019-07075-w

Gardner, J. L., Peters, A., Kearney, M. R., Joseph, L., & Heinsohn, R. (2011). Declining body size: A third universal response to warming? *Trends in Ecology and Evolution*, Vol. 26, pp. 285–291. https://doi.org/10.1016/j.tree.2011.03.005

Gebbink, M. F. B. G., Claessen, D., Bouma, B., Dijkhuizen, L., & Wösten, H. A. B. (2005). Amyloids - A functional coat for microorganisms. *Nature Reviews Microbiology*, *3*(4), 333–341. https://doi.org/10.1038/nrmicro1127

Gentry, T. J., Rensing, C., & Pepper, I. L. (2004). New approaches for bioaugmentation as a remediation technology. *Critical Reviews in Environmental Science and Technology*, Vol. 34, pp. 447–494. https://doi.org/10.1080/10643380490452362

Ghafari, S., Hasan, M., & Aroua, M. K. (2008). Bio-electrochemical removal of nitrate from water and wastewater-A review. *Bioresource Technology*, *99*(10), 3965–3974. https://doi.org/10.1016/j.biortech.2007.05.026

Gilbert, E. M., Agrawal, S., Schwartz, T., Horn, H., & Lackner, S. (2015). Comparing different reactor configurations for Partial Nitritation/Anammox at low temperatures. *Water Research*, *81*, 92–100. https://doi.org/10.1016/j.watres.2015.05.022

Gilbert, J. A., Field, D., Huang, Y., Edwards, R., Li, W., Gilna, P., & Joint, I. (2008). Detection of large numbers of novel sequences in the metatranscriptomes of complex marine microbial communities. *PLoS ONE*, *3*(8). https://doi.org/10.1371/journal.pone.0003042

Gilbert, J. A., Meyer, F., Antonopoulos, D., Balaji, P., Brown, C. T., Brown, C. T., … Stevens, R. (2010). Meeting Report: The Terabase Metagenomics Workshop and the Vision of an Earth Microbiome Project. *Standards in Genomic Sciences*, *3*(3), 243–248. https://doi.org/10.4056/sigs.1433550

Gillooly, J. F., Brown, J. H., West, G. B., Savage, V. M., & Charnov, E. L. (2001). Effects of size and temperature on metabolic rate. *Science*, *293*(5538), 2248–2251. https://doi.org/10.1126/science.1061967

Glass, C., & Silverstein, J. (1998). Denitrification kinetics of high nitrate concentration water: pH effect on inhibition and nitrite accumulation. Water research, 32(3), 831-839. https://doi.org/10.1016/S0043-1354(97)00260-1

Grein, F., Ramos, A. R., Venceslau, S. S., & Pereira, I. A. C. (2013). Unifying concepts in anaerobic respiration: Insights from dissimilatory sulfur metabolism. *Biochimica et Biophysica Acta - Bioenergetics*, Vol. 1827, pp. 145–160. https://doi.org/ 10.1016/j.bbabio.2012.09.001

Gu, Q., Sun, T., Wu, G., Li, M., & Qiu, W. (2014). Influence of carrier filling ratio on the performance of moving bed biofilm reactor in treating coking wastewater. *Bioresource Technology*, *166*, 72–78. https://doi.org/10.1016/j.biortech.2014.05.026

Gu, W., Wang, L., Liu, Y., Liang, P., Zhang, X., Li, Y., & Huang, X. (2020). Anammox bacteria enrichment and denitrification in moving bed biofilm reactors packed with different buoyant carriers: Performances and mechanisms. *Science of the Total Environment*, *719*, 137277. https://doi.org/10.1016/j.scitotenv.2020.137277

Günal, S., Hardman, R., Kopriva, S., & Mueller, J. W. (2019). Sulfation pathways from red to green. *Journal of Biological Chemistry*, Vol. 294, pp. 12293–12312. https://doi.org/10.1074/jbc.REV119.007422

Guo, L. J., Zhao, B., An, Q., & Tian, M. (2016). Characteristics of a Novel Aerobic Denitrifying Bacterium, Enterobacter cloacae Strain HNR. *Applied Biochemistry and Biotechnology*, *178*(5), 947–959. https://doi.org/10.1007/s12010-015-1920-8

Guo, X., Li, B., Zhao, R., Zhang, J., Lin, L., Zhang, G., … Li, X. yan. (2019). Performance and bacterial community of moving bed biofilm reactors with various biocarriers treating primary wastewater effluent with a low organic strength and low C/N ratio. *Bioresource Technology*, *287*(May). https://doi.org/10.1016/j.biortech.2019.121424

Guo, Y., Zhou, X., Li, Y., Li, K., Wang, C., Liu, J., … Xing, J. (2013). Heterotrophic nitrification and aerobic denitrification by a novel Halomonas campisalis. *Biotechnology Letters*, *35*(12), 2045–2049. https://doi.org/10.1007/s10529-013-1294-3

Gustavsson, D. J. I., Suarez, C., Wilén, B. M., Hermansson, M., & Persson, F. (2020). Long-term stability of partial nitritation-anammox for treatment of municipal wastewater in a moving bed biofilm reactor pilot system. *Science of the Total Environment*, *714*. https://doi.org/10.1016/j.scitotenv.2019.136342

Hallin, S., & Pell, M. (1998). Metabolic properties of denitrifying bacteria adapting to methanol and ethanol in activated sludge. *Water Research*, *32*(1), 13–18. https://doi.org/ 10.1016/S0043-1354(97)00199-1

Hamer, G. (1997). Microbial consortia for multiple pollutant biodegradation. *Pure and Applied Chemistry*, *69*(11), 2343–2356. https://doi.org/10.1351/pac199769112343

Han, F., Wei, D., Ngo, H. H., Guo, W., Xu, W., Du, B., & Wei, Q. (2018). Performance, microbial community and fluorescent characteristic of microbial products in a solid-phase denitrification biofilm reactor for WWTP effluent treatment. *Journal of Environmental Management*, *227*(July), 375–385. https://doi.org/10.1016/j.jenvman.2018.09.002

Hansson B. and L. Gunnarsson L. (1990). Chemical Water and Wastewater Treatment. In *Chemical Water and Wastewater Treatment*. https://doi.org/10.1007/978-3-642-76093-8

Hapeshi, E., Lambrianides, A., Koutsoftas, P., Kastanos, E., Michael, C., & Fatta-Kassinos, D. (2013). Investigating the fate of iodinated X-ray contrast media iohexol and diatrizoate during microbial degradation in an MBBR system treating urban wastewater. *Environmental Science and Pollution Research*, *20*(6), 3592–3606. https://doi.org/10.1007/s11356-013-1605-1

Haque, M. M., Oliver, M. M. H., Nahar, K., Alam, M. Z., Hirata, H., & Tsuyumu, S. (2017). CytR homolog of Pectobacterium carotovorum subsp. carotovorum controls air-liquid biofilm formation by regulating multiple genes involved in cellulose production, c-di-GMP signaling, motility, and type III secretion system in response to nutritional and e. *Frontiers in Microbiology*, *8*(MAY), 1–17. https://doi.org/10.3389/fmicb.2017.00972

He, X., Wang, J., Abdoli, L., & Li, H. (2016). Mg2+/Ca2+ promotes the adhesion of marine bacteria and algae and enhances following biofilm formation in artificial seawater. *Colloids and Surfaces B: Biointerfaces*, *146*, 289–295. https://doi.org/10.1016/j.colsurfb.2016.06.029

Heider, J., & Fuchs, G. (2015). Thauera . In *Bergey's Manual of Systematics of Archaea and Bacteria* (pp. 1–11). https://doi.org/10.1002/9781118960608.gbm01004

Herrero, M., & Stuckey, D. C. (2015). Bioaugmentation and its application in wastewater treatment: A review. *Chemosphere*, *140*, 119–128. https://doi.org/ 10.1016/j.chemosphere.2014.10.033

Higgins, M. J., & Novak, J. T. (1997). Characterization of Exocellular Protein and Its Role in Bioflocculation. *Journal of Environmental Engineering*, *123*(5), 479–485. https://doi.org/10.1061/(asce)0733-9372(1997)123:5(479)

Hoang, V., Delatolla, R., Abujamel, T., Mottawea, W., Gadbois, A., Laflamme, E., & Stintzi, A. (2014). Nitrifying moving bed biofilm reactor (MBBR) biofilm and biomass response to long term exposure to 1°C. *Water Research*, *49*, 215–224. https://doi.org/ 10.1016/j.watres.2013.11.018

Hong, P., Shu, Y., Wu, X., Wang, C., Tian, C., Wu, H., … Xiao, B. (2019). Efficacy of zero nitrous oxide emitting aerobic denitrifying bacterium, Methylobacterium gregans DC-1 in nitrate removal with strong auto-aggregation property. *Bioresource Technology*, *293*(June), 122083. https://doi.org/10.1016/j.biortech.2019.122083

Hong, P., Wu, X., Shu, Y., Wang, C., Tian, C., Wu, H., & Xiao, B. (2020). Bioaugmentation treatment of nitrogen-rich wastewater with a denitrifier with biofilm-formation and nitrogen-removal capacities in a sequencing batch biofilm reactor. *Bioresource Technology*, *303*(7), 122905. https://doi.org/10.1016/j.biortech.2020.122905

Hosseini, S. H., & Borghei, S. M. (2005). The treatment of phenolic wastewater using a moving bed bio-reactor. *Process Biochemistry*, *40*(3–4), 1027–1031. https://doi.org/10.1016/j.procbio.2004.05.002

Howell, J. A., & Atkinson, B. (1976). Sloughing of microbial film in trickling filters. *Water Research*, *10*(4), 307–315. https://doi.org/10.1016/0043-1354(76)90172-X

Hreiz, R., Latifi, M. A., & Roche, N. (2015). Optimal design and operation of activated sludge processes: State-of-the-art. *Chemical Engineering Journal*, Vol. 281, pp. 900–920. https://doi.org/10.1016/j.cej.2015.06.125

Huang, T. L., Zhou, S. L., Zhang, H. H., Bai, S. Y., He, X. X., & Yang, X. (2015). Nitrogen removal characteristics of a newly isolated indigenous aerobic denitrifier from oligotrophic drinking water reservoir, Zoogloea sp. N299. *International Journal of Molecular Sciences*, *16*(5), 10038–10060. https://doi.org/10.3390/ijms160510038

Husain Khan, A., Abdul Aziz, H., Khan, N. A., Ahmed, S., Mehtab, M. S., Vambol, S., … Islam, S. (2020). Pharmaceuticals of emerging concern in hospital wastewater: removal of Ibuprofen and Ofloxacin drugs using MBBR method. *International Journal of Environmental Analytical Chemistry*, *00*(00), 1–15. https://doi.org/10.1080/03067319.2020.1855333

Iannacone, F., Di Capua, F., Granata, F., Gargano, R., & Esposito, G. (2021). Shortcut nitrification-denitrification and biological phosphorus removal in acetate- and ethanol-fed moving bed biofilm reactors under microaerobic/aerobic conditions. *Bioresource Technology*, *330*(January), 124958. https://doi.org/10.1016/j.biortech.2021.124958

Iannacone, F., Di Capua, F., Granata, F., Gargano, R., & Esposito, G. (2020). Simultaneous nitrification, denitrification and phosphorus removal in a continuous-flow moving bed biofilm reactor alternating microaerobic and aerobic conditions. *Bioresource Technology*, *310*(April), 123453. https://doi.org/10.1016/j.biortech.2020.123453

Iannacone, F., Di Capua, F., Granata, F., Gargano, R., Pirozzi, F., & Esposito, G. (2019). Effect of carbon-to-nitrogen ratio on simultaneous nitrification denitrification and phosphorus removal in a microaerobic moving bed biofilm reactor. *Journal of Environmental Management*, *250*(August), 109518. https://doi.org/10.1016/j.jenvman.2019.109518

