DAFTAR PUSTAKA

Ahmad, T., Aadil, R. M., Ahmed, H., Rahman, U. ur, Soares, B. C. V., Souza, S. L. Q., Pimentel, T. C., Scudino, H., Guimarães, J. T., Esmerino, E. A., Freitas, M. Q., Almada, R. B., Vendramel, S. M. R., Silva, M. C., & Cruz, A. G. (2019). Treatment and utilization of dairy industrial waste: A review. *Trends in Food Science and Technology*, *88*(12), 361–372. https://doi.org/10.1016/j.tifs.2019.04.003

Albuquerque, P. B. S., & Malafaia, C. B. (2018). Perspectives on the production, structural characteristics and potential applications of bioplastics derived from polyhydroxyalkanoates. *International Journal of Biological Macromolecules*, *107*(PartA), 615–625. https://doi.org/10.1016/j.ijbiomac.2017.09.026

Alshehrei, F. (2017). Biodegradation of Synthetic and Natural Plastic by Microorganism. Journal of Applied & Environmental Microbiology. *Journal of Applied & Environmental Microbiology*, *5(1)*, *8–1*(1), 8–19. https://doi.org/10.12691/jaem-5-1-2

Aristya, G. R., Lin, Y. J., Chang, J. S., Chang, J. J., & Yen, H. W. (2022). Polyhydroxybutyrate (PHB) production from crude glycerol by genetic engineering of *Rhodotorula glutinis. Bioresource Technology Reports*, *18*(April), 101048. https://doi.org/10.1016/j.biteb.2022.101048

Arumugam, A., Senthamizhan, S. G., Ponnusami, V., & Sudalai, S. (2018). Production and optimization of polyhydroxyalkanoates from non-edible *Calophyllum inophyllum* oil using *Cupriavidus necator*. *International Journal of Biological Macromolecules*, *112*, 598–607. https://doi.org/10.1016/j.ijbiomac.2018.02.012

Asiri, F. (2024). Polyhydroxyalkanoates for Sustainable Aquaculture: A Review of Recent Advancements, Challenges, and Future Directions. *Journal of Agricultural and Food Chemistry*, *72*(4), 2034–2058. https://doi.org/10.1021/acs.jafc.3c06488

Awoyera, P. O., & Adesina, A. (2020). Plastic wastes to construction products: Status, limitations and future perspective. *Case Studies in Construction Materials*, *12*, e00330. https://doi.org/10.1016/j.cscm.2020.e00330

Barati, F., Asgarani, E., Gharavi, S., & Soudi, M. R. (2021). Considerable increase in Poly(3-hydroxybutyrate) production via phbC gene overexpression in *Ralstonia eutropha* PTCC 1615. *BioImpacts*, *11*(1), 53–57. https://doi.org/10.34172/BI.2021.07

Batumalaie, K., Khalili, E., Mahat, N. A., Huyop, F. Z., & Wahab, R. A. (2018). A statistical approach for optimizing the protocol for overexpressing lipase KV1 in *Escherichia coli:* purification and characterization. *Biotechnology and Biotechnological Equipment*, *32*(1), 69–87. https://doi.org/10.1080/13102818.2017.1407670

Bauer, R. J., Zhelkovsky, A., Bilotti, K., Crowell, L. E., Evans, T. C., McReynolds, L. A., & Lohman, G. J. S. (2017). Comparative analysis of the end-joining activity of several DNA ligases. *PLoS ONE*, *12*(12), 1–20. https://doi.org/10.1371/journal.pone.0190062

Benachour, A., Auffray, Y., & Hartke, A. (2007). Construction of plasmid vectors for screening replicons from gram-positive bacteria and their use as shuttle cloning vectors. *Current Microbiology*, *54*(5), 342–347. https://doi.org/10.1007/s00284-006-0358-1

Bernadus, Z. G., Fatimawali, F., & Kolondam, B. (2019). Transformasi Plasmid yang Mengandung Gen *mer*B pada *Escherichia coli* BL21(DE3). *Pharmacon*, *8*(1), 196. https://doi.org/10.35799/pha.8.2019.29254

Bharti, S., & Swetha, G. (2016). Need for Bioplastics and Role of Biopolymer PHB: A Short Review. *Journal of Petroleum & Environmental Biotechnology*, *07*(02), 2–4. https://doi.org/10.4172/2157-7463.1000272

Biłas, R., Szafran, K., Hnatuszko-Konka, K., & Kononowicz, A. K. (2016). Cis-regulatory elements used to control gene expression in plants. *Plant Cell, Tissue and Organ Culture*, *127*(2), 269–287. https://doi.org/10.1007/s11240-016-1057-7

Brabcová, K. P., Jamborová, Z., Michaelidesová, A., Davídková, M., Kodaira, S., Šefl, M., & Štěpán, V. (2019). Radiation-Induced Plasmid DNA Damage: Effect of Concentration and Length. *Radiation Protection Dosimetry*, *186*(2–3), 168–171. https://doi.org/10.1093/rpd/ncz196

Bragança, C. R. S., Colombo, L. T., Roberti, A. S., Alvim, M. C. T., Cardoso, S. A., Reis, K. C. P., de Paula, S. O., da Silveira, W. B., & Passos, F. M. L. (2015). Construction of recombinant *Kluyveromyces marxianus* UFV-3 to express dengue virus type 1 nonstructural protein 1 (NS1). *Applied Microbiology and Biotechnology*, *99*(3), 1191–1203. https://doi.org/10.1007/s00253-014-5963-5

