

## REFERENCES

- Abreu, G. E. A., Aguilar, M. E. H., Covarrubias, D. H., & Durán, F. R. (2020). Amantadine as a drug to mitigate the effects of COVID-19. *Medical Hypotheses*, 140(April), 1–3. <https://doi.org/10.1016/j.mehy.2020.109755>
- Adams, Y., Olsen, R. W., Bengtsson, A., Dalgaard, N., Zdioruk, M., Satpathi, S., Behera, P. K., Sahu, P. K., Lawler, S. E., Qvortrup, K., Wassmer, S. C., & Jensen, A. T. R. (2021). *Plasmodium falciparum* erythrocyte membrane protein 1 variants induce cell swelling and disrupt the blood-brain barrier in cerebral malaria. *Journal of Experimental Medicine*, 218(3). <https://doi.org/10.1084/JEM.20201266>
- Adovelande, J., & Schrével, J. (1996). Carboxylic ionophores in malaria chemotherapy: The effects of monensin and nigericin on *Plasmodium falciparum* in vitro and *Plasmodium vinckei petteri* in vivo. *Life Sciences*, 59(20), 309 - 315. . [https://doi.org/10.1016/S0024-3205\(96\)00514-0](https://doi.org/10.1016/S0024-3205(96)00514-0)
- Aguiar, A. C. C., da Rocha, E. M. M., de Souza, N. B., França, T. C. C., & Krettli, A. U. (2012). New approaches in antimalarial drug discovery and development - A Review. *Memorias Do Instituto Oswaldo Cruz*, 107(7), 831–845. <https://doi.org/10.1590/S0074-02762012000700001>
- Ale, M. T., Mikkelsen, J. D., & Meyer, A. S. (2011). Important determinants for fucoidan bioactivity: A critical review of structure-function relations and extraction methods for fucose-containing sulfated polysaccharides from brown seaweeds. In *Marine Drugs*. <https://doi.org/10.3390/md9102106>
- Alimuddin, Asmara, W., Widada, J., & Nurjismi, R. (2010). An Actinomycetes producing anticandida isolated from Cajuput Rhizosphere: partial identification of isolates and amplification of PKS-I genes. *Indonesian Journal of Biotechnology*, 15(1), 1–8.
- Alimuddin, Widada, J., Asmara, W., & Mustofa. (2011). Antifungal production of a strain of Actinomycetes spp isolated from the rhizosphere of Cajuput Plant: selection and detection of exhibiting activity against tested fungi. *Indonesian Journal of Biotechnology*, 16(1), 1–10. <https://doi.org/10.22146/ijbiotech.7829>
- Allocati, N., Masulli, M., Di Ilio, C., & Federici, L. (2018a). Glutathione transferases: Substrates, inhibitors and pro-drugs in cancer and neurodegenerative diseases. In *Oncogenesis*. <https://doi.org/10.1038/s41389-017-0025-3>
- Allocati, N., Masulli, M., Di Ilio, C., & Federici, L. (2018b). Glutathione transferases: Substrates, inhibitors and pro-drugs in cancer and neurodegenerative diseases. *Oncogenesis*, 7(1). <https://doi.org/10.1038/s41389-017-0025-3>
- Aminake, M., & Pradel, G. (2013). Antimalarial drugs resistance in *Plasmodium falciparum* and the current strategies to overcome them. *Microbial Pathogens and Strategies for Combating Them: Science, Technology and Education*, 1(January), 269–282.
- Anand, P., Kunnumakara, A. B., Sundaram, C., Harikumar, K. B., Tharakan, S.