Ikeda-Ohtsubo, W., Miyahara, M., Kim, S. W., Yamada, T., Matsuoka, M., Watanabe, A., … Endo, G. (2013). Bioaugmentation of a wastewater bioreactor system with the nitrous oxide-reducing denitrifier Pseudomonas stutzeri strain TR2. *Journal of Bioscience and Bioengineering*, *115*(1), 37–42. https://doi.org/10.1016/j.jbiosc.2012.08.015

Isaacs, S. H., & Henze, M. (1995). Controlled carbon source addition to an alternating nitrification-denitrification wastewater treatment process including biological P removal. *Water Research*, *29*(1), 77–89. https://doi.org/10.1016/0043-1354(94)E0119-Q

Isaacs, S. H., Henze, M., Søeberg, H., & Kümmel, M. (1994). External carbon source addition as a means to control an activated sludge nutrient removal process. *Water Research*, *28*(3), 511–520. https://doi.org/10.1016/0043-1354(94)90002-7

Ito, T., Aoi, T., Miyazato, N., Hatamoto, M., Fuchigami, S., Yamaguchi, T., & Watanabe, Y. (2019). Diversity and abundance of denitrifying bacteria in a simultaneously nitrifying and denitrifying rotating biological contactor treating real wastewater at low temperatures. *H2Open Journal*, *2*(1), 58–70. https://doi.org/10.2166/H2OJ.2019.021

Jaafari, J., Seyedsalehi, M., Safari, G. H., Ebrahimi Arjestan, M., Barzanouni, H., Ghadimi, S., … Haratipour, P. (2017). Simultaneous biological organic matter and nutrient removal in an anaerobic/anoxic/oxic (A2O) moving bed biofilm reactor (MBBR) integrated system. *International Journal of Environmental Science and Technology*, *14*(2), 291–304. https://doi.org/10.1007/s13762-016-1206-x

Jahren, S. J., Rintala, J. A., & Ødegaard, H. (2002). Aerobic moving bed biofilm reactor treating thermomechanical pulping whitewater under thermophilic conditions. *Water Research*, *36*(4), 1067–1075. https://doi.org/10.1016/S0043-1354(01)00311-6

Jain, K., Parida, S., Mangwani, N., Dash, H. R., & Das, S. (2013). Isolation and characterization of biofilm-forming bacteria and associated extracellular polymeric substances from oral cavity. *Annals of Microbiology*, *63*(4), 1553–1562. https://doi.org/10.1007/s13213-013-0618-9

Jefferson, K. K. (2004). What drives bacteria to produce a biofilm? *FEMS Microbiology Letters*, Vol. 236, pp. 163–173. https://doi.org/10.1016/j.femsle.2004.06.005

Ji, B., Wei, T., Chen, W., Fan, J., Wang, J., Zhu, L., & Yang, K. (2016). Optimization of operation conditions for domestic sewage treatment using a sequencing batch biofilm filter. *Water Science and Technology*, *74*(6), 1492–1498. https://doi.org/10.2166/wst.2016.337

Ji, B., Yang, K., Zhu, L., Jiang, Y., Wang, H., Zhou, J., & Zhang, H. (2015). Aerobic denitrification: A review of important advances of the last 30 years. *Biotechnology and Bioprocess Engineering*, Vol. 20, pp. 643–651. https://doi.org/10.1007/s12257-015-0009-0

Jia, Y., Zhou, M., Chen, Y., Hu, Y., & Luo, J. (2020). Insight into short-cut of simultaneous nitrification and denitrification process in moving bed biofilm reactor: Effects of carbon to nitrogen ratio. *Chemical Engineering Journal*, *400*, 125905. https://doi.org/10.1016/j.cej.2020.125905

Jiang, M., Zheng, X., & Chen, Y. (2020). Enhancement of denitrification performance with reduction of nitrite accumulation and N2O emission by Shewanella oneidensis MR-1 in microbial denitrifying process. *Water Research*, *169*, 115242. https://doi.org/10.1016/j.watres.2019.115242

Jiang, Q., Ngo, H. H., Nghiem, L. D., Hai, F. I., Price, W. E., Zhang, J., … Guo, W. (2018). Effect of hydraulic retention time on the performance of a hybrid moving bed biofilm reactor-membrane bioreactor system for micropollutants removal from municipal wastewater. *Bioresource Technology*, *247*(September), 1228–1232. https://doi.org/10.1016/j.biortech.2017.09.114

Johnson, C. H., Page, M. W., & Blaha, L. (2000). Full scale moving bed biofilm reactor results from refinery and slaughter house treatment facilities. *Water Science and Technology*, *41*(4–5), 401–407. https://doi.org/10.2166/wst.2000.0472

Ju, F., Beck, K., Yin, X., Maccagnan, A., McArdell, C. S., Singer, H. P., … Bürgmann, H. (2019). Wastewater treatment plant resistomes are shaped by bacterial composition, genetic exchange, and upregulated expression in the effluent microbiomes. *ISME Journal*, *13*(2), 346–360. https://doi.org/10.1038/s41396-018-0277-8

Kachieng'a, L., & Momba, M. N. B. (2018). The synergistic effect of a consortium of protozoan isolates (Paramecium sp., Vorticella sp., Epistylis sp. and Opercularia sp.) on the biodegradation of petroleum hydrocarbons in wastewater. *Journal of Environmental Chemical Engineering*, *6*(4), 4820–4827. https://doi.org/10.1016/j.jece.2018.07.005

Kapley, A., & Purohit, H. J. (2009). Diagnosis of treatment efficiency in industrial wastewater treatment plants: A case study at a refinery ETP. *Environmental Science and Technology*, *43*(10), 3789–3795. https://doi.org/10.1021/es803296r

Kapoor, A., & Viraraghavan, T. (1997). Nitrate Removal From Drinking Water—Review. *Journal of Environmental Engineering*, *123*(4), 371–380. https://doi.org/10.1061/(asce) 0733-9372(1997)123:4(371)

Karanasios, K. A., Vasiliadou, I. A., Pavlou, S., & Vayenas, D. V. (2010). Hydrogenotrophic denitrification of potable water: A review. *Journal of Hazardous Materials*, *180*(1–3), 20–37. https://doi.org/10.1016/j.jhazmat.2010.04.090

Karunanidhi, D., Aravinthasamy, P., Subramani, T., & Kumar, M. (2021). Human health risks associated with multipath exposure of groundwater nitrate and environmental friendly actions for quality improvement and sustainable management: A case study from Texvalley (Tiruppur region) of India. *Chemosphere*, *265*, 129083. https://doi.org/10.1016/j.chemosphere.2020.129083

Kavitha, S., Selvakumar, R., Sathishkumar, M., Swaminathan, K., Lakshmanaperumalsamy, P., Singh, A., & Jain, S. K. (2009). Nitrate removal using Brevundimonas diminuta MTCC 8486 from ground water. *Water Science and Technology*, *60*(2), 517–524. https://doi.org/10.2166/wst.2009.378

Keisar, I., Desitti, C., Beliavski, M., Epsztein, R., Tarre, S., & Green, M. (2021). A pressurized hydrogenotrophic denitrification reactor system for removal of nitrates at high concentrations. *Journal of Water Process Engineering*, *42*(April), 102140. https://doi.org/10.1016/j.jwpe.2021.102140

Kesserü, P., Kiss, I., Bihari, Z., & Polyák, B. (2003). Biological denitrification in a continuous-flow pilot bioreactor containing immobilized Pseudomonas butanovora cells. *Bioresource Technology*, *87*(1), 75–80. https://doi.org/10.1016/S0960-8524(02)00209-2

Kim, I. S., Ekpeghere, K. I., Ha, S. Y., Kim, B. S., Song, B., Kim, J. T., … Koh, S. C. (2014). Full-scale biological treatment of tannery wastewater using the novel microbial consortium BM-S-1. *Journal of Environmental Science and Health - Part A*

Toxic/Hazardous Substances and Environmental Engineering, *49*(3), 355–364. https://doi.org/10.1080/10934529.2014.846707

Kim, I. S., Ekpeghere, K., Ha, S. Y., Kim, S. H., Kim, B. S., Song, B., … Koh, S. C. (2013). An eco-friendly treatment of tannery wastewater using bioaugmentation with a novel microbial consortium. *Journal of Environmental Science and Health - Part A Toxic/Hazardous Substances and Environmental Engineering*, *48*(13), 1732–1739. https://doi.org/10.1080/10934529.2013.815563

Kiskira, K., Papirio, S., van Hullebusch, E. D., & Esposito, G. (2017). Influence of pH, EDTA/Fe(II) ratio, and microbial culture on Fe(II)-mediated autotrophic denitrification. *Environmental Science and Pollution Research*, *24*(26), 21323–21333. https://doi.org/10.1007/s11356-017-9736-4

Kłodowska, I., Rodziewicz, J., Janczukowicz, W., Cydzik-Kwiatkowska, A., & Rusanowska, P. (2018). Influence of carbon source on the efficiency of nitrogen removal and denitrifying bacteria in biofilm from bioelectrochemical SBBRs. *Water (Switzerland)*, *10*(4). https://doi.org/10.3390/w10040393

Klotz, M. G., Bryant, D. A., & Hanson, T. E. (2011). The microbial sulfur cycle. *Frontiers in Microbiology*, Vol. 2, pp. 3–4. https://doi.org/10.3389/fmicb.2011.00241

Kniemeyer, O., Probian, C., Rosselló-Mora, R., & Harder, J. (1999). Anaerobic mineralization of quaternary carbon atoms: isolation of denitrifying bacteria on dimethylmalonate. Applied and environmental microbiology, 65(8), 3319-3324. https://doi.org/10.1128/AEM.65.8.3319-3324.1999

Knowles, R. (1982). Denitrification. *Microbiological Reviews*, *46*(1), 43–70.

Kodera, T., Akizuki, S., & Toda, T. (2017). Formation of simultaneous denitrification and methanogenesis granules in biological wastewater treatment. *Process Biochemistry*, *58*, 252–257. https://doi.org/10.1016/j.procbio.2017.04.038

Kora, E., Theodorelou, D., Gatidou, G., Fountoulakis, M. S., & Stasinakis, A. S. (2020). Removal of polar micropollutants from domestic wastewater using a methanogenic – aerobic moving bed biofilm reactor system. *Chemical Engineering Journal*, *382*(September), 122983. https://doi.org/10.1016/j.cej.2019.122983

Körstgens, V., Flemming, H. C., Wingender, J., & Borchard, W. (2001). Influence of calcium ions on the mechanical properties of a model biofilm of mucoid Pseudomonas aeruginosa. *Water Science and Technology*, *43*(6), 49–57. https://doi.org/10.2166/wst.2001.0338

Krishna Mohan, T. V., Nancharaiah, Y. V., Venugopalan, V. P., & Satya Sai, P. M. (2016). Effect of C/N ratio on denitrification of high-strength nitrate wastewater in anoxic granular sludge sequencing batch reactors. *Ecological Engineering*, *91*(2), 441–448. https://doi.org/10.1016/j.ecoleng.2016.02.033

Krishnamoorthy, R., Jose, P. A., Ranjith, M., Anandham, R., Suganya, K., Prabhakaran, J., … Kumutha, K. (2018). Decolourisation and degradation of azo dyes by mixed fungal culture consisted of Dichotomomyces cejpii MRCH 1-2 and Phoma tropica MRCH 1-3. *Journal of Environmental Chemical Engineering*, *6*(1), 588–595. https://doi.org/10.1016/j.jece.2017.12.035

Kunapongkiti, P., Rongsayamanont, C., Nayramitsattha, P., & Limpiyakorn, T. (2020). Application of cell immobilization technology to promote nitritation: A review. *Environmental Engineering Research*, *25*(6), 807–818. https://doi.org/10.4491/eer.2019.151