Bugnicourt, E., Cinelli, P., Lazzeri, A., & Alvarez, V. (2014). Polyhydroxyalkanoate (PHA): Review of synthesis, characteristics, processing and potential applications in packaging. *Express Polymer Letters*, *8*(11), 791–808. https://doi.org/10.3144/expresspolymlett.2014.82

Carr, I. M., Robinson, J. I., Dimitriou, R., Markham, A. F., Morgan, A. W., & Bonthron, D. T. (2009). Inferring relative proportions of DNA variants from sequencing electropherograms. *Bioinformatics*, *25*(24), 3244–3250. https://doi.org/10.1093/bioinformatics/btp583

Castillo, T., Flores, C., Segura, D., Espín, G., Sanguino, J., Cabrera, E., Barreto, J., Díaz-Barrera, A., & Peña, C. (2017). Production of polyhydroxybutyrate (PHB) of high and ultra-high molecular weight by *Azotobacter vinelandii* in batch and fed-batch cultures. *Journal of Chemical Technology and Biotechnology*, *92*(7), 1809–1816. https://doi.org/10.1002/jctb.5182

Chakravarthi, B. V. S. K., Singh, S., Kamalraj, S., Gupta, V. K., & Jayabaskaran, C. (2020). Evaluation of spore inoculum and confirmation of pathway genetic blueprint of T13αH and DBAT from a Taxol-producing endophytic fungus. *Scientific Reports*, *10*(1), 1–11. https://doi.org/10.1038/s41598-020-77605-x

Chen, G. Q., Chen, X. Y., Wu, F. Q., & Chen, J. C. (2020). Polyhydroxyalkanoates (PHA) toward cost competitiveness and functionality. *Advanced Industrial and Engineering Polymer Research*, *3*(1), 1–7. https://doi.org/10.1016/j.aiepr.2019.11.001

Chen, G. Q., & Jiang, X. R. (2018). Engineering microorganisms for improving polyhydroxyalkanoate biosynthesis. *Current Opinion in Biotechnology*, *53*, 20–25. https://doi.org/10.1016/j.copbio.2017.10.008

Cheng, Y.-L., Lee, C.-Y., Huang, Y.-L., Buckner, C. A., Lafrenie, R. M., Dénommée, J. A., Caswell, J. M., Want, D. A., Gan, G. G., Leong, Y. C., Bee, P. C., Chin, E., Teh, A. K. H., Picco, S., Villegas, L., Tonelli, F., Merlo, M., Rigau, J., Diaz, D., … Mathijssen, R. H. J. (2016). PCR Techniques and Their Clinical Applications. *Intech*, *11*(4), 13. https://www.intechopen.com/books/advanced-biometric-technologies/liveness-detection-in-biometrics

Chinaglia, S., Tosin, M., & Degli-Innocenti, F. (2018). Biodegradation rate of biodegradable plastics at molecular level. *Polymer Degradation and Stability*, *147*(October 2017), 237–244. https://doi.org/10.1016/j.polymdegradstab.2017.12.011

Colussi, P. A., & Taron, C. H. (2005). *Kluyveromyces lactis* LAC4 promoter variants that lack function in bacteria but retain full function in K. lactis. *Applied and Environmental Microbiology*, *71*(11), 7092–7098. https://doi.org/10.1128/AEM.71.11.7092-7098.2005

Cranenburgh, R. M. (2004). An equation for calculating the volumetric ratios required in a ligation reaction. *Applied Microbiology and Biotechnology*, *65*(2), 200–202. https://doi.org/10.1007/s00253-004-1577-7

Crépin, L., Lombard, E., & Guillouet, S. E. (2016). Metabolic engineering of *Cupriavidus necator* for heterotrophic and autotrophic alka(e)ne production. *Metabolic Engineering*, *37*, 92–101. https://doi.org/10.1016/j.ymben.2016.05.002

Di Felice, F., Micheli, G., & Camilloni, G. (2019). Restriction enzymes and their use in molecular biology: An overview. *Journal of Biosciences*, *44*(2). https://doi.org/10.1007/s12038-019-9856-8

Dietrich, K., Oliveira-Filho, E. R., Dumont, M. J., Gomez, J. G. C., Taciro, M. K., Silva, L. F. da, Orsat, V., & Rio, L. F. D. (2020). Increasing PHB production with an industrially scalable hardwood hydrolysate as a carbon source. *Industrial Crops and Products*, *154*(December 2019), 112703. https://doi.org/10.1016/j.indcrop.2020.112703

El-kadi, S. M., Elbagory, M., El-zawawy, H. A. H., & El-shaer, H. F. A. (2021). Biosynthesis of Poly-ß-Hydroxybutyrate (PHB) from Different. *Polymers*, *13*, 1–20.