- T., Lai, O. S., Sung, B., & Aggarwal, B. B. (2008). Cancer is a preventable disease that requires major lifestyle changes. *Pharmaceutical Research*, 25(9), 2097–2116. <https://doi.org/10.1007/s11095-008-9661-9>
- Antony, H. A., & Parija, S. C. (2016). Antimalarial drug resistance: An overview. In *Tropical Parasitology*. <https://doi.org/10.4103/2229-5070.175081>
- Arakawa, K., Sugino, F., Kodama, K., Ishii, T., & Kinashi, H. (2005). Cyclization mechanism for the synthesis of macrocyclic antibiotic lankacidin in *Streptomyces rochei*. *Chemistry and Biology*, 12(2), 249 - 256. <https://doi.org/10.1016/j.chembiol.2005.01.009>
- Araújo, R., Aranda-Martínez, J. D., & Aranda-Abreu, G. E. (2020). Amantadine Treatment for People with COVID-19. *Archives of Medical Research*, 51(7), 739–740. <https://doi.org/10.1016/j.arcmed.2020.06.009>
- Asada, A., Doi, T., Takeda, A., & Kajimura, K. (2012). Quantification of 1,3-dimethylol-5,5-dimethylhydantoin and its decomposition products in cosmetics by high-performance liquid chromatography. *Journal of Pharmaceutical and Biomedical Analysis*, 67–68, 163–168. <https://doi.org/10.1016/j.jpba.2012.04.039>
- Aydoğan, C. (2020). Recent advances and applications in LC-HRMS for food and plant natural products: a critical review. *Analytical and Bioanalytical Chemistry*, 412(9), 1973–1991. <https://doi.org/10.1007/s00216-019-02328-6>
- Aziz, R. K., Bartels, D., Best, A., DeJongh, M., Disz, T., Edwards, R. A., Formsma, K., Gerdes, S., Glass, E. M., Kubal, M., Meyer, F., Olsen, G. J., Olson, R., Osterman, A. L., Overbeek, R. A., McNeil, L. K., Paarmann, D., Paczian, T., Parrello, B., ... Zagnitko, O. (2008). The RAST Server: Rapid annotations using subsystems technology. *BMC Genomics*, 9(1), 1 - 15. <https://doi.org/10.1186/1471-2164-9-75>
- Banti, C. N., Kourkoumelis, N., Hatzidimitriou, A. G., Antoniadou, I., Dimou, A., Rallis, M., Hoffmann, A., Schmidtke, M., McGuire, K., Busath, D., Kolocouris, A., & Hadjikakou, S. K. (2020). Amantadine copper(II) chloride conjugate with possible implementation in influenza virus inhibition. *Polyhedron*, 185. <https://doi.org/10.1016/j.poly.2020.114590>
- Baranasich, D., Gacesa, R., Starcevic, A., Zucko, J., Blažič, M., Horvat, M., Gjuračić, K., Fujs, Š., Hranueli, D., Kosec, G., Cullum, J., & Petković, H. (2013). Draft genome sequence of *Streptomyces rapamycinicus* strain NRRL 5491, the producer of the immunosuppressant rapamycin. *Genome Announcements* 1(4), e00581 - 13. <https://doi.org/10.1128/genomeA.00581-13>
- Barka, E. A., Vatsa, P., Sanchez, L., Gaveau-Vaillant, N., Jacquard, C., Klenk, H.-P., Clément, C., Ouhdouch, Y., & van Wezel, G. P. (2016). Taxonomy, physiology, and natural products of Actinobacteria. *Microbiology and Molecular Biology Reviews* 80(1), 1 - 43.
- Becher, P. G., Verschut, V., Bibb, M. J., Bush, M. J., Molnár, B. P., Barane, E., Al-Bassam, M. M., Chandra, G., Song, L., Challis, G. L., Buttner, M. J., & Flärdh, K. (2020). Developmentally regulated volatiles geosmin and 2-methylisoborneol attract a soil arthropod to *Streptomyces* bacteria promoting spore dispersal. *Nature Microbiology* 5(6), 821 - 829.

- <https://doi.org/10.1038/s41564-020-0697-x>
- Beck, C., Garzón, J. F. G., & Weber, T. (2020). Recent advances in re-engineering modular PKS and NRPS assembly lines. In *Biotechnology and Bioprocess Engineering 2020*, 1 - 9. <https://doi.org/10.1007/s12257-020-0265-5>
- Bejon, P., Andrews, L., Hunt-Cooke, A., Sanderson, F., Gilbert, S. C., & Hill, A. V. S. (2006). Thick blood film examination for *Plasmodium falciparum* malaria has reduced sensitivity and underestimates parasite density. *Malaria Journal*, 5, 5–8. <https://doi.org/10.1186/1475-2875-5-104>
- Bérdy, J. (2012). Thoughts and facts about antibiotics: where we are now and where we are heading. In *Journal of Antibiotics* 65(8), 385 - 395. <https://doi.org/10.1038/ja.2012.27>
- Bian, H. B., Pan, X., Yang, J. S., Wang, Z. X., & De, W. (2011). Upregulation of microRNA-451 increases cisplatin sensitivity of non-small cell lung cancer cell line (A549). *Journal of Experimental and Clinical Cancer Research*, 30(1), 1–11. <https://doi.org/10.1186/1756-9966-30-20>
- Blin, K., Shaw, S., Steinke, K., Villebro, R., Ziemert, N., Lee, S. Y., Medema, M. H., & Weber, T. (2019). AntiSMASH 5.0: updates to the secondary metabolite genome mining pipeline. *Nucleic Acids Research* 47(1), 81 - 87. <https://doi.org/10.1093/nar/gkz310>
- Bloland, P. B. (2001). Drug resistance in malaria (WHO/CDS/CSR/DRS/2001.4). [Http://Whqlibdoc.Who.Int/Hq/2001/WHO\\_CDS\\_CSR\\_DRS\\_2001.4.Pdf](http://Whqlibdoc.Who.Int/Hq/2001/WHO_CDS_CSR_DRS_2001.4.Pdf), World Health Organization.