Lackner, S., Holmberg, M., Terada, A., Kingshott, P., & Smets, B. F. (2009). Enhancing the formation and shear resistance of nitrifying biofilms on membranes by surface modification. *Water Research*, *43*(14), 3469–3478. https://doi.org/10.1016/j.watres.2009.05.011

Lalucat, J., Bennasar, A., Bosch, R., García-Valdés, E., & Palleroni, N. J. (2006). Biology of Pseudomonas stutzeri . *Microbiology and Molecular Biology Reviews*, *70*(2), 510–547. https://doi.org/10.1128/mmbr.00047-05

Lang, X., Li, Q., Ji, M., Yan, G., & Guo, S. (2020). Isolation and niche characteristics in simultaneous nitrification and denitrification application of an aerobic denitrifier, Acinetobacter sp. YS2. *Bioresource Technology*, *302*(January), 122799. https://doi.org/10.1016/j.biortech.2020.122799

Larsen, P., Nielsen, J. L., Dueholm, M. S., Wetzel, R., Otzen, D., & Nielsen, P. H. (2007). Amyloid adhesins are abundant in natural biofilms. *Environmental Microbiology*, *9*(12), 3077–3090. https://doi.org/10.1111/j.1462-2920.2007.01418.x

Larsen, P., Nielsen, J. L., Otzen, D., & Nielsen, P. H. (2008). Amyloid-like adhesins produced by floc-forming and filamentous bacteria in activated sludge. *Applied and Environmental Microbiology*, *74*(5), 1517–1526. https://doi.org/10.1128/AEM.02274-07

Lax, S., Abreu, C. I., & Gore, J. (2020). Higher temperatures generically favour slower-growing bacterial species in multispecies communities. *Nature Ecology and Evolution*, *4*(4), 560–567. https://doi.org/10.1038/s41559-020-1126-5

Lee, W. N., Kang, I. J., & Lee, C. H. (2006). Factors affecting filtration characteristics in membrane-coupled moving bed biofilm reactor. *Water Research*, *40*(9), 1827–1835. https://doi.org/10.1016/j.watres.2006.03.007

Leiknes, T. O., & Ødegaard, H. (2007). The development of a biofilm membrane bioreactor. *Desalination*, *202*(1–3), 135–143. https://doi.org/10.1016/j.desal.2005.12.049

Leta, S., Assefa, F., & Dalhammar, G. (2005). Enhancing biological nitrogen removal from tannery effluent by using the efficient Brachymonas denitrificans in pilot plant operations. *World Journal of Microbiology and Biotechnology*, *21*(4), 545–552. https://doi.org/10.1007/s11274-004-3272-3

Leta, S., Assefa, F., Gumaelius, L., & Dalhammar, G. (2004). Biological nitrogen and organic matter removal from tannery wastewater in pilot plant operations in Ethiopia. *Applied Microbiology and Biotechnology*, *66*(3), 333–339. https://doi.org/10.1007/s00253-004-1715-2

Lewandowski, Z., & Boltz, J. P. (2011). Biofilms in Water and Wastewater Treatment. In *Treatise on Water Science* (Vol. 4, pp. 529–570). https://doi.org/10.1016/B978-0-444-53199-5.00095-6

Leyva-Díaz, J. C., Martín-Pascual, J., & Poyatos, J. M. (2017). Moving bed biofilm reactor to treat wastewater. *International Journal of Environmental Science and Technology*, *14*(4), 881–910. https://doi.org/10.1007/s13762-016-1169-y

Li, C., Yue, Z., Feng, F., Xi, C., Zang, H., An, X., & Liu, K. (2016). A novel strategy for acetonitrile wastewater treatment by using a recombinant bacterium with biofilm-forming and nitrile-degrading capability. *Chemosphere*, *161*, 224–232. https://doi.org/10.1016/j.chemosphere.2016.07.019

Li, J., Liang, Y., Miao, Y., Wang, D., Jia, S., & Liu, C. H. (2020). Metagenomic insights into aniline effects on microbial community and biological sulfate reduction pathways during anaerobic treatment of high-sulfate wastewater. *Science of the Total Environment*, *742*, 0–40. https://doi.org/10.1016/j.scitotenv.2020.140537

Li, L., Yan, G., Wang, H., Chu, Z., Li, Z., Ling, Y., & Wu, T. (2019). Denitrification and microbial community in MBBR using A. donax as carbon source and biofilm carriers for reverse osmosis concentrate treatment. *Journal of Environmental Sciences (China)*, *84*, 133–143. https://doi.org/10.1016/j.jes.2019.04.030

Li, W., Zheng, P., Ji, J., Zhang, M., Guo, J., Zhang, J., & Abbas, G. (2014). Floatation of granular sludge and its mechanism: A key approach for high-rate denitrifying reactor. *Bioresource Technology*, *152*, 414–419. https://doi.org/10.1016/j.biortech.2013.11.056

Li, Z. L., Cheng, R., Chen, F., Lin, X. Q., Yao, X. J., Liang, B., … Wang, A. J. (2021). Selective stress of antibiotics on microbial denitrification: Inhibitory effects, dynamics of microbial community structure and function. *Journal of Hazardous Materials*, *405*, 124366. https://doi.org/10.1016/j.jhazmat.2020.124366

Liang, W., Yu, C., Ren, H., Geng, J., Ding, L., & Xu, K. (2015). Minimization of nitrous oxide emission from CASS process treating low carbon source domestic wastewater: Effect of feeding strategy and aeration rate. *Bioresource Technology*, *198*, 172–180. https://doi.org/10.1016/j.biortech.2015.08.075

Liang, Z., Sun, J., Zhan, C., Wu, S., Zhang, L., & Jiang, F. (2020). Effects of sulfide on mixotrophic denitrification by: Thauera -dominated denitrifying sludge. *Environmental Science: Water Research and Technology*, *6*(4), 1186–1195. https://doi.org/10.1039/c9ew01014a

Lim, J. Y., May, J. M., & Cegelski, L. (2012). Dimethyl sulfoxide and ethanol elicit increased amyloid biogenesis and amyloid-integrated biofilm formation in Escherichia coli. *Applied and Environmental Microbiology*, *78*(9), 3369–3378. https://doi.org/10.1128/AEM.07743-11

Lim, J.-W., Beh, H.-G., Ching, D. L. C., Ho, Y.-C., Baloo, L., Bashir, M. J. K., & Wee, S.-K. (2017). Central Composite Design (CCD) applied for statistical optimization of glucose and sucrose binary carbon mixture in enhancing the denitrification process. *Applied Water Science*, *7*(7), 3719–3727. https://doi.org/10.1007/s13201-016-0518-9

Liu, B., Frostegård, Å., & Shapleigh, J. P. (2013). Draft genome sequences of five strains in the genus Thauera. *Genome Announcements*, *1*(1), 15–16. https://doi.org/10.1128/genomeA.00052-12

Liu, L., Zheng, X., Wei, X., Kai, Z., & Xu, Y. (2021). Excessive application of chemical fertilizer and organophosphorus pesticides induced total phosphorus loss from planting causing surface water eutrophication. *Scientific Reports*, *11*(1), 1–8. https://doi.org/10.1038/s41598-021-02521-7

Liu, X., Wang, L., & Pang, L. (2018). Application of a novel strain Corynebacterium pollutisoli SPH6 to improve nitrogen removal in an anaerobic/aerobic-moving bed biofilm reactor (A/O-MBBR). *Bioresource Technology*, *269*, 113–120. https://doi.org/10.1016/j.biortech.2018.08.076

Liu, Y., & Tay, J. H. (2001). Metabolic response of biofilm to shear stress in fixed-film culture. *Journal of Applied Microbiology*, *90*(3), 337–342. https://doi.org/10.1046/j.1365-2672.2001.01244.x

Liu, Y., Gan, L., Chen, Z., Megharaj, M., & Naidu, R. (2012). Removal of nitrate using Paracoccus sp. YF1 immobilized on bamboo carbon. *Journal of Hazardous Materials*, *229–230*, 419–425. https://doi.org/10.1016/j.jhazmat.2012.06.029

López-González, J. A., Suárez-Estrella, F., Vargas-García, M. C., López, M. J., Jurado, M. M., & Moreno, J. (2015). Dynamics of bacterial microbiota during lignocellulosic waste composting: Studies upon its structure, functionality and biodiversity. *Bioresource Technology*, *175*, 406–416. https://doi.org/10.1016/j.biortech.2014.10.123

Louie, T. S., Pavlik, E. J., & Häggblom, M. M. (2021). Genome analysis of Thauera chlorobenzoica strain 3CB-1T, a halobenzoate-degrading bacterium isolated from aquatic sediment. *Archives of Microbiology*, *203*(8), 5095–5104. https://doi.org/10.1007/s00203-021-02497-y

Lowry, O. H. (1951). Protein measurement with the Folin phenol reagent. J biol Chem, 193, 265-275. https://doi.org/10.1016/s0021-9258(19)52451-6

Lu, L., Wang, B., Zhang, Y., Xia, L., An, D., & Li, H. (2019). Identification and nitrogen removal characteristics of Thauera sp. FDN-01 and application in sequencing batch biofilm reactor. *Science of the Total Environment*, *690*, 61–69. https://doi.org/ 10.1016/j.scitotenv.2019.06.453

Luo, G., Xu, G., Gao, J., & Tan, H. (2016). Effect of dissolved oxygen on nitrate removal using polycaprolactone as an organic carbon source and biofilm carrier in fixed-film denitrifying reactors. *Journal of Environmental Sciences (China)*, *43*, 147–152. https://doi.org/10.1016/j.jes.2015.10.022

Mac Faddin, J.F., 1976. Biochemical tests for identification of medical bacteria. Williams & Wilkins Co.

Macy, J. M., Rech, S., Auling, G., Dorsch, M., Stackebrandt, E., & Sly, L. I. (1993). Subclass of Proteobacteria with a novel type of anaerobic respiration. *International Journal of Systematic Bacteriology*, *43*(1), 135–142.

Magnusson, G., Edin, H., & Dalhammar, G. (1998). Characterisation of efficient denitrifying bacteria strains isolated from activated sludge by 16S-rDNA analysis. *Water Science and Technology*, *38*(8–9), 63–68. https://doi.org/10.1016/S0273-1223(98)00678-7

Mahendran, B., Lishman, L., & Liss, S. N. (2012). Structural, physicochemical and microbial properties of flocs and biofilms in integrated fixed-film activated sludge (IFFAS) systems. *Water Research*, *46*(16), 5085–5101. https://doi.org/10.1016/j.watres.2012.05.058

Mangwani, N., Shukla, S. K., Rao, T. S., & Das, S. (2014). Calcium-mediated modulation of Pseudomonas mendocina NR802 biofilm influences the phenanthrene degradation. *Colloids and Surfaces B: Biointerfaces*, *114*, 301–309. https://doi.org/10.1016/ j.colsurfb.2013.10.003

Manoharan, R. K., Srinivasan, S., Shanmugam, G., & Ahn, Y. H. (2021). Shotgun metagenomic analysis reveals the prevalence of antibiotic resistance genes and mobile genetic elements in full scale hospital wastewater treatment plants. *Journal of Environmental Management*, *296*(June), 113270. https://doi.org/10.1016/j. jenvman. 2021.113270

Mao, Y., Xia, Y., & Zhang, T. (2013). Characterization of Thauera-dominated hydrogen-oxidizing autotrophic denitrifying microbial communities by using high-throughput sequencing. *Bioresource Technology*, *128*, 703–710. https://doi.org/10.1016/j.biortech.2012.10.106

Marghade, D. (2020). Detailed geochemical assessment & indexing of shallow groundwater resources in metropolitan city of Nagpur (western Maharashtra, India) with potential health risk assessment of nitrate enriched groundwater for sustainable development. *Chemie Der Erde*, *80*(4), 125627. https://doi.org/10.1016/j.chemer.2020.125627

Markande, A. R., Patel, D., & Varjani, S. (2021). A review on biosurfactants: properties, applications and current developments. *Bioresource Technology*, *330*(January), 124963. https://doi.org/10.1016/j.biortech.2021.124963

