

## DAFTAR PUSTAKA

- Adams, C.J., Manley-Harris, M., & Molan, P.C. 2009. The origin of methylglyoxal in New Zealand manuka (*Leptospermum scoparium*) honey. Carbohydrate research. 344: 1050–1053.
- Aggad H., & Guemor D. 2014. Honey Antibacterial Activity. Medicinal & Aromatic Plants. 03:02.
- Ahn, J. S., Chandramohan, L., Liou, L. E. & Bayles, K. W. 2006. Characterization of CidR-mediated regulation in *Bacillus anthracis* reveals a previously undetected role of S-layer proteins as murein hydrolases. Molecular Microbiology. 62:1158–1169.
- Alanazi, A.M., Neidle, E.L. & Momany, C., 2013. The DNA-binding domain of BenM reveals the structural basis for the recognition of a T-N11-A sequence motif by LysR-type transcriptional regulators. Acta Crystallographica Section D: Biological Crystallography. 69:1995-2007.
- Allen, K.L., Molan, P.C., & Reid, G.M. 1991. A survey of the antibacterial activity of some New Zealand honeys. The Journal of pharmacy and pharmacology. 43: 817–822.
- Arumsari, A., Herawati, D., & Afrizal, M. (2019). Uji aktivitas antibakteri beberapa jenis madu terhadap *Pseudomonas aeruginosa* dan *Staphylococcus aureus* dengan metode difusi agar. Jurnal Ilmiah Farmasi Farmasyifa. 2:26-32.
- Ava, S., Subandiyah, S., Rohman, M.S., Ogawa, N., & Joko, T. 2022. Manuka honey reduces the virulence of *Pectobacterium brasiliense* by suppressing genes that encode plant cell wall-degrading enzymes. ASEAN Journal on science & Technology for Development. 39: 119-124.
- Axler-Diperte, G.L., Miller, V.L. & Darwin, A.J. 2006. YtxR, a conserved LysR-like regulator that induces expression of genes encoding a putative ADP-ribosyltransferase toxin homologue in *Yersinia enterocolitica*. Journal of Bacteriology. 188; 8033–8043.
- Barnett, M.J., Swanson, J.A. & Long, S.R. 1998. Multiple genetic controls on *Rhizobium meliloti* syrA, a regulator of exopolysaccharide. Abundance. Genetics. 148:19–32.
- Bartowsky, E. & Normark, S. 1993. Interactions of wild-type and mutant AmpR of *Citrobacter freundii* with target DNA. Mol Microbiol. 10:555–565.
- Bhat, K.A., Masood, S.D., Bhat, N.A., Bhat, M.A., Razvi, S.M., Mir, M.R., Sabina Akhtar, S.A., Wani, N. & Habib, M., 2010. Current status of post harvest soft rot in vegetables: a review. Asian Journal of Plant Sciences. 9: 200-208.
- Blair, S., Cokcetin, N., Harry, E. & Carter, D. 2009. The unusual antibacterial activity of medical-grade *Leptospermum* honey: antibacterial spectrum, resistance and transcriptome analysis. European journal of clinical microbiology & infectious diseases. 28:1199-1208.

- Bogdanov, S., Jurendic, T., Sieber, R., & Gallmann, P., 2008. Honey for nutrition and health: a review. *Journal of the American college of Nutrition*. 27:677-689.
- Bouzo, D., Cokcetin, N. N., Li, L., Ballerin, G., Bottomley, A. L., Lazenby, J., Whitchurch C.B., Paulsen I.T., Hassan K.A. & Harry, E. J. (2020). Characterizing the mechanism of action of an ancient antimicrobial, Manuka honey, against *Pseudomonas aeruginosa* using modern transcriptomics. *MSystems*. 5: 10-1128.
- Brumbley, S. M., Carney, B. F. & Denny, T. P. 1993. Phenotype conversion in *Pseudomonas solanacearum* due to spontaneous inactivation of PhcA, a putative LysR transcriptional regulator. *Journal of Bacteriology*. 175:5477–5487.
- Buggy, J.J., Sganga, M.W. & Bauer, C.E. 1994. Nucleotide sequence and characterization of the *Rhodobacter capsulatus* hvrB gene: HvrB is an activator of S-adenosyl-L-homocysteine hydrolase expression and is a member of the LysR *family*. *Journal of Bacteriology*. 176:61–69.
- Carter, D.A., S.E. Blair, N.N. Cokcetin, *et al.*, 2016. Therapeutic Manuka Honey : No Longer So Alternative. *Frontiers in Microbiology*. 7:569.