- Braña, A. F., Sarmiento-Vizcaíno, A., Pérez-Victoria, I., Martín, J., Otero, L., Palacios-Gutiérrez, J. J., Fernández, J., Mohamedi, Y., Fontanil, T., Salmón, M., Cal, S., Reyes, F., García, L. A., & Blanco, G. (2019). Desertomycin G, a new antibiotic with activity against *Mycobacterium tuberculosis* and human breast tumor cell lines produced by *Streptomyces althioticus* MSM3, isolated from the cantabrian sea intertidal macroalgae *Ulva* sp. *Marine Drugs* 17(2), 114. <https://doi.org/10.3390/md17020114>
- Burrows, J. N., Hooft Van Huijsduijnen, R., Möhrle, J. J., Oeuvray, C., & Wells, T. N. (2013). Designing the next generation of medicines for malaria control and eradication. *Malaria Journal*, 12(1), 1–20. <https://doi.org/10.1186/1475-2875-12-187>
- Bursy, J., Kuhlmann, A. U., Pittelkow, M., Hartmann, H., Jebbar, M., Pierik, A. J., & Bremer, E. (2008). Synthesis and uptake of the compatible solutes ectoine and 5-hydroxyectoine by *Streptomyces coelicolor* A3(2) in response to salt and heat stresses. *Applied and Environmental Microbiology* 74(23), 7286 - 7296. <https://doi.org/10.1128/AEM.00768-08>
- Butturini, E., Carcereri De Prati, A., Boriero, D., & Mariotto, S. (2019). Natural sesquiterpene lactones enhance chemosensitivity of tumor cells through redox Regulation of STAT3 signaling. *Oxidative Medicine and Cellular Longevity*, 2019. <https://doi.org/10.1155/2019/4568964>
- Challis, G. L. (2014). Exploitation of the *Streptomyces coelicolor* A3(2) genome sequence for discovery of new products and biosynthetic pathways. *Journal Industrial Microbiology and Biotechnology* 41, 219–232.

- Chandrakar, S., & Gupta, A. K. (2019). Actinomycin-producing endophytic *Streptomyces parvulus* associated with root of *Aloe vera* and optimization of conditions for antibiotic production. *Probiotics and Antimicrobial Proteins*, 11(3), 1055–1069. <https://doi.org/10.1007/s12602-018-9451-6>
- Chaube, U. J., Rawal, R., Jha, A. B., Variya, B., & Bhatt, H. G. (2021). Design and development of Tetrahydro-Quinoline derivatives as dual mTOR-C1/C2 inhibitors for the treatment of lung cancer. *Bioorganic Chemistry*, 106(August 2020). <https://doi.org/10.1016/j.bioorg.2020.104501>
- Chawsheen, M. A., & Dash, P. R. (2021). mTOR modulates resistance to gemcitabine in lung cancer in an MTORC2 dependent mechanism. *Cellular Signalling*, 81(February). <https://doi.org/10.1016/j.cellsig.2021.109934>
- Chen, T. R., Drabkowski, D., Hay, R. J., Macy, M., & Peterson, W. (1987). WiDr is a derivative of another colon adenocarcinoma cell line, HT-29. *Cancer Genetics and Cytogenetics*, 27(1), 125–134. [https://doi.org/10.1016/0165-4608\(87\)90267-6](https://doi.org/10.1016/0165-4608(87)90267-6)
- Choi, S. S., Kim, H. J., Lee, H. S., Kim, P., & Kim, E. S. (2015). Genome mining of rare actinomycetes and cryptic pathway awakening. In *Process Biochemistry*. <https://doi.org/10.1016/j.procbio.2015.04.008>
- Chu, M., Yarborough, R., Schwartz, J., Patel, M. G., Horan, A. C., Gullo, V. P., Das, P. R., & Puar, M. S. (1993). Sch 47554 and Sch 47555, two novel antifungal antibiotics produced from a *Streptomyces* sp. *Journal of Antibiotics*, 46(5), 861–865. <https://doi.org/10.7164/antibiotics.46.861>
- Cortés-Funes, H., & Coronado, C. (2007). Role of anthracyclines in the era of targeted therapy. *Cardiovascular Toxicology*, 7(2), 56–60. <https://doi.org/10.1007/s12012-007-0015-3>