Engler, C., Kandzia, R., & Marillonnet, S. (2008). A one pot, one step, precision cloning method with high throughput capability. *PLoS ONE*, *3*(11). https://doi.org/10.1371/journal.pone.0003647

Eraslan, K., Aversa, C., Nofar, M., Barletta, M., Gisario, A., Salehiyan, R., & Goksu, Y. A. (2022). Poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) (PHBH): Synthesis, properties, and applications - A review. *European Polymer Journal*, *167*(November 2021), 111044. https://doi.org/10.1016/j.eurpolymj.2022.111044

Evode, N., Qamar, S. A., Bilal, M., Barceló, D., & Iqbal, H. M. N. (2021). Plastic waste and its management strategies for environmental sustainability. *Case Studies in Chemical and Environmental Engineering*, *4*(8), 1–8. https://doi.org/10.1016/j.cscee.2021.100142

Farid, N. F. S. M., Ariffin, H., Mamat, M. R. Z., Zahari, M. A. K. M., & Hassan, M. A. (2015). Non-solvent pretreatment of poly(3-hydroxybutyrate) for improved bio-based crotonic acid production. *RSC Advances*, *5*(1), 33546–33553.

Favaro, L., Basaglia, M., & Casella, S. (2019). Improving polyhydroxyalkanoate production from inexpensive carbon sources by genetic approaches: a review. *Biofuels, Bioproducts and Biorefining*, *13*(1), 208–227. https://doi.org/10.1002/bbb.1944

Fernandes, M., Salvador, A., Alves, M. M., & Vicente, A. A. (2020). Factors affecting polyhydroxyalkanoates biodegradation in soil. *Polymer Degradation and Stability*, *182*, 109408. https://doi.org/10.1016/j.polymdegradstab.2020.109408

Filiciotto, L., & Rothenberg, G. (2021). Biodegradable Plastics: Standards, Policies, and Impacts. *ChemSusChem*, *14*(1), 56–72. https://doi.org/10.1002/cssc.202002044

Gaffar, S., & Sumarlin, S. (2021). Analisis sekuen mtDNA COI Pari Totol Biru yang didaratkan di Tempat Pendaratan Ikan Kota Tarakan. *Jurnal Harpodon Borneo*, *13*(2), 80–89. https://doi.org/10.35334/harpodon.v13i2.1835

Ganapathy, K., Ramasamy, R., & Dhinakarasamy, I. (2018). Polyhydroxybutyrate production from marine source and its application. *International Journal of Biological Macromolecules*, *111*, 102–108. https://doi.org/10.1016/j.ijbiomac.2017.12.155

Ghaly, A. E., Dave, D., Budge, S., & Brooks, M. S. (2010). Fish spoilage mechanisms and preservation techniques: Review. *American Journal of Applied Sciences*, *7*(7), 846–864. https://doi.org/10.3844/ajassp.2010.859.877

Gruss, A., & Ehrlich, S. D. (1988). Insertion of foreign DNA into plasmids from gram-positive bacteria induces formation of high-molecular-weight plasmid multimers. *Journal of Bacteriology*, *170*(3), 1183–1190. https://doi.org/10.1128/jb.170.3.1183-1190.1988

Gupta, S. K., & Shukla, P. (2016). Advanced technologies for improved expression of recombinant proteins in bacteria: perspectives and applications. *Critical Reviews in Biotechnology*, *36*(6), 1089–1098. https://doi.org/10.3109/07388551.2015.1084264

Ha, S., Shin, B., & Park, W. (2018). Lack of glyoxylate shunt dysregulates iron homeostasis in pseudomonas aeruginosa. *Microbiology (United Kingdom)*, *164*(4), 587–599. https://doi.org/10.1099/mic.0.000623

Hagrosta, A., Goudarzi, H., Ghalavand, Z., Faghihloo, E., & Langroudi, R. (2020). *Molecular Cloning of a New Bi-Functional Fusion Protein of Clostridium perfringens Type A Alpha and Clostridium septicum Alpha Toxin Genes in E. coli* (pp. 1–8).

Hammer, S. K., & Avalos, J. L. (2017). Harnessing yeast organelles for metabolic engineering. *Nature Chemical Biology*, *13*(8), 823–832. https://doi.org/10.1038/nchembio.2429

Hassan, M. A., Bakhiet, E. K., Hussein, H. R., & Ali, S. G. (2019). Statistical optimization studies for polyhydroxybutyrate (PHB) production by novel Bacillus subtilis using agricultural and industrial wastes. *International Journal of Environmental Science and Technology*, *16*(7), 3497–3512. https://doi.org/10.1007/s13762-018-1900-y

Hausjell, J., Weissensteiner, J., Molitor, C., Halbwirth, H., & Spadiut, O. (2018). *E. coli* HMS174(DE3) is a sustainable alternative to BL21(DE3). *Microbial Cell Factories*, *17*(1), 1–9. https://doi.org/10.1186/s12934-018-1016-6

Inui, M., Suda, M., Kimura, S., Yasuda, K., Suzuki, H., Toda, H., Yamamoto, S., Okino, S., Suzuki, N., & Yukawa, H. (2008). Expression of *Clostridium acetobutylicum* butanol synthetic genes in *Escherichia coli. Applied Microbiology and Biotechnology*, *77*(6), 1305–1316. https://doi.org/10.1007/s00253-007-1257-5

Jiang, G., Hill, D. J., Kowalczuk, M., Johnston, B., Adamus, G., Irorere, V., & Radecka, I. (2016). Carbon sources for polyhydroxyalkanoates and an integrated biorefinery. *International Journal of Molecular Sciences*, *17*(7). https://doi.org/10.3390/ijms17071157