- Cao, H., Krishnan, G., Goumnerov, B., Tsongalis, J., Tompkins, R. & Rahme, L.G. 2001. A quorum sensing-associated virulence gene of *Pseudomonas aeruginosa* encodes a LysR-like transcription regulator with a unique self-regulatory mechanism. *Proceedings of the National Academy of Sciences*. 98:14613–14618.
- Charkowski, A.O. 2018. The changing face of bacterial soft-rot diseases. *Annual review of phytopathology*. 56:269-288.
- Charkowski, A.O. 2015. Biology and control of *Pectobacterium* in potato. *American Journal of Potato Research*. 92:223–229.
- Chotimah C., Soffan A., Joko T. 2024. Diversity of universal stress protein in Enterobacteriales and its reduced expressions on *Pectobacterium brasiliense* after manuka honey treatment. *Biodiversitas Journal of Biological Diversity*, 25:49-52
- Chugani, S.A., Parsek, M.R. & Chakrabarty, A.M. 1998. Transcriptional repression mediated by LysR-type regulator CatR bound at multiple binding sites. *Journal of Bacteriology*. 180:2367–2372.
- Coco, W.M., Rothmel, R.K., Henikoff, S. & Chakrabarty, A.M. 1993. Nucleotide sequence and initial functional characterization of the *clcR* gene encoding a LysR *family* activator of the *clcABD* chlorocatechol operon in *Pseudomonas putida*. *Journal of Bacteriology*. 175:417–427.
- Cokcetin, N.N., Pappalardo, M., Campbell, L.T., Brooks, P., Carter, D.A., Blair, S. E., & Harry, E.J. 2016. The antibacterial activity of Australian *Leptospermum* honey correlates with methylglyoxal levels. *PloS one* .11: e0167780.

- Collier, L. S., Gaines, G. L. & Neidle, E. L. 1998. Regulation of benzoate degradation in *Acinetobacter* sp. strain ADP1 by BenM, a LysR-type transcriptional activator. *Journal of Bacteriology*. 180:2493–2501.
- Craven, S. H., Ezezika, O. C., Haddad, S., Hall, R. A., Momany, C., & Neidle, E. L. 2009. Inducer responses of BenM, a LysR-type transcriptional regulator from *Acinetobacter baylyi* ADP1. *Molecular microbiology*. 72:881-894.
- Czajkowski, R., Perombelon, M.C.M., van Veen, J.A., & van der Wolf, J.M. 2011. Control of blackleg and tuber soft rot of potato caused by *Pectobacterium* and *Dickeya* species: a review. *Plant Pathology*. 60: 999–1013.
- da Silva PM, Gauche C, Gonzaga LV, Costa ACO, Fett R. 2016. Honey: chemical composition, stability and authenticity. *Food Chemistry*. 196: 309 –323.
- Deghmane, A. E., Petit, S., Topilko, A., Pereira, Y., Giorgini, D., Larribe, M. & Taha, M. K. 2000. Intimate adhesion of *Neisseria meningitidis* to human epithelial cells is under the control of the *crgA* gene, a novel LysR-type transcriptional regulator. *The EMBO Journal*. 19:1068– 1078.
- Dienel, G. A. 2014. Energy metabolism in the brain. In *From molecules to networks*. Academic Press. 53-117pp.
- Dover, N. & Padan, E. 2001. Transcription of *nhaA*, the main Na<sup>+</sup>/ H<sup>+</sup> antiporter of *Escherichia coli*, is regulated by Na<sup>+</sup> and growth phase. *Journal of Bacteriology*. 183: 644–653.
- Duarte, V., De Boer, S.H., Ward, L.J., & de Oliveira, A.M.R. 2004. Characterization of atypical *Erwinia carotovora* strains causing blackleg of potato in Brazil. *Journal of Application Microbiology*. 96: 535 – 545.
- Du Raan, S., Coutinho, T.A., & Van der Waals, J.E. 2016. Cardinal temperature differences, determined in vitro, between closely related species and subspecies of pectinolytic bacteria responsible for blackleg and soft rot on potatoes. *European Journal of Plant Pathology*. 144: 361-369.
- Ezezika, O.C., Collier-Hyams, L.S., Dale, H.A., Burk, A.C. & Neidle, E.L. 2006. CatM regulation of the benABCDE operon: functional divergence of two LysR-type paralogs in *Acinetobacter baylyi* ADP1. *Applied and Environmental Microbiology*. 72:1749–1758.
- Farr, S. B. & Kogoma, T. 1991. Oxidative stress responses in *Escherichia coli* and *Salmonella typhimurium*. *Microbiol Reviews*. 55: 561–585.