- Couto, N., Wood, J., & Barber, J. (2016). The role of glutathione reductase and related enzymes on cellular redox homeostasis network. *Free Radical Biology and Medicine*, 95, 27–42. <https://doi.org/10.1016/j.freeradbiomed.2016.02.028>
- Crespo-Ortiz, M. P., & Wei, M. Q. (2012). Antitumor activity of artemisinin and its derivatives: From a well-known antimalarial agent to a potential anticancer drug. *Journal of Biomedicine and Biotechnology*, 2012. <https://doi.org/10.1155/2012/247597>
- Cruz-Coke, R. (2016). WHO, World Malaria Report 2016. In *Geneva, Switzerland, 2016*. (Vol. 0, Issue 0). <https://doi.org/10.4135/9781452276151.n221>
- D'Alessandro, S., Corbett, Y., Ilboudo, D. P., Misiano, P., Dahiya, N., Abay, S. M., Habluetzel, A., Grande, R., Gismondo, M. R., Decherig, K. J., Koolen, K. M. J., Sauerwein, R. W., Taramelli, D., Basilico, N., & Parapini, S. (2015). Salinomycin and other ionophores as a new class of antimalarial drugs with transmission-blocking activity. *Antimicrobial Agents and Chemotherapy*, 59(9), 5135–5144. <https://doi.org/10.1128/AAC.04332-14>
- Dahl, E. L., & Rosenthal, P. J. (2007). Multiple antibiotics exert delayed effects against the *Plasmodium falciparum* apicoplast. *Antimicrobial Agents and Chemotherapy*, 51(10), 3485–3490. <https://doi.org/10.1128/AAC.00527-07>
- Dalisay, D. S., Williams, D. E., Wang, X. L., Centko, R., Chen, J., & Andersen,



- R. J. (2013). Marine sediment-derived *Streptomyces* bacteria from British Columbia, Canada are a promising microbiota resource for the discovery of Antimicrobial Natural Products. *PLoS ONE*.  
<https://doi.org/10.1371/journal.pone.0077078>
- Damayanti, E., Nisa, K., Handayani, S., Dewi, R. T., Febriansah, R., Mustofa, Dinoto, A., & Widada, J. (2020). Cytotoxicity and molecular mechanism of marine-derived *Streptomyces* sp. GMY01 on human lung cancer cell line A549. *Journal of Applied Pharmaceutical Science*, 11(06), 46–55.  
<https://doi.org/10.7324/japs.2021.110605>
- Das, A. (2015). Anticancer effect of antimalarial artemisinin compounds. *Annals of Medical and Health Sciences Research*. <https://doi.org/10.4103/2141-9248.153609>
- Davies, W. L., Grunert, R. R., Haff, R. F., Mcgahen, J. W., Neumayer, E. M., Paulshock, M., Watts, J. C., Wood, T. R., Hermann, E. C., & Hoffmann, C. E. (1964). Antiviral activity of 1-adamantanamine (amantadine). *Science*.  
<https://doi.org/10.1126/science.144.3620.862>
- de Carvalho, L. P., Kreidenweiss, A., & Held, J. (2021). Drug repurposing: A review of old and new antibiotics for the treatment of malaria: Identifying antibiotics with a fast onset of antiplasmodial action. *Molecules*, 26(8).  
<https://doi.org/10.3390/molecules26082304>
- Dhaneesha, M., Benjamin Naman, C., Krishnan, K. P., Sinha, R. K., Jayesh, P., Joseph, V., Bright Singh, I. S., Gerwick, W. H., & Sajeewan, T. P. (2017). *Streptomyces artemisiae* MCCB 248 isolated from Arctic fjord sediments has unique PKS and NRPS biosynthetic genes and produces potential new anticancer natural products. *3 Biotech*, 7(1). <https://doi.org/10.1007/s13205-017-0610-3>
- Dobson, L. F., O’Cleirigh, C. C., & O’Shea, D. G. (2008). The influence of morphology on geldanamycin production in submerged fermentations of *Streptomyces hygroscopicus* var. *geldanus*. *Applied Microbiology and Biotechnology* 79(5), 859 - 866. <https://doi.org/10.1007/s00253-008-1493-3>
- Du, Y., Wang, Y., Huang, T., Tao, M., Deng, Z., & Lin, S. (2014). Identification and characterization of the biosynthetic gene cluster of polyoxypeptin A, a potent apoptosis inducer. *BMC Microbiology*, 14(1), 1–12.  