Joshi, S. J., & Geetha, S. J. (2019). Recent advances in biotechnology. *Recent Advances in Biotechnology*, *2*(1), 1–290. https://doi.org/10.14429/dsj.51.2297

Jung, H. M., Im, D. K., Lim, J. H., Jung, G. Y., & Oh, M. K. (2019). Metabolic perturbations in mutants of glucose transporters and their applications in metabolite production in Escherichia coli. *Microbial Cell Factories*, *18*(1), 1–14. https://doi.org/10.1186/s12934-019-1224-8

Khalid, S., Zia-ur-Rehman, M., Ali, S. A., Hameed, U., Khan, F., Ahmed, N., Farooq, A. M., & Haider, M. S. (2017). Construction of an infectious chimeric geminivirus by molecular cloning based on coinfection and recombination. *International Journal of Agriculture and Biology*, *19*(4), 629–634. https://doi.org/10.17957/IJAB/15.0310

Kocharin, K., Chen, Y., Siewers, V., & Nielsen, J. (2012). Engineering of acetyl-CoA metabolism for the improved production of polyhydroxybutyrate in *Saccharomyces cerevisiae. AMB Express*, *2*(1), 1–11. https://doi.org/10.1186/2191-0855-2-52

Kumar, G., Bakonyi, P., Kobayashi, T., Xu, K. Q., Sivagurunathan, P., Kim, S. H., Buitrón, G., Nemestóthy, N., & Bélafi-Bakó, K. (2016). Enhancement of biofuel production via microbial augmentation: The case of dark fermentative hydrogen. *Renewable and Sustainable Energy Reviews*, *57*, 879–891. https://doi.org/10.1016/j.rser.2015.12.107

Kusnadi, H., Izzati, N., Nuryana, I., & Laksmi, A. (2023). Kloning Gen Penyandi Trehalosa Sintase dari *Arthrobacter psychrolactophilus* di *Escherichia coli* DH5- α. *1*(1), 21–29.

Lalonde, J. N., Pilania, G., & Marrone, B. L. (2024). Materials designed to degrade: structure, properties, processing, and performance relationships in polyhydroxyalkanoate biopolymers. *Polymer Chemistry*, *16*(3), 235–265. https://doi.org/10.1039/d4py00623b

Lee, Y. R., Nur Fitriana, H., Lee, S. Y., Kim, M. S., Moon, M., Lee, W. H., Lee, J. S., & Lee, S. (2020). Molecular profiling and optimization studies for growth and phb production conditions in rhodobacter sphaeroides. *Energies*, *13*(23), 1–14. https://doi.org/10.3390/en13236471

Li, M., Liu, Q., Teng, Y., Ou, L., Xi, Y., Chen, S., & Duan, G. (2019). The resistance mechanism of *Escherichia coli* induced by ampicillin in laboratory. *Infection and Drug Resistance*, *12*, 2853–2863. https://doi.org/10.2147/IDR.S221212

Li, Z. J., Qiao, K., Liu, N., & Stephanopoulos, G. (2017). Engineering *Yarrowia lipolytica* for poly-3-hydroxybutyrate production. *Journal of Industrial Microbiology and Biotechnology*, *44*(4–5), 605–612. https://doi.org/10.1007/s10295-016-1864-1

Lopes, C., dos Santos, N. V., Dupont, J., Pedrolli, D. B., Valentini, S. R., de Carvalho Santos-Ebinuma, V., & Pereira, J. F. B. (2019). Improving the cost effectiveness of enhanced green fluorescent protein production using recombinant *Escherichia coli* BL21 (DE3): Decreasing the expression inducer concentration. *Biotechnology and Applied Biochemistry*, *66*(4), 527–536. https://doi.org/10.1002/bab.1749

Lopez-Arenas, T., González-Contreras, M., Anaya-Reza, O., & Sales-Cruz, M. (2017). Analysis of the fermentation strategy and its impact on the economics of the production process of PHB (polyhydroxybutyrate). *Computers and Chemical Engineering*, *107*, 140–150. https://doi.org/10.1016/j.compchemeng.2017.03.009

Lozano Terol, G., Gallego-Jara, J., Sola Martínez, R. A., Martínez Vivancos, A., Cánovas Díaz, M., & de Diego Puente, T. (2021). Impact of the Expression System on Recombinant Protein Production in *Escherichia coli* BL21. *Frontiers in Microbiology*, *12*(6), 1–12. https://doi.org/10.3389/fmicb.2021.682001

Madeira-Jr, J. V., & Gombert, A. K. (2018). Towards high-temperature fuel ethanol production using *Kluyveromyces marxianus:* On the search for plug-in strains for the Brazilian sugarcane-based biorefinery. *Biomass and Bioenergy*, *119*(August), 217–228. https://doi.org/10.1016/j.biombioe.2018.09.010

Markl, E., Grünbichler, H., & Lackner, M. (2018). PHB - Bio Based and Biodegradable Replacement for PP: A Review. *Novel Techniques in Nutrition & Food Science*, *2*(5), 206–209. https://doi.org/10.31031/ntnf.2018.02.000546