- Fauzia RA, Joko T. 2021. Characterization of pto-like protein kinase disease resistance genes in orchid. *Asian Journal of Plant Sciences*. 20:281–290.
- Fujimoto T, Yasuoka S, Aono Y, Nakayama T, Ohki T, Sayama M, *et al.*, 2016. First report of potato blackleg caused by *Pectobacterium carotovorum* subsp. *brasiliense* in Japan. *Plant Disease*. 101:241.
- Ganz, T. 2003. Defensins: antimicrobial peptides of innate immunity. *Nature Reviews Immunology*. 3: 710-720.

- Geertz, M. and Maerkl, S.J., 2010. Experimental strategies for studying transcription factor–DNA binding specificities. *Briefings in functional genomics*, 9(5-6), pp.362-373.
- Girma, A., Seo, W., & She, R.C. 2019. Antibacterial activity of varying UMF-graded Manuka honeys. *PLoS One* 14:e0224495.
- Gokul, G.G., Louis, V., Namitha, P.M., Mathew, D., Girija, D., Shylaja, M.R., Abida, P.S. 2019. Variability of *Pectobacterium carotovorum* causing rhizome rot in banana. *Biocatal. Agriculture Biotechnology*. 17: 60–81
- Goldberg, M. B., Boyko, S. A. & Calderwood, S. B. 1991. Positive transcriptional regulation of an iron-regulated virulence gene in *Vibrio cholerae*. *Proceeding of the National Academy of Science USA*.88:1125–1129.
- Guillouard, I., Auger, S., Hullo, M. F., Chetouani, F., Danchin, A. & Martin-Verstraete, I. 2002. Identification of *Bacillus subtilis* CysL, a regulator of the *cysJI* operon, which encodes sulfite reductase. *J Bacteriol* .184:4681–4689.
- Habeeb, L. F., Wang, L. & Winans, S. C. 1991. Transcription of the octopine catabolism operon of the *Agrobacterium* tumor-inducing plasmid pTiA6 is activated by a LysR-type regulatory protein. *Molecular Plant Microbe Interact*. 4:379–385
- Hall, T.A. 1999. BioEdit: a user-friendly biological sequence alignment editor and analysis program for Windows 95/98/NT. *Nucleic acids symposium series*. 41:95-98.
- Hammond, E.N. & Donkor, E.S. 2013. Antibacterial effect of Manuka honey on *Clostridium difficile*. *BMC Res Notes*. 6:188.
- Harris, S. J., Shih, Y. L., Bentley, S. D., & Salmond, G. P. 1998. The *hexA* gene of *Erwinia carotovora* encodes a LysR homologue and regulates motility and the expression of multiple virulence determinants. *Molecular microbiology*. 28: 705-717.
- Henikoff, S., Haughn, G. W., Calvo, J. M., & Wallace, J. 1988. A large family of bacterial activator proteins. *Proceedings of the National Academy of Sciences*. 85: 6602-6606.
- Heo J, Lee JY, Kim W. 2020. Bayesian information criterion accounting for the number of covariance parameters in mixed effects models. *Communication for Statistical Applications and Methods*. 27 (3): 301-311.
- Hérault, E., Reverchon, S., & Nasser, W. 2014. Role of the LysR-type transcriptional regulator PecT and DNA supercoiling in the thermoregulation of *pel* genes, the major virulence factors in *Dickeya dadantii*. *Environmental microbiology*. 16: 734-745.
- Hernández-Lucas, I., Gallego-Hernández, A. L., Encarnación, S., Fernández-Mora, M., Martínez-Batallar, A.G., Salgado, H., Oropeza, R. & Calva, E. 2008. The LysR-type transcriptional regulator LeuO controls expression of several genes in *Salmonella enterica* serovar Typhi. *Journal of Bacteriology* 190, 1658–1670.

- Heroven, A. K., Bohme, K., Tran-Winkler, H. & Dersch, P. 2007. Regulatory elements implicated in the environmental control of invasins expression in enteropathogenic *Yersinia*. *Advances in Experimental Medicine and Biology*. 603:156–166.
- Housseini B Issa K, Phan G, Broutin I. 2018. Functional mechanism of the efflux pumps transcription regulators from *Pseudomonas aeruginosa* based on 3D structures. *Front Molecular Bioscience* 5:57.
- Hutchings, M.I., Truman, A.W., & Wilkinson, B. 2019. Antibiotics: past, present and future. *Current opinion in microbiology*. 51: 72–80.
- Irish, J, Blair, S, Carter, DA. 2011. The antibacterial activity of honey derived from Australian flora. *PLoS One* 6:e18229.