<https://doi.org/10.1186/1471-2180-14-30>
- Duru, V., Witkowski, B., & Ménard, D. (2016). Review article *Plasmodium falciparum* resistance to artemisinin derivatives and piperazine: A major challenge for malaria elimination in Cambodia. In *American Journal of Tropical Medicine and Hygiene* 95(6), 1228.  
<https://doi.org/10.4269/ajtmh.16-0234>
- Elsayed, E. A., Farid, M. A., & El-Enshasy, H. A. (2019). Enhanced Natamycin production by *Streptomyces natalensis* in shake-flasks and stirred tank bioreactor under batch and fed-batch conditions. *BMC Biotechnology*, 19(1), 1–13. <https://doi.org/10.1186/s12896-019-0546-2>
- Evans, S. G., & Havlik, I. (1994). In vitro drug interaction between amantadine and classical antimalarial drugs in *Plasmodium falciparum* infections. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 88,

- 683–686. [https://doi.org/https://doi.org.ezproxy.ugm.ac.id/10.1016/0035-9203\(94\)90229-1](https://doi.org/https://doi.org.ezproxy.ugm.ac.id/10.1016/0035-9203(94)90229-1)
- F. Thorn, C., Oshiro, C., Marsh, S., Hernandez-Boussard, T., McLeod, H., E. Klein, T., & B. Altman, R. (2011). Doxorubicin pathways: pharmacodynamics and adverse effects. *Pharmacogenet Genomics*, 21(7), 440–446. <https://doi.org/10.1097/FPC.0b013e32833ffb56>. Doxorubicin
- Farida, Y., Widada, J., & Meiyanto, E. (2007). Combination methods for screening marine Actinomycetes producing potential compounds as anticancer. *Indonesian Journal of Biotechnology*, 12(2), 988–997. <https://doi.org/10.22146/ijbiotech.7772>
- Felsenstein, J. (1985). Confidence limits on phylogenies: an approach using the bootstrap. *Evolution*, 39(4). <https://doi.org/10.2307/2408678>
- Férir, G., Hänchen, A., François, K. O., Hoorelbeke, B., Huskens, D., Dettner, F., Süßmuth, R. D., & Schols, D. (2012). Feglymycin, a unique natural bacterial antibiotic peptide, inhibits HIV entry by targeting the viral envelope protein gp120. *Virology*, 433(2), 308–319.
- Ferreira, L. G., Dos Santos, R. N., Oliva, G., & Andricopulo, A. D. (2015). Molecular docking and structure-based drug design strategies. In *Molecules* (Vol. 20, Issue 7). <https://doi.org/10.3390/molecules200713384>
- Finch, R. A., Revankar, G. R., & Chan, P. K. (1997). Structural and functional relationships of toyocamycin on NPM-translocation. *Anti-Cancer Drug Design*.
- Florento, L., Matias, R., Tuaño, E., Santiago, K., Cruz, F. Dela, & Tuazon, A. (2012). Comparison of cytotoxic activity of anticancer drugs against various human tumor cell lines using in vitro cell-based approach. *International Journal of Biomedical Science*, 8(1), 76–80.
- Fong, K. Y., & Wright, D. W. (2013). Hemozoin and antimalarial drug discovery. *Future Medicinal Chemistry*, 5(12), 1437–1450. <https://doi.org/10.4155/fmc.13.113>
- Fujiwara, T., Takahashi, Y., Matsumoto, K., & Kondo, E. (1980). Production of a new aminoglycoside antibiotic by a mutant of *Bacillus circulans*. *The Journal of Antibiotics*. <https://doi.org/10.7164/antibiotics.33.836>
- Fukui, Y., & Sawabe, T. (2007). Improved one-step colony PCR detection of *Vibrio harveyi*. *Microbes and Environments*, 22(1), 1–10. <https://doi.org/10.1264/jsme2.22.1>
- Gaillard, T., Dormoi, J., Madamet, M., & Pradines, B. (2016). Macrolides and associated antibiotics based on similar mechanism of action like lincosamides in malaria. *Malaria Journal*, 15(1), 1–11. <https://doi.org/10.1186/s12936-016-1114-z>
- Gaillard, T., Madamet, M., Tsombeng, F. F., Dormoi, J., & Pradines, B. (2016). Antibiotics in malaria therapy: which antibiotics except tetracyclines and macrolides may be used against malaria? In *Malaria Journal* 15(1), 1 - 10. <https://doi.org/10.1186/s12936-016-1613-y>
- Ganot, N., Meker, S., Reytman, L., Tzuber, A., & Tshuva, E. Y. (2013). Anticancer metal complexes: synthesis and cytotoxicity evaluation by the MTT assay. *Journal of Visualized Experiments: JoVE*, 81, 1–6.