Marmulla, R., Šafarić, B., Markert, S., Schweder, T., & Harder, J. (2016). Linalool isomerase, a membrane-anchored enzyme in the anaerobic monoterpene degradation in Thauera linaloolentis 47Lol. *BMC Biochemistry*, *17*(1), 1–11. https://doi.org/10.1186/s12858-016-0062-0

Martínez, J., Ortiz, A., & Ortiz, I. (2017). State-of-the-art and perspectives of the catalytic and electrocatalytic reduction of aqueous nitrates. *Applied Catalysis B: Environmental*, Vol. 207, pp. 42–59. https://doi.org/10.1016/j.apcatb.2017.02.016

Martín-Rodríguez, A. J., Reyes-Darias, J. A., Martín-Mora, D., González, J. M., Krell, T., & Römling, U. (2021). Reduction of alternative electron acceptors drives biofilm formation in Shewanella algae. *Npj Biofilms and Microbiomes*, *7*(1), 1–15. https://doi.org/10.1038/s41522-020-00177-1

Mason, O. U., Hazen, T. C., Borglin, S., Chain, P. S. G., Dubinsky, E. A., Fortney, J. L., … Jansson, J. K. (2012). Metagenome, metatranscriptome and single-cell sequencing reveal microbial response to Deepwater Horizon oil spill. *ISME Journal*, *6*(9), 1715–1727. https://doi.org/10.1038/ismej.2012.59

Massoompour, A. R., Borghei, S. M., & Raie, M. (2020). Enhancement of biological nitrogen removal performance using novel carriers based on the recycling of waste materials. *Water Research*, *170*, 115340. https://doi.org/10.1016/j.watres.2019.115340

Masuko, T., Minami, A., Iwasaki, N., Majima, T., Nishimura, S. I., & Lee, Y. C. (2005). Carbohydrate analysis by a phenol-sulfuric acid method in microplate format. *Analytical Biochemistry*, *339*(1), 69–72. https://doi.org/10.1016/j.ab.2004.12.001

Maurya, J., Pradhan, S. N., Seema, & Ghosh, A. K. (2020). Evaluation of ground water quality and health risk assessment due to nitrate and fluoride in the Middle Indo-Gangetic plains of India. *Human and Ecological Risk Assessment*, *27*(5), 1349–1365. https://doi.org/10.1080/10807039.2020.1844559

Mazioti, A. A., Stasinakis, A. S., Psoma, A. K., Thomaidis, N. S., & Andersen, H. R. (2017). Hybrid Moving Bed Biofilm Reactor for the biodegradation of benzotriazoles and hydroxy-benzothiazole in wastewater. *Journal of Hazardous Materials*, *323*, 299–310. https://doi.org/10.1016/j.jhazmat.2016.06.035

McQuarrie, J. P., & Boltz, J. P. (2011). Moving Bed Biofilm Reactor Technology: Process Applications, Design, and Performance. *Water Environment Research*, *83*(6), 560–575. https://doi.org/10.2175/106143010x12851009156286

Mechichi, T., Stackebrandt, E., Gad'on, N., & Fuchs, G. (2002). Phylogenetic and metabolic diversity of bacteria degrading aromatic compounds under denitrifying conditions, and description of Thauera phenylacetica sp. nov., Thauera aminoaromatica sp. nov., and Azoarcus buckelii sp. nov. *Archives of Microbiology*, *178*(1), 26–35. https://doi.org/10.1007/s00203-002-0422-6

Meng, Y., Zhou, Z., & Meng, F. (2019). Impacts of diel temperature variations on nitrogen removal and metacommunity of anammox biofilm reactors. *Water Research*, *160*, 1–9. https://doi.org/10.1016/j.watres.2019.05.021

Miao, Y., Liao, R., Zhang, X. X., Wang, Y., Wang, Z., Shi, P., … Li, A. (2015). Metagenomic insights into Cr(VI) effect on microbial communities and functional genes of an expanded granular sludge bed reactor treating high-nitrate wastewater. *Water Research*, *76*(Vi), 43–52. https://doi.org/10.1016/j.watres.2015.02.042

Mohd Ikram Ansari, Katarzyna Schiwon, A. M. and E. G. (2012). Environmental protection strategies for sustainable development. In *Environmental Protection Strategies for Sustainable Development*. https://doi.org/10.1007/978-94-007-1591-2

Moosvi, S., Kher, X., & Madamwar, D. (2007). Isolation, characterization and decolorization of textile dyes by a mixed bacterial consortium JW-2. *Dyes and Pigments*, *74*(3), 723–729. https://doi.org/10.1016/j.dyepig.2006.05.005

Morimatsu, K., Eguchi, K., Hamanaka, D., Tanaka, F., & Uchino, T. (2012). Effects of temperature and nutrient conditions on biofilm formation of pseudomonas putida. *Food Science and Technology Research*, *18*(6), 879–883. https://doi.org/10.3136/fstr.18.879

Nawale, V. P., Malpe, D. B., Marghade, D., & Yenkie, R. (2021). Non-carcinogenic health risk assessment with source identification of nitrate and fluoride polluted groundwater of Wardha sub-basin, central India. *Ecotoxicology and Environmental Safety*, *208*, 111548. https://doi.org/10.1016/j.ecoenv.2020.111548

Nicolella, C., Van Loosdrecht, M. C. M., & Heijnen, J. J. (2000). Wastewater treatment with particulate biofilm reactors. *Journal of Biotechnology*, *80*(1), 1–33. https://doi.org/10.1016/S0168-1656(00)00229-7

Nielsen, J. L., & Nielsen, P. H. (2002). Enumeration of acetate-consuming bacteria by microautoradiography under oxygen and nitrate respiring conditions in activated sludge. *Water Research*, *36*(2), 421–428. https://doi.org/10.1016/S0043-1354(01)00224-X

Nzila, A. (2018). Biodegradation of high-molecular-weight polycyclic aromatic hydrocarbons under anaerobic conditions: Overview of studies, proposed pathways and future perspectives. *Environmental Pollution*, Vol. 239, pp. 788–802. https://doi.org/10.1016/j.envpol.2018.04.074

O'Toole, G. A., Gibbs, K. A., Hager, P. W., Phibbs, P. V., & Kolter, R. (2000). The global carbon metabolism regulator Crc is a component of a signal transduction pathway required for biofilm development by Pseudomonas aeruginosa. *Journal of Bacteriology*, *182*(2), 425–431. https://doi.org/10.1128/JB.182.2.425-431.2000

Odegaard, H., Rusten, B., & Westrum, T. (2006). A new moving bed biofilm reactor - applications and results. *Water Science and Technology*, *29*(10–11), 157–165. https://doi.org/10.2166/wst.1994.0757

Okamoto, S., & Eltis, L. D. (2007). Purification and characterization of a novel nitrile hydratase from Rhodococcus sp. RHA1. *Molecular Microbiology*, *65*(3), 828–838. https://doi.org/10.1111/j.1365-2958.2007.05834.x

Onnis-Hayden, A., & Gu, A. Z. (2012). Comparisons of Organic Sources for Denitrification: Biodegradability, Denitrification Rates, Kinetic Constants and Practical Implication for

Their Application in WWTPs. *Proceedings of the Water Environment Federation*, *2008*(17), 253–273. https://doi.org/10.2175/193864708788735510

Ontañon, O. M., Fernandez, M., Agostini, E., & González, P. S. (2018). Identification of the main mechanisms involved in the tolerance and bioremediation of Cr(VI) by Bacillus sp. SFC 500-1E. *Environmental Science and Pollution Research*, *25*(16), 16111–16120. https://doi.org/10.1007/s11356-018-1764-1

Ooi, G. T. H., Tang, K., Chhetri, R. K., Kaarsholm, K. M. S., Sundmark, K., Kragelund, C., … Andersen, H. R. (2018). Biological removal of pharmaceuticals from hospital wastewater in a pilot-scale staged moving bed biofilm reactor (MBBR) utilising nitrifying and denitrifying processes. *Bioresource Technology*, *267*, 677–687. https://doi.org/10.1016/j.biortech.2018.07.077

Panneerselvam, B., Muniraj, K., Duraisamy, K., Pande, C., Karuppannan, S., & Thomas, M. (2022). An integrated approach to explore the suitability of nitrate-contaminated groundwater for drinking purposes in a semiarid region of India. *Environmental Geochemistry and Health*, (0123456789). https://doi.org/10.1007/s10653-022-01237-5

Panneerselvam, B., Muniraj, K., Pande, C., Ravichandran, N., Thomas, M., & Karuppannan, S. (2021). Geochemical evaluation and human health risk assessment of nitrate-contaminated groundwater in an industrial area of South India. *Environmental Science and Pollution Research*, (0123456789). https://doi.org/10.1007/s11356-021-17281-0

Park, M., Kim, J., Lee, T., Oh, Y. K., Nguyen, V. K., & Cho, S. (2021). Correlation of microbial community with salinity and nitrogen removal in an anammox-based denitrification system. *Chemosphere*, *263*, 128340. https://doi.org/10.1016/j.chemosphere.2020.128340

Parkin, T. B., Sexstone, A. J., & Tiedje, J. M. (1985). Adaptation of Denitrifying Populations to Low Soil pH. *Applied and Environmental Microbiology*, *49*(5), 1053–1056. https://doi.org/10.1128/aem.49.5.1053-1056.1985

Pazhuparambil Jayarajan, S. K., & Kuriachan, L. (2021). Exposure and health risk assessment of nitrate contamination in groundwater in Coimbatore and Tirupur districts in Tamil Nadu, South India. *Environmental Science and Pollution Research*, *28*(8), 10248–10261. https://doi.org/10.1007/s11356-020-11552-y

Peng, P., Huang, H., Ren, H., Ma, H., Lin, Y., Geng, J., … Ding, L. (2018). Exogenous N-acyl homoserine lactones facilitate microbial adhesion of high ammonia nitrogen wastewater on biocarrier surfaces. *Science of the Total Environment*, *624*, 1013–1022. https://doi.org/10.1016/j.scitotenv.2017.12.248

Peng, Y. Z., Yong, M. A., & Wang, S. Y. (2007). Denitrification potential enhancement by addition of external carbon sources in a pre-denitrification process. Journal of Environmental Sciences, 19(3), 284-289.https://doi.org/10.1016/S1001-0742(07)60046-1

Persson, F., Sultana, R., Suarez, M., Hermansson, M., Plaza, E., & Wilén, B. M. (2014). Structure and composition of biofilm communities in a moving bed biofilm reactor for nitritation-anammox at low temperatures. *Bioresource Technology*, *154*, 267–273. https://doi.org/10.1016/j.biortech.2013.12.062

Piñar, G., Duque, E., Haïdour, A., Oliva, J. M., Sánchez-Barbero, L., Calvo, V., & Ramos, J. L. (1997). Removal of high concentrations of nitrate from industrial wastewaters by bacteria. *Applied and Environmental Microbiology*, *63*(5), 2071–2073. https://doi.org/10.1128/aem.63.5.2071-2073.1997

Plugge, C. M., Zhang, W., Scholten, J. C. M., & Stams, A. J. M. (2011). Metabolic flexibility of sulfate-reducing bacteria. *Frontiers in Microbiology*, *2*(MAY), 1–8. https://doi.org/10.3389/fmicb.2011.00081

Pochana, K., & Keller, J. (1999). Study of factors affecting simultaneous nitrification and denitrification (SND). *Water Science and Technology*, *39*(6), 61–68. https://doi.org/10.1016/S0273-1223(99)00123-7

Purcell, A. M., Mikucki, J. A., Achberger, A. M., Alekhina, I. A., Barbante, C., Christner, B. C., … Tulaczyk, S. (2014). Microbial sulfur transformations in sediments from Subglacial Lake Whillans. *Frontiers in Microbiology*, *5*(NOV), 1–16. https://doi.org/10.3389/fmicb.2014.00594