- Istiqomah, D., Joko, T., & Ogawa, N. 2023. A Brief Overview of LacI-Family Transcriptional Regulators in Bacteria. *Reviews in Agricultural Science*. 11: 310-325.
- Iyoda, S., Honda N., Saitoh, T., Shimuta K., Terajima J., Watanabe H., & Ohnishi M. 2011. Coordinate control of the locus of enterocyte effacement and enterohemolysin genes by multiple common virulence regulators in enterohemorrhagic *Escherichia coli*. *Infection and immunity* 79:4628-4637.
- Jenkins, R., Burton, N., & Cooper, R. 2011. Effect of manuka honey on the expression of universal stress protein A in methicillin-resistant *Staphylococcus aureus*. *International Journal of Antimicrobial Agents*. 37: 373–376.
- Jenkins, R., Burton, N. & Cooper, R. 2014. Proteomic and genomic analysis of methicillin-resistant *Staphylococcus aureus* (MRSA) exposed to manuka honey in vitro demonstrated down-regulation of virulence markers. *Journal of Antimicrobial Chemotherapy*. 69:603-615.
- Johnston, M., McBride, M., Dahiya, D., Owusu-Apenten, R., & Nigam, PS. 2018. Antibacterial activity of Manuka honey and its components: An overview. *AIMS Microbiology*. 4: 655-664.
- Joko, T., A. Subandi, N. Kusumandari, A. Wibowo, 2014. Activities of plant cell wall-degrading enzymes by bacterial soft rot of orchid. *Arch.of.Phytopathology.Plant Protection*. 47:1239-1250.
- Jones, R. M., Britt-Compton, B. & Williams, P. A. 2003. The naphthalene catabolic (nag) genes of *Ralstonia* sp. strain U2 are an operon that is regulated by NagR, a LysR-type transcriptional regulator. *Journal of Bacteriology*. 185:5847–5853.
- Kato, Y., Umeda, N., Maeda, A., Matsumoto, D., Kitamoto, N., & Kikuzaki, H. 2012. Identification of a novel glycoside, leptosin, as a chemical marker of manuka honey. *Journal of agricultural and food chemistry*. 60: 3418–3423.
- Kim, J., Kim, J. G., Kang, Y., Jang, J. Y., Jog, G. J., Lim, J. Y., Kim, S., Suga, H., Nagamatsu, T. & Hwang, I. 2004. Quorum sensing and the LysR-type transcriptional activator ToxR regulate toxoflavin biosynthesis and transport in *Burkholderia glumae*. *Mol Microbiol* 54:921–934.

- Klair, D., Silva, J., Arizala, D., Boluk, G., Dobhal, S., Ahmad, A. & Arif, M. 2021. First Report of *Pectobacterium brasiliense* causing soft rot on mizuna (*Brassica rapa* var. *japonica*) in the United States. *Plant Disease*. 105:4149.
- Ko, M. an& Park, C., 2000. H-NS-Dependent regulation of flagellar synthesis is mediated by a LysR *family* protein. *Journal of Bacteriology*. 182:4670-4672.
- Koentjoro MP, Adachi N., Senda M., Ogawa N., & Senda T. 2018. Crystal structure of the DNA-binding domain of the LysRtype transcriptional regulator CbnR in complex with a DNA fragment of the recognition-binding site in the promoter region. *The FEBS J.* 285: 977-989
- Kot, B., Sytykiewicz, H., Sprawka, I., & Witeska, M., 2020. Effect of manuka honey on biofilm-associated genes expression during methicillin-resistant *Staphylococcus aureus* biofilm formation. *Scientific reports*. 10:13552.
- Kovach, T. K. .2014. Jacob-Monod: The lac operon. In *Gene control*. Retrieved from <https://www.khanacademy.org/test-prep/mcat/biomolecules/gene-control/v/jacob-monod-the-lac-operon>.
- Kovaleva, G. Y. & Gelfand, M. S. 2007. Transcriptional regulation of the methionine and cysteine transport and metabolism in streptococci. *FEMS Microbiol Letters*. 276: 207–215.
- Kubheka, G.C., Coutinho, T.A., Moleleki, N., & Moleleki, L.N. 2013. Colonization patterns of an mCherry-tagged *Pectobacterium carotovorum* subsp. *brasiliense* strain in potato plants. *Phytopathology*. 103:1268-1279.
- Kumar, A., Hunjan, M.S., Kaur, H., Dhillon, H.K. & Singh, P.P., 2017. Biochemical responses associated with resistance to bacterial stalk rot caused by *Dickeya zea* in maize. *Journal of Phytopathology*. 165:822-832.