Martin, W. F. (2020). Older Than Genes: The Acetyl CoA Pathway and Origins. *Frontiers in Microbiology*, *11*(June), 1–21. https://doi.org/10.3389/fmicb.2020.00817

Mazur, P., Katkov, I. I., Katkova, N., & Critser, J. K. (2000). The enhancement of the ability of mouse sperm to survive freezing and thawing by the use of high concentrations of glycerol and the presence of an *Escherichia coli* membrane preparation (Oxyrase) to lower the oxygen concentration. *Cryobiology*, *40*(3), 187–209. https://doi.org/10.1006/cryo.2000.2238

McAdam, B., Fournet, M. B., McDonald, P., & Mojicevic, M. (2020). Production of polyhydroxybutyrate (PHB) and factors impacting its chemical and mechanical characteristics. *Polymers*, *12*(12), 1–20. https://doi.org/10.3390/polym12122908

Mierziak, J., Burgberger, M., & Wojtasik, W. (2021). 3-Hydroxybutyrate As a Metabolite and a Signal Molecule Regulating Processes of Living Organisms. *Biomolecules*, *11*(3), 1–21. https://doi.org/10.3390/biom11030402

Moshood, T. D., Nawanir, G., Mahmud, F., Mohamad, F., Ahmad, M. H., & AbdulGhani, A. (2022). Biodegradable plastic applications towards sustainability: A recent innovations in the green product. *Cleaner Engineering and Technology*, *6*, 100404. https://doi.org/10.1016/j.clet.2022.100404

Mozumder, M. S. I. (2015). *Optimization of a two-phase fermentation process for the production of polyhydroxybutyrate (PHB) from organic and inorganic (industrial waste) substrate*.

Muhammadi, Shabina, Afzal, M., & Hameed, S. (2015). Bacterial polyhydroxyalkanoates-eco-friendly next generation plastic: Production, biocompatibility, biodegradation, physical properties and applications. *Green Chemistry Letters and Reviews*, *8*(3–4), 56–77. https://doi.org/10.1080/17518253.2015.1109715

Mukherjee, A., & Koller, M. (2023). Microbial PolyHydroxyAlkanoate (PHA) Biopolymers—Intrinsically Natural. *Bioengineering*, *10*(7), 1–16. https://doi.org/10.3390/bioengineering10070855

Müller-Santos, M., Koskimäki, J. J., Alves, L. P. S., De Souza, E. M., Jendrossek, D., & Pirttilä, A. M. (2021). The protective role of PHB and its degradation products against stress situations in bacteria. *FEMS Microbiology Reviews*, *45*(3), 1–13. https://doi.org/10.1093/femsre/fuaa058

Najim, S. M., Al-Noor, J. M., & Al-Waely, W. A. (2015). Extraction of crude peptone from fish wastes for use as a nitrogen source in microbiological media. *Global Journal of Fisheries and Aquaculture Researches*, *2*, 29–37.

Nandy, S. K., & Srivastava, R. K. (2018). A review on sustainable yeast biotechnological processes and applications. *Microbiological Research*, *207*(August 2017), 83–90. https://doi.org/10.1016/j.micres.2017.11.013

Nath, P. C., Sharma, R., Debnath, S., Sharma, M., Inbaraj, B. S., Dikkala, P. K., Nayak, P. K., & Sridhar, K. (2023). Recent trends in polysaccharide-based biodegradable polymers for smart food packaging industry. *International Journal of Biological Macromolecules*, *253*(P8), 127524. https://doi.org/10.1016/j.ijbiomac.2023.127524

Neuman, N., Kostic, M., Scheffmann, P., & Gibson, T. (2014). Contents, Ed. Board. *Trends in Biochemical Sciences*, *39*(8), i. https://doi.org/10.1016/s0968-0004(14)00112-1

Noor, S., Pramono, H., & Aziz, S. (2014). Deteksi Keragaman Spesies Bakteri Metanogen Rumen Sapi Menggunakan Kloning Gen 16S rRNA dan Sekuensing. *Scripta Biologica |*, *1*(4), 1–8.

Nora, L. C., Westmann, C. A., Martins-Santana, L., Alves, L. de F., Monteiro, L. M. O., Guazzaroni, M. E., & Silva-Rocha, R. (2019). The art of vector engineering: towards the construction of next-generation genetic tools. *Microbial Biotechnology*, *12*(1), 125–147. https://doi.org/10.1111/1751-7915.13318

Nouban, F., & Abazid, M. (2017). The principle and application of new PCR technologies. *IOP Conference Series: Earth and Environmental Science*, *8*(2), 68–74. https://doi.org/10.1088/1755-1315

Olavarria, K., Carnet, A., van Renselaar, J., Quakkelaar, C., Cabrera, R., Guedes da Silva, L., Smids, A. L., Villalobos, P. A., van Loosdrecht, M. C. M., & Wahl, S. A. (2021). An NADH preferring acetoacetyl-CoA reductase is engaged in poly-3-hydroxybutyrate accumulation in *Escherichia coli. Journal of Biotechnology*, *325*(July 2020), 207–216. https://doi.org/10.1016/j.jbiotec.2020.10.022

Partridge, S. R., Kwong, S. M., Firth, N., & Jensen, S. O. (2018). Mobile genetic elements associated with antimicrobial resistance. *Clinical Microbiology Reviews*, *31*(4). https://doi.org/10.1128/CMR.00088-17