Qi, W., Taherzadeh, M. J., Ruan, Y., Deng, Y., Chen, J. S., Lu, H. F., & Xu, X. Y. (2020). Denitrification performance and microbial communities of solid-phase denitrifying reactors using poly (butylene succinate)/bamboo powder composite. *Bioresource Technology*, *305*(February), 123033. https://doi.org/10.1016/j.biortech.2020.123033

Qian, X., Chen, L., Sui, Y., Chen, C., Zhang, W., Zhou, J., … Ochsenreither, K. (2020). Biotechnological potential and applications of microbial consortia. In *Biotechnology Advances* (Vol. 40). https://doi.org/10.1016/j.biotechadv.2019.107500

Qiao, N., Xi, L., Zhang, J., Liu, D., Ge, B., & Liu, J. (2018). Thauera sinica sp. nov., a phenol derivative-degrading bacterium isolated from activated sludge. *Antonie van Leeuwenhoek, International Journal of General and Molecular Microbiology*, *111*(6), 945–954. https://doi.org/10.1007/s10482-017-0993-5

Qin, J., Li, R., Raes, J., Arumugam, M., Burgdorf, S., Manichanh, C., … Yang, H. (2010). Europe PMC Funders Group Europe PMC Funders Author Manuscripts A human gut microbial gene catalog established by metagenomic sequencing. *Nature*, *464*(7285), 59–65. https://doi.org/10.1038/nature08821.A

Qiu, T., Zuo, Z., Gao, J., Gao, M., Han, M., Sun, L., … Wang, X. (2015). Diaphorobacter polyhydroxybutyrativorans sp. nov., a novel poly(3-hydroxybutyrate-co-3-hydroxyvalerate)-degrading bacterium isolated from biofilms. *International Journal of Systematic and Evolutionary Microbiology*, *65*(9), 2913–2918. https://doi.org/ 10.1099/ijs.0.000353

Qu, Y., Zhang, R., Ma, F., Zhou, J., & Yan, B. (2011). Bioaugmentation with a novel alkali-tolerant Pseudomonas strain for alkaline phenol wastewater treatment in sequencing batch reactor. *World Journal of Microbiology and Biotechnology*, *27*(8), 1919–1926. https://doi.org/10.1007/s11274-011-0653-2

Quan, X., Yang, Z., Shi, H., Tang, Q., & Qian, Y. (2005). The effect of a secondary chlorophenol presence on the removal of 2,4-dichlorophenol (2,4-DCP) in an activated sludge system bioaugmented with 2,4-DCP degrading special culture. *Process Biochemistry*, *40*(11), 3462–3467. https://doi.org/10.1016/j.procbio.2005.02.018

Rahman, K. S. M., Banat, I. M., Thahira, J., Thayumanavan, T., & Lakshmanaperumalsamy, P. (2002). Bioremediation of gasoline contaminated soil by a bacterial consortium amended with poultry litter, coir pith and rhamnolipid biosurfactant. *Bioresource Technology*, *81*(1), 25–32. https://doi.org/10.1016/S0960-8524(01)00105-5

Rahman, K. S. M., Thahira-Rahman, J., Lakshmanaperumalsamy, P., & Banat, I. M. (2002). Towards efficient crude oil degradation by a mixed bacterial consortium. *Bioresource Technology*, *85*(3), 257–261. https://doi.org/10.1016/S0960-8524(02)00119-0

Rajakumar, S., Ayyasamy, P. M., Shanthi, K., Thavamani, P., Velmurugan, P., Song, Y. C., & Lakshmanaperumalsamy, P. (2008). Nitrate removal efficiency of bacterial consortium (Pseudomonas sp. KW1 and Bacillus sp. YW4) in synthetic nitrate-rich water. *Journal of Hazardous Materials*, *157*(2–3), 553–563. https://doi.org/10.1016/j.jhazmat.2008.01.020

Rajitha, K., Nancharaiah, Y. V., & Venugopalan, V. P. (2021). Temperature induced amyloid production, biofilm formation and fitness in marine Bacillus sp. *International Biodeterioration and Biodegradation*, *161*(April), 105229. https://doi.org/10.1016/j.ibiod.2021.105229

Rajmohan, K. S., Gopinath, M., & Chetty, R. (2018). Bioremediation of Nitrate-Contaminated Wastewater and Soil. In *Energy, Environment, and Sustainability* (pp. 387–409). https://doi.org/10.1007/978-981-10-7485-1_19

Ramalingam, S., Panneerselvam, B., & Kaliappan, S. P. (2022). Effect of high nitrate contamination of groundwater on human health and water quality index in semi-arid region, South India. *Arabian Journal of Geosciences*, *15*(3). https://doi.org/10.1007/s12517-022-09553-x

Ranzinger, F., Herrling, M. P., Lackner, S., Grande, V. W., Baniodeh, A., Powell, A. K., … Guthausen, G. (2016). Direct surface visualization of biofilms with high spin coordination clusters using Magnetic Resonance Imaging. *Acta Biomaterialia*, *31*, 167–177. https://doi.org/10.1016/j.actbio.2015.12.007

Rehfuss, M., & Urban, J. (2005). Alcaligenes faecalis subsp. phenolicus subsp. nov. a phenol-degrading, denitrifying bacterium isolated from a graywater bioprocessor. *Systematic and Applied Microbiology*, *28*(5), 421–429. https://doi.org/10.1016/j.syapm.2005.03.003

Renner, L. D., & Weibel, D. B. (2011). Physicochemical regulation of biofilm formation. *MRS Bulletin*, Vol. 36, pp. 347–355. https://doi.org/10.1557/mrs.2011.65

Rishi, M. S., Kaur, L., & Sharma, S. (2020). Groundwater quality appraisal for non-carcinogenic human health risks and irrigation purposes in a part of Yamuna sub-basin, India. *Human and Ecological Risk Assessment*, *26*(10), 2716–2736. https://doi.org/10.1080/10807039.2019.1682514

Rodgers, M., & Zhan, X. M. (2003). Moving-medium biofilm reactors. *Reviews in Environmental Science and Biotechnology*, *2*(2–4), 213–224. https://doi.org/10.1023/B:RESB.0000040467.78748.1e

Ruan, Y., Taherzadeh, M. J., Kong, D., Lu, H., Zhao, H., Xu, X., … Cai, L. (2020). Nitrogen removal performance and metabolic pathways analysis of a novel aerobic denitrifying halotolerant Pseudomonas balearica strain RAD-17. *Microorganisms*, *8*(1). https://doi.org/10.3390/microorganisms8010072

Rumbaugh, K. P., & Sauer, K. (2020). Biofilm dispersion. *Nature Reviews Microbiology*, Vol. 18, pp. 571–586. https://doi.org/10.1038/s41579-020-0385-0

Rusten, B., Eikebrokk, B., Ulgenes, Y., & Lygren, E. (2006). Design and operations of the Kaldnes moving bed biofilm reactors. *Aquacultural Engineering*, *34*(3), 322–331. https://doi.org/10.1016/j.aquaeng.2005.04.002

Rusten, B., Hem, L. J., & Ødegaard, H. (1995). Nitrogen removal from dilute wastewater in cold climate using moving-bed biofilm reactors. *Water Environment Research*, *67*(1), 65–74. https://doi.org/10.2175/106143095x131204

Sakano, Y., Pickering, K. D., Strom, P. F., & Kerkhof, L. J. (2002). Spatial distribution of total, ammonia-oxidizing, and denitrifying bacteria in biological wastewater treatment reactors for bioregenerative life support. *Applied and Environmental Microbiology*, *68*(5), 2285–2293. https://doi.org/10.1128/AEM.68.5.2285-2293.2002

Saliling, W. J. B., Westerman, P. W., & Losordo, T. M. (2007). Wood chips and wheat straw as alternative biofilter media for denitrification reactors treating aquaculture and other wastewaters with high nitrate concentrations. *Aquacultural Engineering*, *37*(3), 222–233. https://doi.org/10.1016/j.aquaeng.2007.06.003

Samatya, S., Kabay, N., Yüksel, Ü., Arda, M., & Yüksel, M. (2006). Removal of nitrate from aqueous solution by nitrate selective ion exchange resins. *Reactive and Functional Polymers*, *66*(11), 1206–1214. https://doi.org/10.1016/j.reactfunctpolym.2006.03.009

Santhanarajan, A. E., Han, Y. H., & Koh, S. C. (2021). The Efficacy of Functional Composts Manufactured Using Spent Coffee Ground, Rice Bran, Biochar, and Functional Microorganisms. *Applied Sciences*, *11*(16), 7703. https://doi.org/10.3390/ app11167703

Santy, S., Mujumdar, P., & Bala, G. (2020). Potential Impacts of Climate and Land Use Change on the Water Quality of Ganga River around the Industrialized Kanpur Region. *Scientific Reports*, *10*(1), 1–13. https://doi.org/10.1038/s41598-020-66171-x

Sanz, J. L., & Köchling, T. (2019). Next-generation sequencing and waste/wastewater treatment: a comprehensive overview. *Reviews in Environmental Science and Biotechnology*, Vol. 18, pp. 635–680. https://doi.org/10.1007/s11157-019-09513-0

Sarang, M. C., & Nerurkar, A. S. (2020). Amyloid protein produced by B. cereus CR4 possesses bioflocculant activity and has potential application in microalgae harvest. *Biotechnology Letters*, *42*(1), 79–91. https://doi.org/10.1007/s10529-019-02758-3

Sarjit, A., Mei Tan, S., & A. Dykes, G. (2015). Surface modification of materials to encourage beneficial biofilm formation. *AIMS Bioengineering*, *2*(4), 404–422. https://doi.org/10.3934/bioeng.2015.4.404

Saunders, A. M., Albertsen, M., Vollertsen, J., & Nielsen, P. H. (2016). The activated sludge ecosystem contains a core community of abundant organisms. *ISME Journal*, *10*(1), 11–20. https://doi.org/10.1038/ismej.2015.117

Schauer-Gimenez, A. E., Zitomer, D. H., Maki, J. S., & Struble, C. A. (2010). Bioaugmentation for improved recovery of anaerobic digesters after toxicant exposure. *Water Research*, *44*(12), 3555–3564. https://doi.org/10.1016/j.watres.2010.03.037

Schipper, L. A., Robertson, W. D., Gold, A. J., Jaynes, D. B., & Cameron, S. C. (2010). Denitrifying bioreactors-An approach for reducing nitrate loads to receiving waters. *Ecological Engineering*, Vol. 36, pp. 1532–1543. https://doi.org/10.1016/ j.ecoleng.2010.04.008

Shah, V., Zakrzewski, M., Wibberg, D., Eikmeyer, F., Schlüter, A., & Madamwar, D. (2013). Taxonomic Profiling and Metagenome Analysis of a Microbial Community from a Habitat Contaminated with Industrial Discharges. *Microbial Ecology*, *66*(3), 533–550. https://doi.org/10.1007/s00248-013-0253-9

Sharma, R., Kumar, A., Singh, N., & Sharma, K. (2021). Impact of seasonal variation on water quality of Hindon River: physicochemical and biological analysis. *SN Applied Sciences*, *3*(1), 1–11. https://doi.org/10.1007/s42452-020-03986-3

Shchegolkova, N. M., Krasnov, G. S., Belova, A. A., Dmitriev, A. A., Kharitonov, S. L., Klimina, K. M., … Kudryavtseva, A. V. (2016). Microbial community structure of activated sludge in treatment plants with different wastewater compositions. *Frontiers in Microbiology*, *7*(FEB), 1–15. https://doi.org/10.3389/fmicb.2016.00090

Shen, Z., Zhou, Y., Hu, J., & Wang, J. (2013). Denitrification performance and microbial diversity in a packed-bed bioreactor using biodegradable polymer as carbon source and biofilm support. *Journal of Hazardous Materials*, *250–251*, 431–438. https://doi.org/10.1016/j.jhazmat.2013.02.026