- Kwakman PHS, & Zaat S. 2012. Antibacterial components of honey. *IUBMB Life*. 64:48 –55.
- Lehnen, D., Blumer, C., Polen, T., Wackwitz, B., Wendisch, V. F. & Uden, G. 2002. LrhA as a new transcriptional key regulator of flagella, motility and chemotaxis genes in *Escherichia coli*. *Molecular Microbiology*. 45: 521–532.
- Le S.Q., & Gascuel O. 2008. An improved general amino acid replacement matrix. *Molecular Biology and Evolution*. 25 : 1307-1320.
- Litwin, C.M. & Quackenbush, J. 2001. Characterization of a *Vibrio vulnificus* LysR homologue, HupR, which regulates expression of the haem uptake outer membrane protein, HupA. *Microbial Pathogenesis*. 31:295–307.
- Livak, K.J. & T.D. Schmittgen. 2001. Analysis of relative gene expression data using realtime quantitative PCR and the  $2^{-\Delta\Delta CT}$  method . *Methods*. 25:402–40.
- Lu, Z., Takeuchi, M. & Sato, T. 2007. The LysR-type transcriptional regulator YofA controls cell division through the regulation of expression of *ftsW* in *Bacillus subtilis*. *Journal of Bacteriology*. 189: 5642–5651.
- Lu, J., Carter, D.A., Turnbull, L., Rosendale, D., Hedderley, D., Stephens, J., Gannabathula, S., Steinhorn, G., Schlothauer, R.C., Witchurch, C.B., &

- Harry, E.J. 2013. The effect of new zealand kanuka, manuka and clover honeys on bacterial growth dynamics and cellular morphology varies according to the species. *PLoS ONE*. 8: e55898
- Ma, B., Hibbing, M. E., Kim, H. S., Reedy, R. M., Yedidia, I., Breuer, J.,. 2007. Host range and molecular phylogenies of the soft rot enterobacterial genera *Pectobacterium* and *Dickeya*. *Phytopathology*. 97:1150–1163.
- Maddocks SE & Oyston PCF .2008. Structure and function of the LysR–type transcriptional regulator (LTTR) *family* proteins. *Microbiology*, 154: 3609-3623
- Mavric, E., Wittmann, S., Barth, G., & Henle, T. 2008. Identification and quantification of methylglyoxal as the dominant antibacterial constituent of Manuka (*Leptospermum scoparium*) honeys from New Zealand. *Molecular nutrition & food research* 52: 483–489.
- Meng, X., A. Chai, Y. Shi, X. Xie, Z. Ma, & Li B, 2017. Emergence of bacterial soft rot in cucumber caused by *Pectobacterium carotovorum* subsp. *brasiliense* in China. *Plant.Disease*. 101:279-287.
- Modrzejewska, M., Kawalek, A., & Bartosik, A.A., 2021. The LysR-type transcriptional regulator BsrA (PA2121) controls vital metabolic pathways in *Pseudomonas aeruginosa*. *Msystems*. 6:10-1128.
- Molan PC & Russell KM. 1988. Non-peroxide antibacterial activity in some New Zealand honeys. *Journal of Apicultural Research*. 27:62– 67.
- Morrison, D.A., 2006. Phylogenetic analyses of parasites in the new millennium. *Advances in Parasitology*. 19:479-539.
- Mukherjee, S., Chaki, S., Das, S., Sen, S., Dutta, S.K., & Dastidar, S.G. 2011. Distinct synergistic action of piperacillin and methylglyoxal against *Pseudomonas aeruginosa*. *Indian Journal of Experimental Biology*. 49:547-551.
- Muduli, S., Karmakar, S., & Mishra, S. 2023. The coordinated action of the enzymes in the L-lysine biosynthetic pathway and how to inhibit it for antibiotic targets. *Biochimica et Biophysica Acta (BBA)-General Subjects*. 1867:130320.
- Nandineni, M. R. & Gowrishankar, J. 2004. Evidence for an arginine exporter encoded by *yggA* (*argO*) that is regulated by the LysR-type transcriptional regulator *ArgP* in *Escherichia coli*. *Journal of Bacteriology*. 186:3539–3546.
- Nolan VC, Harrison, J. & Jonathan A.G.C. 2019. Dissecting the Antimicrobial Composition of Honey. *Antibiotics*. 8:251.
- Onkendi, E.M., A.M. Ramesh, S. Kwenda, S. Naidoo, & L. Moleleki. 2016. Draft genome sequence of a virulent *Pectobacterium carotovorum* subsp. *brasiliense* isolate causing soft rot of cucumber. *Genome Announcements*.4.