Patigu, R. F., Wijayanti, P., Sebastian, A., & Purwestri, Y. A. (2021). Optimization of heat shock temperature and time on the transformation of pRGEB32 into *Escherichia coli* DH5Ã□Â±. *Jurnal Biologi Tropis*, *21*(3), 632–640. https://doi.org/10.29303/jbt.v21i3.2811

Rajan, K. P., Thomas, S. P., Gopanna, A., & Chavali, M. (2019). Polyhydroxybutyrate (PHB): A standout biopolymer for environmental sustainability. *Handbook of Ecomaterials*, *4*, 2803–2826. https://doi.org/10.1007/978-3-319-68255-6_92

Rianti, E. D. D., Tania, P. O. A., & Listyawati, A. F. (2022). Kuat medan listrik AC dalam menghambat pertumbuhan koloni *Staphylococcus aureus* dan *Escherichia coli. Bioma : Jurnal Ilmiah Biologi*, *11*(1), 79–88. https://doi.org/10.26877/bioma.v11i1.9561

Rivera-Briso, A. L., & Serrano-Aroca, Á. (2018). Poly(3-Hydroxybutyrate-co-3-Hydroxyvalerate): Enhancement strategies for advanced applications. *Polymers*, *10*(7), 1–28. https://doi.org/10.3390/polym10070732

Roberts, L. A., & Shell, S. S. (2023). A research program-linked, course-based undergraduate research experience that allows undergraduates to participate in current research on

mycobacterial gene regulation. *Frontiers in Microbiology*, *13*(January). https://doi.org/10.3389/fmicb.2022.1025250

Rodríguez-Beltrán, J., DelaFuente, J., León-Sampedro, R., MacLean, R. C., & San Millán, Á. (2021). Beyond horizontal gene transfer: the role of plasmids in bacterial evolution. *Nature Reviews Microbiology*, *19*(6), 347–359. https://doi.org/10.1038/s41579-020-00497-1

Roohi, Zaheer, M. R., & Kuddus, M. (2018). PHB (poly-β-hydroxybutyrate) and its enzymatic degradation. *Polymers for Advanced Technologies*, *29*(1), 30–40. https://doi.org/10.1002/pat.4126

Rosano, G. L., & Ceccarelli, E. A. (2014). Recombinant protein expression in Escherichia coli: Advances and challenges. *Frontiers in Microbiology*, *5*(4), 1–17. https://doi.org/10.3389/fmicb.2014.00172

Rotinsulu, S., Fatimawali, F., & Tallei, T. E. (2019). Transformasi Plasmid yang Mengandung Gen *mer*B pada Bakteri *Escherichia coli* TOP-10. *Pharmacon*, *8*(2), 290. https://doi.org/10.35799/pha.8.2019.29294

Rujnić-Sokele, M., & Pilipović, A. (2017). Challenges and opportunities of biodegradable plastics: A mini review. *Waste Management and Research*, *35*(2), 132–140. https://doi.org/10.1177/0734242X16683272

Saini, P., Beniwal, A., Kokkiligadda, A., & Vij, S. (2018). Response and tolerance of yeast to changing environmental stress during ethanol fermentation. *Process Biochemistry*, *72*(July), 1–12. https://doi.org/10.1016/j.procbio.2018.07.001

Sakihama, Y., Hidese, R., Hasunuma, T., & Kondo, A. (2019). Increased flux in acetyl-CoA synthetic pathway and TCA cycle of *Kluyveromyces marxianus* under respiratory conditions. *Scientific Reports*, *9*(1), 1–7. https://doi.org/10.1038/s41598-019-41863-1

Sakthiselvan, P., & Madhumathi, R. (2019). Optimization on Microbial Production of Polyhydroxybutyrate (PHB): A Review. *International Journal of Research and Analytical Reviews*, *6*(1), 243–251.

Saleem, J., Adil Riaz, M., & Gordon, M. (2018). Oil sorbents from plastic wastes and polymers: A review. *Journal of Hazardous Materials*, *341*, 424–437. https://doi.org/10.1016/j.jhazmat.2017.07.072

Samorì, C., Martinez, G. A., Bertin, L., Pagliano, G., Parodi, A., Torri, C., & Galletti, P. (2022). PHB into PHB: Recycling of polyhydroxybutyrate by a tandem “thermolytic distillation-microbial fermentation” process. *Resources, Conservation and Recycling*, *178*(11, 106082. https://doi.org/10.1016/j.resconrec.2021.106082

Sanderson, H., McCarthy, M. C., Nnajide, C. R., Sparrow, J., Rubin, J. E., Dillon, J. A. R., & White, A. P. (2023). Identification of plasmids in avian-associated *Escherichia coli* using nanopore and illumina sequencing. *BMC Genomics*, *24*(1), 1–14. https://doi.org/10.1186/s12864-023-09784-6

Sandström, A. G., Muñoz de las Heras, A., Portugal-Nunes, D., & Gorwa-Grauslund, M. F. (2015). Engineering of *Saccharomyces cerevisiae* for the production of poly-3-d-hydroxybutyrate from xylose. *AMB Express*, *5*(1). https://doi.org/10.1186/s13568-015-0100-0