Sheridan, J. A., & Bickford, D. (2011). Shrinking body size as an ecological response to climate change. *Nature Climate Change*, Vol. 1, pp. 401–406. https://doi.org/10.1038/nclimate1259

Shi, Y., Chai, L., Yang, Z., Jing, Q., Chen, R., & Chen, Y. (2012). Identification and hexavalent chromium reduction characteristics of Pannonibacter phragmitetus. *Bioprocess and Biosystems Engineering*, *35*(5), 843–850. https://doi.org/10.1007/s00449-011-0668-y

Shomar, B., Al-Darwish, K., & Vincent, A. (2020). Optimization of wastewater treatment processes using molecular bacteriology. *Journal of Water Process Engineering*, *33*(October 2019), 101030. https://doi.org/10.1016/j.jwpe.2019.101030

Shu, D., He, Y., Yue, H., & Wang, Q. (2016). Metagenomic and quantitative insights into microbial communities and functional genes of nitrogen and iron cycling in twelve wastewater treatment systems. *Chemical Engineering Journal*, *290*, 21–30. https://doi.org/10.1016/j.cej.2016.01.024

Shukla, S., & Saxena, A. (2020). Water quality index assessment of groundwater in the central ganga plain with reference to raebareli district, Uttar Pradesh, India. *Current Science*, *119*(8), 1308–1315. https://doi.org/10.18520/cs/v119/i8/1308-1315

Siddiqi, M. Z., Sok, W., Choi, G., Kim, S. Y., Wee, J. H., & Im, W. T. (2020). Simplicispira hankyongi sp. nov., a novel denitrifying bacterium isolated from sludge. *Antonie van*

Leeuwenhoek, International Journal of General and Molecular Microbiology, *113*(3), 331–338. https://doi.org/10.1007/s10482-019-01341-0

Singh, S., Hariteja, N., Renuka Prasad, T. J., Raju, N. J., & Ramakrishna, C. (2020). Impact assessment of faecal sludge on groundwater and river water quality in Lucknow environs, Uttar Pradesh, India. *Groundwater for Sustainable Development*, *11*(March), 100461. https://doi.org/10.1016/j.gsd.2020.100461

Sodhi, V., Singh, C., Pal Singh Cheema, P., Sharma, R., Bansal, A., & Kumar Jha, M. (2021). Simultaneous sludge minimization, pollutant and nitrogen removal using integrated MBBR configuration for tannery wastewater treatment. *Bioresource Technology*, *341*(June), 125748. https://doi.org/10.1016/j.biortech.2021.125748

Somerton, B., Lindsay, D., Palmer, J., Brooks, J., & Flint, S. (2015). Changes in sodium, calcium, and magnesium ion concentrations that inhibit Geobacillus biofilms have no effect on Anoxybacillus flavithermus biofilms. *Applied and Environmental Microbiology*, *81*(15), 5115–5122. https://doi.org/10.1128/AEM.01037-15

Song, Z., Su, X., Li, P., Sun, F., Dong, W., Zhao, Z., … Liao, R. (2021). Facial fabricated biocompatible homogeneous biocarriers involving biochar to enhance denitrification performance in an anoxic moving bed biofilm reactor. *Bioresource Technology*, *341*(August). https://doi.org/10.1016/j.biortech.2021.125866

Song, Z., Zhang, X., Ngo, H. H., Guo, W., Song, P., Zhang, Y., … Guo, J. (2019). Zeolite powder based polyurethane sponges as biocarriers in moving bed biofilm reactor for improving nitrogen removal of municipal wastewater. *Science of the Total Environment*, *651*, 1078–1086. https://doi.org/10.1016/j.scitotenv.2018.09.173

Sonwani, R. K., Swain, G., Giri, B. S., Singh, R. S., & Rai, B. N. (2019). A novel comparative study of modified carriers in moving bed biofilm reactor for the treatment of wastewater: Process optimization and kinetic study. *Bioresource Technology*, *281*(February), 335–342. https://doi.org/10.1016/j.biortech.2019.02.121

Sorokin, D. Y., Tourova, T. P., Bezsoudnova, E. Y., Pol, A., & Muyzer, G. (2007). Denitrification in a binary culture and thiocyanate metabolism in Thiohalophilus thiocyanoxidans gen. nov. sp. nov. - A moderately halophilic chemolithoautotrophic sulfur-oxidizing Gammaproteobacterium from hypersaline lakes. *Archives of Microbiology*, *187*(6), 441–450. https://doi.org/10.1007/s00203-006-0208-3

Srinandan, C. S., D'souza, G., Srivastava, N., Nayak, B. B., & Nerurkar, A. S. (2012). Carbon sources influence the nitrate removal activity, community structure and biofilm architecture. *Bioresource Technology*, *117*, 292–299. https://doi.org/10.1016/j.biortech.2012.04.079

Srinandan, C. S., Jadav, V., Cecilia, D., & Nerurkar, A. S. (2010). Nutrients determine the spatial architecture of Paracoccus sp. biofilm. *Biofouling*, *26*(4), 449–459. https://doi.org/10.1080/08927011003739760

Srinandan, C. S., Shah, M., Patel, B., & Nerurkar, A. S. (2011). Assessment of denitrifying bacterial composition in activated sludge. *Bioresource Technology*, *102*(20), 9481–9489. https://doi.org/10.1016/j.biortech.2011.07.094

Stavrakidis-Zachou, O., Ernst, A., Steinbach, C., Wagner, K., & Waller, U. (2019). Development of denitrification in semi-automated moving bed biofilm reactors operated in a marine recirculating aquaculture system. *Aquaculture International*, *27*(5), 1485–1501. https://doi.org/10.1007/s10499-019-00402-5

Stoodley, P., Sauer, K., Davies, D. G., & Costerton, J. W. (2002). Biofilms as complex differentiated communities. *Annual Review of Microbiology*, Vol. 56, pp. 187–209. https://doi.org/10.1146/annurev.micro.56.012302.160705

Su, J. feng, Luo, X. xin, Wei, L., Ma, F., Zheng, S. chen, & Shao, S. cheng. (2016). Performance and microbial communities of Mn(II)-based autotrophic denitrification in a Moving Bed Biofilm Reactor (MBBR). *Bioresource Technology*, *211*(Ii), 743–750. https://doi.org/10.1016/j.biortech.2016.03.101

Su, J. feng, Ma, M., Huang, T. lin, Ma, F., Shao, S. cheng, Lu, J. suo, & Deng, L. yu. (2017a). Characteristics of Autotrophic and Heterotrophic Denitrification by the Strain Pseudomonas sp. H117. *Geomicrobiology Journal*, *34*(1), 45–52. https://doi.org/10.1080/01490451.2015.1137661

Su, J. feng, Shi, J. xin, & Ma, F. (2017b). Aerobic denitrification and biomineralization by a novel heterotrophic bacterium, Acinetobacter sp. H36. *Marine Pollution Bulletin*, *116*(1–2), 209–215. https://doi.org/10.1016/j.marpolbul.2017.01.014

Su, J. feng, Xue, L., Huang, T. lin, Wei, L., Gao, C. yu, & Wen, Q. (2019). Performance and microbial community of simultaneous removal of NO3−-N, Cd2+ and Ca2+ in MBBR. *Journal of Environmental Management*, *250*(June), 109548. https://doi.org/ 10.1016/j.jenvman.2019.109548

Sul, W. J., Kim, I. S., Ekpeghere, K. I., Song, B., Kim, B. S., Kim, H. G., … Koh, S. C. (2016). Metagenomic insight of nitrogen metabolism in a tannery wastewater treatment plant bioaugmented with the microbial consortium BM-S-1. *Journal of Environmental Science and Health - Part A Toxic/Hazardous Substances and Environmental Engineering*, *51*(13), 1164–1172. https://doi.org/10.1080/10934529.2016.1206387

Sun, Z., Lv, Y., Liu, Y., & Ren, R. (2016). Removal of nitrogen by heterotrophic nitrification-aerobic denitrification of a novel metal resistant bacterium Cupriavidus sp. S1. *Bioresource Technology*, *220*, 142–150. https://doi.org/10.1016/j.biortech.2016.07.110

Suvarna, B., Sunitha, V., Reddy, Y. S., & Reddy, N. R. (2020). Data health risk assessment of nitrate contamination in groundwater of rural region in the Yerraguntla Mandal, South India. *Data in Brief*, *30*, 105374. https://doi.org/10.1016/j.dib.2020.105374

Suvarna, B., Sunitha, V., Sudharshan Reddy, Y., Muralidhara Reddy, B., Kadam, A. K., & Ramakrishna Reddy, M. (2022). Groundwater quality assessment using multivariate statistical approach and geospatial modelling around cement industrial corridor, South India. *International Journal of Environmental Science and Technology*, (0123456789). https://doi.org/10.1007/s13762-022-04210-y

Taghavi, K., Pendashteh, A., & Mozhdehi, S. P. (2017). Combined fenton-like oxidation and aerobic MBBR biological processes for treatment of the wastewater of detergent industries. *Desalination and Water Treatment*, *77*(January), 206–214. https://doi.org/10.5004/dwt.2017.20866

Tak, S., Tiwari, A., & Vellanki, B. P. (2020). Identification of emerging contaminants and their transformation products in a moving bed biofilm reactor (MBBR)–based drinking water treatment plant around River Yamuna in India. *Environmental Monitoring and Assessment*, *192*(6). https://doi.org/10.1007/s10661-020-08303-4

Takahashi, J., Ichikawa, Y., Sagae, H., Komura, I., Kanou, H., & Yamada, K. (1980). Isolation and identification of n-butane-assimilating bacterium. *Agricultural and Biological Chemistry*, *44*(8), 1835–1840. https://doi.org/10.1080/00021369.1980.10864232

Takaki, K., Fushinobu, S., Kim, S. W., Miyahara, M., Wakagi, T., & Shoun, H. (2008). Streptomyces griseus enhances denitrification by Ralstonia pickettii K50, which is possibly mediated by histidine produced during co-culture. *Bioscience, Biotechnology and Biochemistry*, *72*(1), 163–170. https://doi.org/10.1271/bbb.70528

Tang, K., Ooi, G. T. H., Litty, K., Sundmark, K., Kaarsholm, K. M. S., Sund, C., … Andersen, H. R. (2017). Removal of pharmaceuticals in conventionally treated wastewater by a polishing moving bed biofilm reactor (MBBR) with intermittent feeding. *Bioresource Technology*, *236*, 77–86. https://doi.org/10.1016/j.biortech.2017.03.159

Tang, Y., Zhou, C., Ziv-El, M., & Rittmann, B. E. (2011). A pH-control model for heterotrophic and hydrogen-based autotrophic denitrification. *Water Research*, *45*(1), 232–240. https://doi.org/10.1016/j.watres.2010.07.049

Tao, C., & Hamouda, M. A. (2019). Steady-state modeling and evaluation of partial nitrification-anammox (PNA)for moving bed biofilm reactor and integrated fixed-film activated sludge processes treating municipal wastewater. *Journal of Water Process Engineering*, *31*(February). https://doi.org/10.1016/j.jwpe.2019.100854

Thomsen, T. R., Kong, Y., & Nielsen, P. H. (2007). Ecophysiology of abundant denitrifying bacteria in activated sludge. *FEMS Microbiology Ecology*, *60*(3), 370–382. https://doi.org/10.1111/j.1574-6941.2007.00309.x

Tian, H., Liang, X., Gong, Y., Qi, L., Liu, Q., Kang, Z., … Jin, H. (2020). Health risk assessment of nitrate pollution in shallow groundwater: A case study in China. *Polish Journal of Environmental Studies*, *29*(1), 827–839. https://doi.org/10.15244/pjoes/104361