- Oulghazi, S., Moumni, M., Khayi, S., Robic, K., Sarfraz, S., Lopez-Roques, C., Vandecasteele, C., & Faure, D. 2020. Diversity of *Pectobacteriaceae*

- species in potato growing regions in Northern Morocco. *Microorganisms*. 8:895.
- Park, W., Jeon, C.O. & Madsen, E.L. 2002. Interaction of NahR, a LysR-type transcriptional regulator, with the alpha subunit of RNA polymerase in the naphthalene degrading bacterium, *Pseudomonas putida* NCIB 9816-4. *FEMS Microbiology Letters*. 213:159–165.
- Park, H., Do, E., Kim, M., Park, H.J., Lee, J., & Han, S.W. 2020. A LysR-type transcriptional regulator LcrX is involved in virulence, biofilm formation, swimming motility, siderophore secretion, and growth in sugar sources in *Xanthomonas axonopodis* pv. *glycines*. *Frontiers in Plant Science*. 10:1657.
- Peng, H. L., Shiou, S. R. & Chang, H. Y. 1999. Characterization of mdcR, a regulatory gene of the malonate catabolic system in *Klebsiella pneumoniae*. *Journal of Bacteriology*. 181:2302–2306.
- Pevsner, J. 2009. *Bioinformatics and functional genomics*, Second edition. John Wiley & Sons. 1109p.
- Picossi, S., Belitsky, B.R. & Sonenshein, A.L. 2007. Molecular mechanism of the regulation of *Bacillus subtilis* gltAB expression by GltC. *Journal Molecular Biology*. 365:1298–1313.
- Popović, T., I. Kostić, Z. Milićević, *et al.*, 2017. Essential oils as an alternative bactericides against soft-rot bacteria, *Pectobacterium carotovorum* subsp. *carotovorum*. VIII.In.Sci.Agric.Symp.“Agrosym 2017”, Jahorina, Bosnia Herzegovina, B Proc. 2017:1377-1383.
- Portier, P., Pédrón, J., Taghouti, G., Fischer-Le Saux, M., Caullireau, E., Bertrand, C., Laurent, A., Chawki, K., Oulgazi, S., Moumni, M., Andrivon, D., Dutrieux, C., Faure, D., Hélias, V., & Barny, M. A. 2019. Elevation of *Pectobacterium carotovorum* subsp. *odoriferum* to species level as *Pectobacterium odoriferum* sp. nov., proposal of *Pectobacterium brasiliense* sp. nov. and *Pectobacterium actinidiae* sp. nov., emended description of *Pectobacterium carotovorum* and description of *Pectobacterium versatile* sp. nov., isolated from streams and symptoms on diverse plants. *International journal of systematic and evolutionary microbiology*. 69: 3207–3216.
- Rabie, E., J.C. Serem, H.M. Oberholzer, A.R.M.Gaspar, & M.J. Bester. 2016. How methylglyoxal kills bacteria: An ultrastructural study. *Ultrastructural Pathology* 40:107-111.
- Rashid, M. M., Ikawa, Y., & Tsuge, S. 2016. GamR, the LysR-type galactose metabolism regulator, regulates hrp gene expression via transcriptional activation of two key hrp regulators, HrpG and HrpX, in *Xanthomonas oryzae* pv. *oryzae*. *Applied and Environmental Microbiology*. 82:3947–3958.
- Raskin, C., Ge´rard, C., Donfut, S., Giannotta, E., Van Driessche, G., Van Beeumen, J. & Dusart, J. 2003. BlaB, a protein involved in the regulation of *Streptomyces cacaoi* b-lactamases, is a penicillin-binding protein. *Cellular and Molecular Life Sciences CMLS*. 60: 1460–1469.

- Renault, P., Gaillardin, C. & Heslot, H. 1989. Product of the *Lactococcus lactis* gene required for malolactic fermentation is homologous to a *family* of positive regulators. *Journal of bacteriology*. 171:3108–3114.
- Renna, M.C., Najimudin, N., Winik, L.R. & Zahler, S.A. 1993. Regulation of the *Bacillus subtilis* *alsS*, *alsD*, and *alsR* genes involved in post-exponential-phase production of acetoin. *Journal of Bacteriology*. 175: 3863–3875.
- Roberts, A.E., Maddocks, S.E. & Cooper, R.A. 2014. Manuka honey reduces the motility of *Pseudomonas aeruginosa* by suppression of flagella-associated genes. *Journal of Antimicrobial Chemotherapy*. 70:716-725.
- Roberts, A., Brown, H.L., & Jenkins, R. 2015. On the antibacterial effects of Manuka honey: mechanistic insights. *Research and Reports in Biology*. 6:215-224.