Schadeweg, V., & Boles, E. (2016). N-Butanol production in *Saccharomyces cerevisiae* is limited by the availability of coenzyme A and cytosolic acetyl-CoA. *Biotechnology for Biofuels*, *9*(1), 1–12. https://doi.org/10.1186/s13068-016-0456-7

Schwarzenbach, H., Da Silva, A. M., Calin, G., & Pantel, K. (2015). Data normalization strategies for microRNA quantification. *Clinical Chemistry*, *61*(11), 1333–1342. https://doi.org/10.1373/clinchem.2015.239459

Segawa, M., Wen, C., Orita, I., Nakamura, S., & Fukui, T. (2019). Two NADH-dependent (S)-3-hydroxyacyl-CoA dehydrogenases from polyhydroxyalkanoate-producing

Ralstonia eutropha. Journal of Bioscience and Bioengineering, *127*(3), 294–300. https://doi.org/10.1016/j.jbiosc.2018.08.009

Segeritz, C. P., & Vallier, L. (2017). Cell Culture: Growing Cells as Model Systems In Vitro. In *Basic Science Methods for Clinical Researchers*. Elsevier Inc. https://doi.org/10.1016/B978-0-12-803077-6.00009-6

Sha, Y., Ge, M., Lu, M., Xu, Z., Zhai, R., & Jin, M. (2025). Advances in metabolic engineering for enhanced acetyl-CoA availability in yeast. *Critical Reviews in Biotechnology*, *45*(4), 904–922. https://doi.org/10.1080/07388551.2024.2399542

Sharma, R., Garg, P., Kumar, P., Bhatia, S. K., & Kulshrestha, S. (2020). Microbial fermentation and its role in quality improvement of fermented foods. *Fermentation*, *6*(4), 1–20. https://doi.org/10.3390/fermentation6040106

Sharma, V., Sehgal, R., & Gupta, R. (2021). Polyhydroxyalkanoate (PHA): Properties and Modifications. *Polymer*, *212*(September 2020), 123161. https://doi.org/10.1016/j.polymer.2020.123161

Shearer, R. F., & Saunders, D. N. (2015). Experimental design for stable genetic manipulation in mammalian cell lines: Lentivirus and alternatives. *Genes to Cells*, *20*(1), 1–10. https://doi.org/10.1111/gtc.12183

Shen, R., Yin, J., Ye, J. W., Xiang, R. J., Ning, Z. Y., Huang, W. Z., & Chen, G. Q. (2018). Promoter Engineering for Enhanced P(3HB- co-4HB) Production by *Halomonas bluephagenesis. ACS Synthetic Biology*, *7*(8), 1897–1906. https://doi.org/10.1021/acssynbio.8b00102

Singh, V., Haque, S., Niwas, R., Srivastava, A., Pasupuleti, M., & Tripathi, C. K. M. (2017). Strategies for fermentation medium optimization: An in-depth review. *Frontiers in Microbiology*, *7*(JAN). https://doi.org/10.3389/fmicb.2016.02087

Sirohi, R., Prakash Pandey, J., Kumar Gaur, V., Gnansounou, E., & Sindhu, R. (2020). Critical overview of biomass feedstocks as sustainable substrates for the production of polyhydroxybutyrate (PHB). *Bioresource Technology*, *311*(March), 123536. https://doi.org/10.1016/j.biortech.2020.123536

Stevenson, J., Krycer, J. R., Phan, L., & Brown, A. J. (2013). A practical comparison of ligation-independent cloning techniques. *PLoS ONE*, *8*(12), 8–14. https://doi.org/10.1371/journal.pone.0083888

Suea-Ngam, A., Bezinge, L., Mateescu, B., Howes, P. D., Demello, A. J., & Richards, D. A. (2020). Enzyme-Assisted Nucleic Acid Detection for Infectious Disease Diagnostics: Moving toward the Point-of-Care. *ACS Sensors*, *5*(9), 2701–2723. https://doi.org/10.1021/acssensors.0c01488

Tang, H. J., Neoh, S. Z., & Sudesh, K. (2022). A review on poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) [P(3HB-co-3HHx)] and genetic modifications that affect its production. *Frontiers in Bioengineering and Biotechnology*, *10*(December). https://doi.org/10.3389/fbioe.2022.1057067

Tang, R., Weng, C., Peng, X., & Han, Y. (2020). Metabolic engineering of *Cupriavidus necator* H16 for improved chemoautotrophic growth and PHB production under oxygen-limiting conditions. *Metabolic Engineering*, *61*(January), 11–23. https://doi.org/10.1016/j.ymben.2020.04.009

Tao, Z., Yuan, H., Liu, M., Liu, Q., Zhang, S., Liu, H., Jiang, Y., Huang, D., & Wang, T. (2023). Yeast Extract: Characteristics, Production, Applications and Future Perspectives. *Journal of Microbiology and Biotechnology*, *33*(1), 151–166. https://doi.org/10.4014/jmb.2207.07057

Tarrahi, R., Fathi, Z., Seydibeyoğlu, M. Ö., Doustkhah, E., & Khataee, A. (2020). Polyhydroxyalkanoates (PHA): From production to nanoarchitecture. *International*

Journal of Biological Macromolecules, *146*(9), 596–619. https://doi.org/10.1016/j.ijbiomac.2019.12.181

Thapa, C., Shakya, P., Shrestha, R., Pal, S., & Manandhar, P. (2019). Isolation of Polyhydroxybutyrate (PHB) Producing Bacteria, Optimization of Culture Conditions for PHB production, Extraction and Characterization of PHB. *Nepal Journal of Biotechnology*, *6*(1), 62–68. https://doi.org/10.3126/njb.v6i1.22339

Vashishth, A., & Tehri, N. (2015). The role of recombinant DNA technology for human welfare. *International Journal of Research in Biological Sciences*, *5*(4), 35–39.