Tiku, D. K., Kumar, A., Chaturvedi, R., Makhijani, S. D., Manoharan, A., & Kumar, R. (2010). Holistic bioremediation of pulp mill effluents using autochthonous bacteria. *International Biodeterioration and Biodegradation*, *64*(3), 173–183. https://doi.org/10.1016/j.ibiod.2010.01.001

Torresi, E., Tang, K., Deng, J., Sund, C., Smets, B. F., Christensson, M., & Andersen, H. R. (2019). Removal of micropollutants during biological phosphorus removal: Impact of redox conditions in MBBR. *Science of the Total Environment*, *663*, 496–506. https://doi.org/10.1016/j.scitotenv.2019.01.283

Toyofuku, M., Inaba, T., Kiyokawa, T., Obana, N., Yawata, Y., & Nomura, N. (2016). Environmental factors that shape biofilm formation. *Bioscience, Biotechnology and Biochemistry*, Vol. 80, pp. 7–12. https://doi.org/10.1080/09168451.2015.1058701

Uemoto, H., & Saiki, H. (2000). Distribution of Nitrosomonas europaea and Paracoccus denitrificans immobilized in tubular polymeric gel for nitrogen removal. Applied and Environmental Microbiology, 66(2), 816-819. https://doi.org/10.1128/AEM.66.2.816-819.2000

United States Department of Agriculture, Food Safety and Inspection Service. (2014). Appendix 2.05: Most probable number procedure and tables, Revision 5. Washington, DC: Microbiology Laboratory Guidebook U.S. Department of Agriculture Food Safety and Inspection Service. Retrieved from https://www.fsis.usda.gov/wps/wcm/connect/8872ec11-d6a3-4fcf-86df4d87e57780f5/MLG-Appendix-2.pdf?MOD=AJPERE

Vaidya, S., Devpura, N., Jain, K., & Madamwar, D. (2018). Degradation of chrysene by enriched bacterial consortium. *Frontiers in Microbiology*, *9*(JUN), 1–14. https://doi.org/10.3389/fmicb.2018.01333

Van Rijn, J., Tal, Y., & Barak, Y. (1996). Influence of volatile fatty acids on nitrite accumulation by a Pseudomonas stutzeri strain isolated from a denitrifying fluidized bed reactor. *Applied and Environmental Microbiology*, *62*(7), 2615–2620. https://doi.org/10.1128/aem.62.7.2615-2620.1996

van Rijn, J., Tal, Y., & Schreier, H. J. (2006). Denitrification in recirculating systems: Theory and applications. *Aquacultural Engineering*, *34*(3), 364–376. https://doi.org/10.1016/j.aquaeng.2005.04.004

Verstraeten, N., Braeken, K., Debkumari, B., Fauvart, M., Fransaer, J., Vermant, J., & Michiels, J. (2008). Living on a surface: swarming and biofilm formation. *Trends in Microbiology*, *16*(10), 496–506. https://doi.org/10.1016/j.tim.2008.07.004

Wagh, V. M., Panaskar, D. B., Mukate, S. V., Aamalawar, M. L., & Laxman Sahu, U. (2020). Nitrate associated health risks from groundwater of Kadava River Basin Nashik, Maharashtra, India. *Human and Ecological Risk Assessment*, *26*(3), 654–672. https://doi.org/10.1080/10807039.2018.1528861

Wang, B., Wu, D., Dai, J., Ekama, G. A., Hao, X., & Chen, G. H. (2019a). Elucidating the effects of starvation and reactivation on anaerobic sulfidogenic granular sludge: Reactor performance and granular sludge transformation. *Water Research*, *151*, 44–53. https://doi.org/10.1016/j.watres.2018.12.008

Wang, C. C., & Lee, C. M. (2007). Isolation of the acrylamide denitrifying bacteria from a wastewater treatment system manufactured with polyacrylonitrile fiber. *Current Microbiology*, *55*(4), 339–343. https://doi.org/10.1007/s00284-007-0199-6

Wang, J., Liu, Q., Wu, B., Hu, H., Dong, D., Yin, J., & Ren, H. (2020). Effect of salinity on mature wastewater treatment biofilm microbial community assembly and metabolite characteristics. *Science of the Total Environment*, *711*, 134437. https://doi.org/10.1016/j.scitotenv.2019.134437

Wang, Q., & He, J. (2020). Complete nitrogen removal via simultaneous nitrification and denitrification by a novel phosphate accumulating Thauera sp. strain SND5. *Water Research*, *185*, 116300. https://doi.org/10.1016/j.watres.2020.116300

Wang, R. C., Wen, X. H., & Qian, Y. (2005). Influence of carrier concentration on the performance and microbial characteristics of a suspended carrier biofilm reactor. *Process Biochemistry*, *40*(9), 2992–3001. https://doi.org/10.1016/j.procbio.2005.02.024

Wang, R., Yang, C., Zhang, M., Xu, S. Y., Dai, C. L., Liang, L. Y., … Zheng, P. (2017). Chemoautotrophic denitrification based on ferrous iron oxidation: Reactor performance and sludge characteristics. *Chemical Engineering Journal*, *313*, 693–701. https://doi.org/10.1016/j.cej.2016.12.052

Wang, T., Flint, S., & Palmer, J. (2019b). Magnesium and calcium ions: roles in bacterial cell attachment and biofilm structure maturation. Biofouling, 35(9), 959-974. https://doi.org/10.1080/08927014.2019.1674811

Wang, W., Ding, Y., Wang, Y., Song, X., Ambrose, R. F., & Ullman, J. L. (2016). Intensified nitrogen removal in immobilized nitrifier enhanced constructed wetlands with external carbon addition. *Bioresource Technology*, *218*, 1261–1265. https://doi.org/10.1016/j.biortech.2016.06.135

Wang, X., An, Q., Zhao, B., Guo, J. S., Huang, Y. S., & Tian, M. (2018). Auto-aggregation properties of a novel aerobic denitrifier Enterobacter sp. strain FL. *Applied Microbiology and Biotechnology*, *102*(4), 2019–2030. https://doi.org/10.1007/s00253-017-8720-8

Wang, X., Wang, W., Zhang, Y., Sun, Z., Zhang, J., Chen, G., & Li, J. (2019c). Simultaneous nitrification and denitrification by a novel isolated Pseudomonas sp. JQ-H3 using polycaprolactone as carbon source. *Bioresource Technology*, *288*(March). https://doi.org/10.1016/j.biortech.2019.121506

Wang, Y., Peng, Y., & Stephenson, T. (2009). Effect of influent nutrient ratios and hydraulic retention time (HRT) on simultaneous phosphorus and nitrogen removal in a two-sludge sequencing batch reactor process. *Bioresource Technology*, *100*(14), 3506–3512. https://doi.org/10.1016/j.biortech.2009.02.026

Wang, Y., Yang, Z., Peng, B., Chai, L., Wu, B., & Wu, R. (2013). Biotreatment of chromite ore processing residue by Pannonibacter phragmitetus BB. *Environmental Science and Pollution Research*, *20*(8), 5593–5602. https://doi.org/10.1007/s11356-013-1526-z

Wang, Y., Zou, Y. L., Chen, H., & Lv, Y. K. (2021). Nitrate removal performances of a new aerobic denitrifier, Acinetobacter haemolyticus ZYL, isolated from domestic wastewater. *Bioprocess and Biosystems Engineering*, *44*(2), 391–401. https://doi.org/10.1007/s00449-020-02451-0

Ward, M. H., Jones, R. R., Brender, J. D., de Kok, T. M., Weyer, P. J., Nolan, B. T., … van Breda, S. G. (2018). Drinking water nitrate and human health: An updated review. *International Journal of Environmental Research and Public Health*, Vol. 15, pp. 1–31. https://doi.org/10.3390/ijerph15071557

Watnick, P., & Kolter, R. (2000). Biofilm, city of microbes. *Journal of Bacteriology*, Vol. 182, pp. 2675–2679. https://doi.org/10.1128/JB.182.10.2675-2679.2000

Wei, H., Wang, L., Hassan, M., & Xie, B. (2018). Succession of the functional microbial communities and the metabolic functions in maize straw composting process. *Bioresource Technology*, *256*, 333–341. https://doi.org/10.1016/j.biortech.2018.02.050

Wike, Andreas, Gerlach, Wolfgang, Harrison, Travis, Paczian, Tobias, Trimble, William L, Meyer, F. (2017). *MG-RAST Manual for Version 4 Revision 0*.

Wilderer, P. A., & McSwain, B. S. (2004). The SBR and its biofilm application potentials. *Water Science and Technology*, Vol. 50, pp. 1–10. https://doi.org/10.2166/wst.2004.0596

Wilén, B. M., Jin, B., & Lant, P. (2003). The influence of key chemical constituents in activated sludge on surface and flocculating properties. *Water Research*, *37*(9), 2127–2139. https://doi.org/10.1016/S0043-1354(02)00629-2

World Health Organization. (2017). Guidelines for Drinking-water Quality. In *Proceedings of the Royal Society of Medicine* (Vol. 55). https://doi.org/10.5005/jp/books/11431_8

Wu, J., Yin, Y., & Wang, J. (2018). Hydrogen-based membrane biofilm reactors for nitrate removal from water and wastewater. *International Journal of Hydrogen Energy*, Vol. 43, pp. 1–15. https://doi.org/10.1016/j.ijhydene.2017.10.178

Wu, S., Kuschk, P., Wiessner, A., Müller, J., Saad, R. A. B., & Dong, R. (2013). Sulphur transformations in constructed wetlands for wastewater treatment: A review. *Ecological Engineering*, Vol. 52, pp. 278–289. https://doi.org/10.1016/j.ecoleng.2012.11.003

Wu, X., Wu, X., Li, J., Wu, Q., Ma, Y., Sui, W., … Zhang, X. (2020). Cross-feeding between Thauera aminoaromatica and Rhodococcus pyridinivorans drove quinoline biodegradation in a denitrifying bioreactor. *BioRxiv*.

Xing, W., Li, J., Li, P., Wang, C., Cao, Y., Li, D., … Zuo, J. (2018). Effects of residual organics in municipal wastewater on hydrogenotrophic denitrifying microbial communities. *Journal of Environmental Sciences (China)*, *65*, 262–270. https://doi.org/10.1016/j.jes.2017.03.001

Xiong, J., Zheng, Z., Yang, X., He, J., Luo, X., & Gao, B. (2018). Mature landfill leachate treatment by the MBBR inoculated with biocarriers from a municipal wastewater treatment plant. *Process Safety and Environmental Protection*, *119*, 304–310. https://doi.org/10.1016/j.psep.2018.08.019

Xu, L., Luo, M., Li, W., Wei, X., Xie, K., Liu, L., … Liu, H. (2011). Reduction of hexavalent chromium by Pannonibacter phragmitetus LSSE-09 stimulated with external electron donors under alkaline conditions. *Journal of Hazardous Materials*, *185*(2–3), 1169–1176. https://doi.org/10.1016/j.jhazmat.2010.10.028

Xu, Z., Chen, X., Li, H., Wan, D., & Wan, J. (2020). Combined heterotrophic and autotrophic system for advanced denitrification of municipal secondary effluent in full-scale plant and bacterial community analysis. *Science of the Total Environment*, *717*, 136981. https://doi.org/10.1016/j.scitotenv.2020.136981

Yadav, T. C., Pal, R. R., Shastri, S., Jadeja, N. B., & Kapley, A. (2015). Comparative metagenomics demonstrating different degradative capacity of activated biomass treating hydrocarbon contaminated wastewater. *Bioresource Technology*, *188*, 24–32. https://doi.org/10.1016/j.biortech.2015.01.141

Yamamoto, M., & Takai, K. (2011). Sulfur metabolisms in epsilon-and gamma-proteobacteria in deep-sea hydrothermal fields. *Frontiers in Microbiology*, Vol. 2, pp. 1–8. https://doi.org/10.3389/fmicb.2011.00192