<https://doi.org/10.3791/50767>

- Ghanem, N. B., Sabry, S. A., El-Sherif, Z. M., & Abu El-Ela, G. A. (2000). Isolation and enumeration of marine actinomycetes from seawater and sediments in Alexandria. *Journal of General and Applied Microbiology*, 46(3), 105–111. <https://doi.org/10.2323/jgam.46.105>
- Ghosh, A., Verma, A. K., Tingirikari, J. R., Shukla, R., & Goyal, A. (2015). Recovery and purification of oligosaccharides from copra meal by recombinant Endo- $\beta$ -mannanase and deciphering molecular mechanism involved and its role as potent therapeutic agent. *Molecular Biotechnology*, 57(2), 111–127. <https://doi.org/10.1007/s12033-014-9807-4>
- Gomez-Escribano, J. P., Castro, J. F., Razmilic, V., Chandra, G., Andrews, B., Asenjo, J. A., & Bibb, M. J. (2015). The *Streptomyces leeuwenhoekii* genome: De novo sequencing and assembly in single contigs of the chromosome, circular plasmid pSLE1 and linear plasmid pSLE2. *BMC Genomics* 16(1), 1 - 11. <https://doi.org/10.1186/s12864-015-1652-8>
- Goreshnik, I., Brock, A. M., & Maly, D. J. (2011). Biochemical and pharmacological profiling of the pro-survival protein BCL-XL. *Bioorganic and Medicinal Chemistry Letters* 21(17), 4951 - 4955.
- Goto, T., Toya, Y., & Kondo, T. (1980). Structure of amipurimycin, a new nucleoside antibiotic produced by *Streptomyces novoguineensis*. *Nucleic Acids Symposium Series* 8, 73 - 74.
- GÜLLER, P. (2021). The in vitro and in silico inhibition mechanism of glutathione reductase by resorcinol derivatives: a molecular docking study. *Journal of Molecular Structure*, 1228. <https://doi.org/10.1016/j.molstruc.2020.129790>
- Haldar, K., Bhattacharjee, S., & Safeukui, I. (2018). Drug resistance in Plasmodium. *Nature Reviews Microbiology*, 16(3), 156–170. <https://doi.org/10.1038/nrmicro.2017.161>
- Haldar, S., & Nazareth, S. W. (2018). Taxonomic diversity of bacteria from mangrove sediments of Goa: metagenomic and functional analysis. 3 *Biotech*. <https://doi.org/10.1007/s13205-018-1441-6>
- Hall, B. F., & Fauci, A. S. (2009). Malaria control, elimination, and eradication: The role of the evolving biomedical research agenda. *Journal of Infectious Diseases*, 200(11), 1639–1643. <https://doi.org/10.1086/646611>
- Hall, T. (2013). BioEdit version 7.2. 5. *Ibis Biosciences, Carlsbad, CA, USA*.
- Handayani, I., Ratnakomala, S., Lisdiyanti, P., Alanjary, M., Wohlleben, W., & Mast, Y. (2018). Complete genome sequence of *Streptomyces* sp. strain BSE7F, a Bali mangrove sediment actinobacterium with antimicrobial activities. *Genome Announcement* 6(26), e00618 - 18. <https://doi.org/10.1128/genomeA.00618-18>
- Handayani, I., Ratnakomala, S., Lisdiyanti, P., Fahrurrozi, Kusharyoto, W., Alanjary, M., Ort-Winklbauer, R., Kulik, A., Wohlleben, W., & Mast, Y. (2018). Complete genome sequence of *Streptomyces* sp. strain SHP22-7, a new species isolated from mangrove of Enggano Island, Indonesia. *Microbiology Resource Announcements* 7(20), e01317 - 18. <https://doi.org/10.1128/mra.01317-18>

- Handayani, I., Saad, H., Ratnakomala, S., Lisdiyanti, P., Kusharyoto, W., Krause, J., Kulik, A., Wohlleben, W., Aziz, S., Gross, H., Gavriilidou, A., Ziemert, N., & Mast, Y. (2021). Mining Indonesian microbial biodiversity for novel natural compounds by a combined genome mining and molecular networking approach. *Marine Drugs* 19(6), 316.