Wagner, J. C., Goldfless, S. J., Ganesan, S. M., Lee, M. C. S., Fidock, D. A., & Niles, J. C. (2013). An integrated strategy for efficient vector construction and multi-gene expression in *Plasmodium falciparum*. *Malaria Journal*, *12*(1), 1–2. https://doi.org/10.1186/1475-2875-12-373

Wahyuni, F. D., Sidiq, M. A., Seprianto, S., & Saraswati, H. (2022). Transformasi Plasmid Rekombinan pRI_101-AN Membawa Sisispan Gen *cryI*II melalui *Agrobacterium tumefaciens*. *Berita Biologi*, *21*(1), 71–78. https://doi.org/10.14203/beritabiologi.v21i3.4256

Wang, Y., Yin, J., & Chen, G. Q. (2014). Polyhydroxyalkanoates, challenges and opportunities. *Current Opinion in Biotechnology*, *30*, 59–65. https://doi.org/10.1016/j.copbio.2014.06.001

Wehantouw, A., Ginting, E., & Wullur, S. (2017). Identifikasi sirip ikan hiu yang didapat dari pengumpul di Minahasa Tenggara menggunakan DNA Barcode. *Jurnal Pesisir Dan Laut Tropis*, *5*(1), 62. https://doi.org/10.35800/jplt.5.1.2017.15007

Wiharyani, R., Hardianto, D., Kusumaningrum, H. P., & Budiharjo, A. (2014). Kloning Gen pcbC dari *Penicillium chrysogenum* ke dalam Plasmid pPICZA untuk Pengembangan Produksi Penisilin G. *Bioma : Berkala Ilmiah Biologi*, *16*(1), 33. https://doi.org/10.14710/bioma.16.1.33-38

Wu, H., Chen, J., & Chen, G. Q. (2016). Engineering the growth pattern and cell morphology for enhanced PHB production by *Escherichia coli. Applied Microbiology and Biotechnology*, *100*(23), 9907–9916. https://doi.org/10.1007/s00253-016-7715-1

Yang, C., Hu, S., Zhu, S., Wang, D., Gao, X., & Hong, J. (2015). Characterizing yeast promoters used in *Kluyveromyces marxianus. World Journal of Microbiology and Biotechnology*, *31*(10), 1641–1646. https://doi.org/10.1007/s11274-015-1899-x

Ylinen, A., de Ruijter, J. C., Jouhten, P., & Penttilä, M. (2022). PHB production from cellobiose with *Saccharomyces cerevisiae*. *Microbial Cell Factories*, *21*(1), 1–13. https://doi.org/10.1186/s12934-022-01845-x

Zeka, F., Vanderheyden, K., De Smet, E., Cuvelier, C. A., Mestdagh, P., & Vandesompele, J. (2016). Straightforward and sensitive RT-qPCR based gene expression analysis of FFPE samples. *Scientific Reports*, *6*(1), 2–11. https://doi.org/10.1038/srep21418

Zhang, B., Ren, L., Wang, Y., Xu, D., Zhang, S., Wang, H., Wang, H., Zeng, X., Xin, B., & Li, F. (2020). Glycerol production through TPI1 defective *Kluyveromyces marxianus* at high temperature with glucose, fructose, and xylose as feedstock. *Biochemical Engineering Journal*, *161*(April), 107689. https://doi.org/10.1016/j.bej.2020.107689

Zhang, B., Zhu, Y., Zhang, J., Wang, D., Sun, L., & Hong, J. (2017). Engineered *Kluyveromyces marxianus* for pyruvate production at elevated temperature with simultaneous consumption of xylose and glucose. *Bioresource Technology*, *224*, 553–562. https://doi.org/10.1016/j.biortech.2016.11.110

Zhang, H., Ma, S., Dou, X., Chen, R., Lu, H., Chi, Z., Xue, S., Li-Beisson, Y., & Kong, F. (2024). Harnessing Algal Peroxisomes for Efficient Poly Hydroxybutyrate Production. In *ACS Sustainable Chemistry and Engineering* (Vol. 12, Issue 8). https://doi.org/10.1021/acssuschemeng.3c07974

Zhang, M., Kurita, S., Orita, I., Nakamura, S., & Fukui, T. (2019). Modification of acetoacetyl-CoA reduction step in *Ralstonia eutropha* for biosynthesis of poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) from structurally unrelated compounds. *Microbial Cell Factories*, *18*(1), 1–12. https://doi.org/10.1186/s12934-019-1197-7

Zhang, Q., Wu, D., Lin, Y., Wang, X., Kong, H., & Tanaka, S. (2015). Substrate and product inhibition on yeast performance in ethanol fermentation. *Energy and Fuels*, *29*(2), 1019–1027. https://doi.org/10.1021/ef502349v