Yan, W., Wang, N., Wei, D., Liang, C., Chen, X., Liu, L., & Shi, J. (2021). Bacterial community compositions and nitrogen metabolism function in a cattle farm wastewater treatment plant revealed by Illumina high-throughput sequencing. *Environmental Science and Pollution Research*, *28*(30), 40895–40907. https://doi.org/10.1007/s11356-021-13570-w

Yang, G. Q., Zhang, J., Kwon, S. W., Zhou, S. G., Han, L. C., Chen, M., … Li, Z. (2013). Thauera humireducens sp. nov., a humus-reducing bacterium isolated from a microbial fuel cell. *International Journal of Systematic and Evolutionary Microbiology*, *63*(PART3), 873–878. https://doi.org/10.1099/ijs.0.040956-0

Yang, M., Lu, D., Qin, B., Liu, Q., Zhao, Y., Liu, H., & Ma, J. (2018). Highly efficient nitrogen removal of a coldness-resistant and low nutrient needed bacterium, Janthinobacterium sp. M-11. *Bioresource Technology*, *256*(February), 366–373. https://doi.org/10.1016/j.biortech.2018.02.049

Ye, L., Zhang, T., Wang, T., & Fang, Z. (2012). Microbial structures, functions, and metabolic pathways in wastewater treatment bioreactors revealed using high-throughput sequencing. *Environmental Science and Technology*, *46*(24), 13244–13252. https://doi.org/ 10.1021/es303454k

Ye, R. W., & Thomas, S. M. (2001). Microbial nitrogen cycles: Physiology, genomics and applications. *Current Opinion in Microbiology*, Vol. 4, pp. 307–312. https://doi.org/10.1016/S1369-5274(00)00208-3

Yergeau, E., Sanschagrin, S., Maynard, C., St-Arnaud, M., & Greer, C. W. (2014). Microbial expression profiles in the rhizosphere of willows depend on soil contamination. *ISME Journal*, *8*(2), 344–358. https://doi.org/10.1038/ismej.2013.163

Yilmaz, Z., Akkaş, P. K., Şen, M., & Güven, O. (2006). Removal of nitrite ions from aqueous solutions by poly(N,N-dimethylamino ethylmethacrylate) hydrogels. *Journal of Applied Polymer Science*, *102*(6), 6023–6027. https://doi.org/10.1002/app.25206

Yoshie, S., Noda, N., Tsuneda, S., Hirata, A., & Inamori, Y. (2004). Salinity decreases nitrite reductase gene diversity in denitrifying bacteria of wastewater treatment systems. *Applied and Environmental Microbiology*, *70*(5), 3152–3157. https://doi.org/10.1128/AEM.70.5.3152-3157.2004

Yoshino, T., Asakura, T., & Toda, K. (1996). Cellulose production by Acetobacter pasteurianus on silicone membrane. *Journal of Fermentation and Bioengineering*, *81*(1), 32–36. https://doi.org/10.1016/0922-338X(96)83116-3

Young, B., Banihashemi, B., Forrest, D., Kennedy, K., Stintzi, A., & Delatolla, R. (2016). Meso and micro-scale response of post carbon removal nitrifying MBBR biofilm across carrier type and loading. *Water Research*, *91*, 235–243. https://doi.org/10.1016/j.watres.2016.01.006

Young, B., Delatolla, R., Kennedy, K., Laflamme, E., & Stintzi, A. (2017). Low temperature MBBR nitrification: Microbiome analysis. *Water Research*, *111*, 224–233. https://doi.org/10.1016/j.watres.2016.12.050

Yu, H., Susanti, D., McGlynn, S. E., Skennerton, C. T., Chourey, K., Iyer, R., … Orphan, V. J. (2018). Comparative genomics and proteomic analysis of assimilatory sulfate reduction pathways in anaerobic methanotrophic archaea. *Frontiers in Microbiology*, *9*(December), 1–15. https://doi.org/10.3389/fmicb.2018.02917

Yu, K., & Zhang, T. (2012). Metagenomic and metatranscriptomic analysis of microbial community structure and gene expression of activated sludge. *PLoS ONE*, *7*(5). https://doi.org/10.1371/journal.pone.0038183

Yuan, Q., Wang, H., Hang, Q., Deng, Y., Liu, K., Li, C., & Zheng, S. (2015). Comparison of the MBBR denitrification carriers for advanced nitrogen removal of wastewater treatment plant effluent. *Environmental Science and Pollution Research*, *22*(18), 13970–13979. https://doi.org/10.1007/s11356-015-4546-z

Yue, W., Chen, M., Cheng, Z., Xie, L., & Li, M. (2018). Bioaugmentation of strain Methylobacterium sp. C1 towards p-nitrophenol removal with broad spectrum coaggregating bacteria in sequencing batch biofilm reactors. *Journal of Hazardous Materials*, *344*, 431–440. https://doi.org/10.1016/j.jhazmat.2017.10.039

Zekker, I., Rikmann, E., Kroon, K., Mandel, A., Mihkelson, J., Tenno, T., & Tenno, T. (2017). Ameliorating nitrite inhibition in a low-temperature nitritation–anammox MBBR using bacterial intermediate nitric oxide. *International Journal of Environmental Science and Technology*, *14*(11), 2343–2356. https://doi.org/10.1007/s13762-017-1321-3

Zekker, I., Rikmann, E., Tenno, T., Vabamäe, P., Tomingas, M., Menert, A., … Tenno, T. (2012). Anammox bacteria enrichment and phylogenic analysis in moving bed biofilm reactors. *Environmental Engineering Science*, *29*(10), 946–950. https://doi.org/10.1089/ees.2011.0146

Zhang, H., Li, S., Ma, B., Huang, T., Qiu, H., Zhao, Z., … Liu, K. (2020a). Nitrate removal characteristics and 13C metabolic pathways of aerobic denitrifying bacterium Paracoccus denitrificans Z195. *Bioresource Technology*, *307*(January), 123230. https://doi.org/10.1016/j.biortech.2020.123230

Zhang, J., Zhang, Y., Quan, X., Li, Y., Chen, S., Zhao, H., & Wang, D. (2012a). An anaerobic reactor packed with a pair of Fe-graphite plate electrodes for bioaugmentation of azo dye wastewater treatment. *Biochemical Engineering Journal*, *63*, 31–37. https://doi.org/10.1016/j.bej.2012.01.008

Zhang, Q. L., Liu, Y., Ai, G. M., Miao, L. L., Zheng, H. Y., & Liu, Z. P. (2012b). The characteristics of a novel heterotrophic nitrification-aerobic denitrification bacterium, Bacillus methylotrophicus strain L7. *Bioresource Technology*, *108*, 35–44. https://doi.org/10.1016/j.biortech.2011.12.139

Zhang, Q., Chen, X., Zhang, Z., Luo, W., Wu, H., Zhang, L., … Zhao, T. (2020b). Performance and microbial ecology of a novel moving bed biofilm reactor process inoculated with heterotrophic nitrification-aerobic denitrification bacteria for high ammonia nitrogen wastewater treatment. *Bioresource Technology*, *315*(July), 123813. https://doi.org/ 10.1016/j.biortech.2020.123813

Zhang, S., Sun, X., Fan, Y., Qiu, T., Gao, M., & Wang, X. (2017a). Heterotrophic nitrification and aerobic denitrification by Diaphorobacter polyhydroxybutyrativorans SL-205 using poly(3-hydroxybutyrate-co-3-hydroxyvalerate) as the sole carbon source. *Bioresource Technology*, *241*, 500–507. https://doi.org/10.1016/j.biortech.2017.05.185

Zhang, W., Shen, J., Zhang, H., Zheng, C., Wei, R., Gao, Y., & Yang, L. (2021). Efficient nitrate removal by Pseudomonas mendocina GL6 immobilized on biochar. *Bioresource Technology*, *320*, 124324. https://doi.org/10.1016/j.biortech.2020.124324

Zhang, X., Chen, X., Zhang, C., Wen, H., Guo, W., & Ngo, H. H. (2016a). Effect of filling fraction on the performance of sponge-based moving bed biofilm reactor. *Bioresource Technology*, *219*, 762–767. https://doi.org/10.1016/j.biortech.2016.08.031

Zhang, X., Song, Z., Guo, W., Lu, Y., Qi, L., Wen, H., & Ngo, H. H. (2017b). Behavior of nitrogen removal in an aerobic sponge based moving bed biofilm reactor. *Bioresource Technology*, *245*(August), 1282–1285. https://doi.org/10.1016/j.biortech.2017.08.106

Zhang, Z., Xu, Y., Shi, W., Wang, W., Zhang, R., Bao, X., … Cui, F. (2016b). Electrochemical-catalytic reduction of nitrate over Pd-Cu/γAl2O3 catalyst in cathode chamber: Enhanced removal efficiency and N2 selectivity. *Chemical Engineering Journal*, *290*, 201–208. https://doi.org/10.1016/j.cej.2016.01.063

Zhao, B., Cheng, D. Y., Tan, P., An, Q., & Guo, J. S. (2018). Characterization of an aerobic denitrifier Pseudomonas stutzeri strain XL-2 to achieve efficient nitrate removal. *Bioresource Technology*, *250*, 564–573. https://doi.org/10.1016/j.biortech.2017.11.038

Zhao, Y., Han, Y., Ma, T., & Guo, T. (2011). Simultaneous desulfurization and denitrification from flue gas by ferrate(VI). *Environmental Science and Technology*, *45*(9), 4060–4065. https://doi.org/10.1021/es103857g

Zhao, Y., Huang, C., Ma, X., Chen, F., Liang, B., & Wang, A. (2019). Bioaugmentation with the sulfur oxidizing Thauera sp. HDD1 for shortening the startup time in the denitrifying sulfide removal process. *Bioresource Technology Reports*, *7*(March), 100192. https://doi.org/10.1016/j.biteb.2019.100192

Zhao, Y., Huang, J., Zhao, H., & Yang, H. (2013). Microbial community and N removal of aerobic granular sludge at high COD and N loading rates. *Bioresource Technology*, *143*, 439–446. https://doi.org/10.1016/j.biortech.2013.06.020

Zheng, M., Zhu, H., Han, Y., Xu, C., Zhang, Z., & Han, H. (2019). Comparative investigation on carbon-based moving bed biofilm reactor (MBBR) for synchronous removal of phenols and ammonia in treating coal pyrolysis wastewater at pilot-scale. *Bioresource Technology*, *288*(May), 121590. https://doi.org/10.1016/j.biortech.2019.121590

Zhong, C., Sun, S., Zhang, D., Liu, L., Zhou, S., & Zhou, J. (2020). Production of a bioflocculant from ramie biodegumming wastewater using a biomass-degrading strain and its application in the treatment of pulping wastewater. *Chemosphere*, *253*, 126727. https://doi.org/10.1016/j.chemosphere.2020.126727

Zhou, Y., Zhou, X., Yu, D. L., Sang, B., Feng, J. T., Han, L. R., & Zhang, X. (2018). Optimization of fermentation conditions and bench-scale for improvement of a novel glycoprotein gp-1 production by streptomyces kanasenisi ZX01. *Molecules*, *23*(1). https://doi.org/10.3390/molecules23010137

Zhu, Y., Zhang, Y., Ren, H. qiang, Geng, J. ju, Xu, K., Huang, H., & Ding, L. li. (2015). Physicochemical characteristics and microbial community evolution of biofilms during the start-up period in a moving bed biofilm reactor. *Bioresource Technology*, *180*, 345–351. https://doi.org/10.1016/j.biortech.2015.01.006

Zkeri, E., Iliopoulou, A., Katsara, A., Korda, A., Aloupi, M., Gatidou, G., … Stasinakis, A. S. (2021). Comparing the use of a two-stage MBBR system with a methanogenic MBBR coupled with a microalgae reactor for medium-strength dairy wastewater treatment. *Bioresource Technology*, *323*(November 2020), 124629. https://doi.org/ 10.1016/ j.biortech.2020.124629