- Hansen, M. B., Nielsen, S. E., & Berg, K. (1989). Re-examination and further development of a precise and rapid dye method for measuring cell growth/cell kill. *Journal of Immunological Methods* 119(2), 203 - 210. [https://doi.org/10.1016/0022-1759\(89\)90397-9](https://doi.org/10.1016/0022-1759(89)90397-9)
- Harinantenaina Rakotondraibe, L., Rasolomampianina, R., Park, H. Y., Li, J., Slebochnik, C., Brodie, P. J., Blasiak, L. C., Hill, R., Tendyke, K., Shen, Y., Cassera, M. B., Rejo, F., & Kingston, D. G. I. (2015a). Antiproliferative and antiplasmodial compounds from selected *Streptomyces* species. *Bioorganic and Medicinal Chemistry Letters* 25(23), 5646 - 5649
- Harinantenaina Rakotondraibe, L., Rasolomampianina, R., Park, H. Y., Li, J., Slebochnik, C., Brodie, P. J., Blasiak, L. C., Hill, R., Tendyke, K., Shen, Y., Cassera, M. B., Rejo, F., & Kingston, D. G. I. (2015b). Antiproliferative and antiplasmodial compounds from selected *Streptomyces* species. *Bioorganic and Medicinal Chemistry Letters*, 25(23), 5646–5649. <https://doi.org/10.1016/j.bmcl.2015.07.103>
- Harwaldt, P., Rahlfs, S., & Becker, K. (2002). Glutathione S-transferase of the malarial parasite *Plasmodium falciparum*: Characterization of a potential drug target. *Biological Chemistry*. <https://doi.org/10.1515/BC.2002.086>
- Hardini, C., Hartanto, S., Mubarika, S., Hariwiyanto, B., Wijayanti, N., Hosoyama, A., Yamazoe, A., Nojiri, H., & Widada, J. (2015). Diversity of nonribosomal peptide synthetase genes in the anticancer producing Actinomycetes isolated from marine sediment in Indonesia. *Indonesian Journal of Biotechnology*, 20(1), 34. <https://doi.org/10.22146/ijbiotech.15266>
- Hardini, C., Mubarika, S., Hariwiyanto, B., Wijayanti, N., Hosoyama, A., Yamazoe, A., Nojiri, H., & Widada, J. (2017a). Secondary bioactive metabolite gene clusters identification of anticandida-producing *Streptomyces* sp. GMR22 isolated from Wanagama forest as revealed by Genome mining approach. *Indonesian Journal of Pharmacy* 28(1), 26 - 33. <https://doi.org/10.14499/indonesianjpharm28iss1pp26>
- Hardini, C., Mubarika, S., Hariwiyanto, B., Wijayanti, N., Hosoyama, A., Yamazoe, A., Nojiri, H., & Widada, J. (2017b). Secondary bioactive metabolite gene clusters identification of anticandida-producing *Streptomyces* sp. GMR22 isolated from Wanagama forest as revealed by Genome mining approach. *Indonesian Journal of Pharmacy*, 28(1), 26–33. <https://doi.org/10.14499/indonesianjpharm28iss1pp26>
- Hiller, N., Fritz-Wolf, K., Deponte, M., Wende, W., Zimmermann, H., & Becker, K. (2006). *Plasmodium falciparum* glutathione S-transferase-structural and mechanistic studies on ligand binding and enzyme inhibition . *Protein Science*. <https://doi.org/10.1110/ps.051891106>
- Hobbs, G., Obanye, A. I. C., Petty, J., Mason, J. C., Barratt, E., Gardner, D. C. J., Flett, F., Smith, C. P., Broda, P., & Oliver, S. G. (1992). An integrated

- approach to studying regulation of production of the antibiotic methylenomycin by *Streptomyces coelicolor* A3(2). *Journal of Bacteriology*, 174(5), 1487–1494. <https://doi.org/10.1128/jb.174.5.1487-1494.1992>
- Housman, G., Byler, S., Heerboth, S., Lapinska, K., Longacre, M., Snyder, N., & Sarkar, S. (2014). Drug resistance in cancer: An overview. *Cancers*, 6(3), 1769–1792. <https://doi.org/10.3390/cancers6031769>
- Huang, H., Yang, T., Ren, X., Liu, J., Song, Y., Sun, A., Ma, J., Wang, B., Zhang, Y., Huang, C., Zhang, C., & Ju, J. (2012). Cytotoxic angucycline class glycosides from the deep sea actinomycete *Streptomyces lusitanus* SCSIO LR32. *Journal of Natural Products*. <https://doi.org/10.1021/np2008335>