- Schneider, C.A., W.S. Rasband, & K.W. Eliceiri. 2012. NIH Image to ImageJ: 25 years of image analysis. *Nature methods*. 9:671-675.
- Schlaman, H.R., Okker, R.J. & Lugtenberg, B.J. 1992. Regulation of nodulation gene expression by NodD in rhizobia. *Journal of Bacteriology*. 174:5177–5182.
- Sheehan, B.J. & Dorman, C.J. 1998. In vivo analysis of the interactions of the LysR-like regulator SpvR with the operator sequences of the *spvA* and *spvR* virulence genes of *Salmonella typhimurium*. *Molecular Microbiology*. 30:91–105.
- Shelver, D., Rajagopal, L., Harris, T.O. & Rubens, C.E. 2003. MtaR, a regulator of methionine transport, is critical for survival of group B streptococcus in vivo. *Journal of bacteriology*. 185:6592–6599.
- Sibeijn, M., & Pequito S. 2022. A time-reversed model selection approach to time series forecasting. *Scientific Reports*. 12: 10912.
- Sojka, M., Valachova, I., Bucekova, M., & Majtan, J. 2016. Antibiofilm efficacy of honey and bee-derived defensin-1 on multispecies wound biofilm. *Journal of Medical Microbiology*. 65:337-344.
- Sperandio, V., Li, C.C. & Kaper, J. B. 2002. Quorum-sensing *Escherichia coli* regulator A: a regulator of the LysR *family* involved in the regulation of the locus of enterocyte effacement pathogenicity island in enterohemorrhagic *E. coli*. *Infection and Immunity*. 70:3085–3093.
- Stec, E., Witkowska-Zimny, M., Hryniewicz, M.M., Neumann, P., Wilkinson, A.J., Brzozowski, A.M., Verma, C.S., Zaim, J., Wysocki, S., Bujacz, G.D. 2006. Structural basis of the sulphate starvation response in *E. coli*: crystal structure and mutational analysis of the cofactor-binding domain of the Cbl transcriptional regulator. *Journal of Molecular Biology*. 364:309–322.
- Stragier, P., Richaud, F., Borne, F. & Patte, J. C. 1983. Regulation of diaminopimelate decarboxylase synthesis in *Escherichia coli*. I. Identification of a *lysR* gene encoding an activator of the *lysA* gene. *Journal of Molecular Biology*. 168: 307–320.

- Sturny, R., Cam, K., Gutierrez, C. & Conter, A., 2003. NhaR and RcsB independently regulate the *osmCp1* promoter of *Escherichia coli* at overlapping regulatory sites. *Journal of bacteriology*. 185:4298-4304.
- Sun, H., Wang, M., Liu, Y., Wu, P., Yao, T., Yang, W., Yang, Q., Yan, J. & Yang, B., 2022. Regulation of flagellar motility and biosynthesis in enterohemorrhagic *Escherichia coli* O157: H7. *Gut Microbes*. 14:2110822.
- Sundin, G.W., & N. Wang, 2018. Antibiotic Resistance in Plant-Pathogenic Bacteria. *Annual Review of Phytopathology*. 56:161–80.
- Sung, Y. C. & Fuchs, J. A. 1992. The *Escherichia coli* K-12 *cyn* operon is positively regulated by a member of the *lysR* family. *Journal of Bacteriology*. 174, 3645–3650.
- Surgey, N., Robert-Baudouy, J., & Condemine, G. 1996. The *Erwinia chrysanthemi* *pecT* gene regulates pectinase gene expression. *Journal of Bacteriology*. 178:1593-1599.
- Suryanto D. & Suwanto A. 2000. Seleksi dan Isolasi Bakteri Pengurai Senyawa Hidrokarbon Aromatik. *Jurnal Mikrobiologi Indonesia*. 5:39-42.
- Suzuki, K., Uchiyama, T., Suzuki, M., Nikaidou, N., Regue, M. & Watanabe, T. 2001. LysR-type transcriptional regulator ChiR is essential for production of all chitinases and a chitin-binding protein, CBP21, in *Serratia marcescens* 2170. *Bioscience, Biotechnology, and Biochemistry*. 65:338–347.
- Tamura, K., Stecher, G., & Kumar, S. 2021. MEGA6: Molecular Evolutionary Genetics Analysis Version 11. *Molecular Biology and Evolution*. 38:3022–3027.
- Taylor, J.L., De Silva, R.S., Kovacicova, G., Lin, W., Taylor, R.K., Skorupski, K. & Kull F.J. 2012 The crystal structure of AphB, a virulence gene activator from *Vibrio cholerae*, reveals residues that influence its response to oxygen and pH. *Biophysical Journal*. 102: 75a.
- Thai, S.N.M., Lum, M.R., Naegle, J., Onofre, M., Abdulla, H., Garcia, A., Fiterz, A., Arnell, A., Lwin, T.T., Kavanaugh, A. & Hikmat, Z. 2021. Multiple copies of *flhDC* in *paraburkholderia unamae* regulate flagellar gene expression, motility, and biofilm formation. *Journal of Bacteriology*, 203:10-1128.
- Van der Berg, A.J., van den Worm, E., van Ufford, H.C., Halkes, S.B., Hoekstra, M.J., & Beukelman, C.J. 2008. An in vitro examination of the antioxidant and anti-inflammatory properties of buckwheat honey. *Journal of wound care* 17: 172–178.
- Van der Meer, J.R., Frijters, A.C., Leveau, J. H., Eggen, R. I., Zehnder, A. J. & de Vos, W. M. 1991. Characterization of the *Pseudomonas* sp. strain P51 gene *tcbR*, a LysR-type transcriptional activator of the *tcbCDEF* chlorocatechol oxidative operon, and analysis of the regulatory region. *Journal of Bacteriology*. 173:3700–3708.
- Van der Merwe, J.J., Coutinho, T.A., Korsten, L., & van der Waals, J.E. 2010. *Pectobacterium carotovorum* subsp. *brasiliensis* causing blackleg on

potatoes in South Africa. *European Journal of Plant Pathology*. 126:175–185.

- Van der Ploeg, J.R., Iwanicka-Nowicka, R., Kertesz, M.A., Leisinger, T. & Hryniewicz, M.M. 1997. Involvement of CysB and Cbl regulatory proteins in expression of the tauABCD operon and other sulfate starvation-inducible genes in *Escherichia coli*. *Journal of Bacteriology*. 179: 7671– 7678.
- Van Keulen, G., Ridder, A.N., Dijkhuizen, L. & Meijer, W.G. 2003. Analysis of DNA binding and transcriptional activation by the LysR-type transcriptional regulator CbbR of *Xanthobacter flavus*. *Journal of Bacteriology* 185:1245–1252.
- Viale, A.M., Kobayashi, H., Akazawa, T. & Henikoff, S. 1991. rbcR, a gene coding for a member of the LysR family of transcriptional regulators, is located upstream of the expressed set of ribulose 1,5- bisphosphate carboxylase/oxygenase genes in the photosynthetic bacterium *Chromatium vinosum*. *Journal of Bacteriology*. 173:5224–5229.
- Von Lintig, J., Kreuzsch, D. & Schroder, J. 1994. Opine-regulated promoters and LysR-type regulators in the nopaline (noc) and octopine (occ) catabolic regions of Ti plasmids of *Agrobacterium tumefaciens*. *Journal of Bacteriology*.. 176: 495–503.
- Wasfi, R., Elkhatib, W.F. & Khairalla, A.S. 2016. Effects of selected Egyptian honeys on the cellular ultrastructure and the gene expression profile of *Escherichia coli*. *PloS one*. 11:0150984.
- Wek, R.C. & Hatfield, G.W.1988. Transcriptional activation at adjacent operators in the divergent-overlapping ilvY and ilvC promoters of *Escherichia coli*. *Journal of Molecular Biology*. 203:643–663.
- Werra, P.D., F. Bussereau, A. Keiser, & D. Ziegler, 2015. First report of potato blackleg caused by *Pectobacterium carotovorum* subsp. *brasiliense* in Switzerland. *Plant Disease*. 99:551.
- Windhovel, U. & Bowien, B. 1991. Identification of cfxR, an activator gene of autotrophic CO<sub>2</sub> fixation in *Alcaligenes eutrophus*. *Molecular Microbiology*. 5:2695–2705.
- Yang, S.J., Rice, K.C., Brown, R.J., Patton, T.G., Liou, L.E., Park, Y.H. & Bayles, K.W. 2005. A LysR-type regulator, CidR, is required for induction of the *Staphylococcus aureus* cidABC operon. *Journal of Bacteriology*.187:5893–5900.
- Zaim J, & Kierzek AM. 2003. The structure of full-length LysR-type transcriptional regulators. Modeling of the full-length OxyR transcription factor dimer. *Nucleic acids research*. 31: 1444-1454.
- Zhao, Y., Blumer, S.E., & Sundin, G.W. 2005. Identification of *Erwinia amylovora* genes induced during infection of immature pear tissue. *Journal of Bacteriology*. 187:8088-8103.