- Huang, Z. (2000). Bcl-2 family proteins as targets for anticancer drug design. In *Oncogene*. <https://doi.org/10.1038/sj.onc.1204087>
- Ibrahim, A. A., El-Housseiny, G. S., Aboshanab, K. M., Yassien, M. A., & Hassouna, N. A. (2019). Paromomycin production from *Streptomyces rimosus* NRRL 2455: Statistical optimization and new synergistic antibiotic combinations against multidrug resistant pathogens. *BMC Microbiology*, 19(1), 1–15. <https://doi.org/10.1186/s12866-019-1390-1>
- Ichinose, K., Ozawa, M., Itou, K., Kunieda, K., & Ebizuka, Y. (2003). Cloning, sequencing and heterologous expression of the medermycin biosynthetic gene cluster of *Streptomyces* sp. AM-7161: Towards comparative analysis of the benzoisochromanquinone gene clusters. *Microbiology*, 149(7), 1633–1645. <https://doi.org/10.1099/mic.0.26310-0>
- Ikeda, H., Ishikawa, J., Hanamoto, A., Shinose, M., Kikuchi, H., Shiba, T., Sakaki, Y., Hattori, M., & Omura, S. (2003). Complete genome sequence and comparative analysis of the industrial microorganism *Streptomyces avermitilis*. *Nature Biotechnology*. <https://doi.org/10.1038/nbt820>
- Intaraudom, C., Bunbamrung, N., Dramaee, A., Danwisetkanjana, K., Rachtawee, P., & Pittayakhajonwut, P. (2015). Antimalarial and antimycobacterial agents from *Streptomyces* sp. BCC27095. *Tetrahedron Letters*, 56(49), 6875–6877. <https://doi.org/10.1016/j.tetlet.2015.10.098>
- Intaraudom, C., Rachtawee, P., Suvannakad, R., & Pittayakhajonwut, P. (2011). Antimalarial and antituberculosis substances from *Streptomyces* sp. BCC26924. *Tetrahedron*, 67(39), 7593–7597. <https://doi.org/10.1016/j.tet.2011.07.053>
- Isaka, M., Jaturapat, A., Kramyu, J., Tanticharoen, M., & Thebtaranonth, Y. (2002). Potent in vitro antimalarial activity of metacycloprodigiosin isolated from *Streptomyces spectabilis* BCC 4785. *Antimicrobial Agents and Chemotherapy* 46(4), 1112 - 1113. <https://doi.org/10.1128/AAC.46.4.1112-1113.2002>
- Izumiyama, S., Omura, M., Takasaki, T., Ohmae, H., & Asahi, H. (2009). *Plasmodium falciparum*: Development and validation of a measure of intraerythrocytic growth using SYBR Green I in a flow cytometer. *Experimental Parasitology*, 121(2), 144–150. <https://doi.org/10.1016/j.exppara.2008.10.008>
- Jana, U. K., Suryawanshi, R. K., Prajapati, B. P., & Kango, N. (2021). Prebiotic mannooligosaccharides: Synthesis, characterization and bioactive properties.



- Food Chemistry*, 342(March 2020).  
<https://doi.org/10.1016/j.foodchem.2020.128328>
- Jia, X. Y., Tian, Z. H., Shao, L., Qu, X. D., Zhao, Q. F., Tang, J., Tang, G. L., & Liu, W. (2006). Genetic characterization of the chlorothricin gene cluster as a model for spirotetronate antibiotic biosynthesis. *Chemistry and Biology*, 13(6), 575–585. <https://doi.org/10.1016/j.chembiol.2006.03.008>
- Jia, X., Zhang, C., Qiu, J., Wang, L., Bao, J., Wang, K., Zhang, Y., Chen, M., Wan, J., Su, H., Han, J., & He, C. (2015). Purification, structural characterization and anticancer activity of the novel polysaccharides from *Rhynchosia minima* root. *Carbohydrate Polymers*. <https://doi.org/10.1016/j.carbpol.2015.05.059>
- Jiang, J., He, X., & Cane, D. E. (2007). Biosynthesis of the earthy odorant geosmin by a bifunctional *Streptomyces coelicolor* enzyme. *Nature Chemical Biology*. <https://doi.org/10.1038/nchembio.2007.29>
- Kaneda, S., Hour-Young, C., Yazawa, K., Takahashi, K., Mikami, Y., & Arai, T. (1986). Antitumor activity of new semisynthetic saframycin derivatives. *Japanese Journal of Cancer Research GANN*. [https://doi.org/10.20772/cancersci1985.77.10\\_1043](https://doi.org/10.20772/cancersci1985.77.10_1043)
- Kanini, G. S., Katsifas, E. A., Savvides, A. L., & Karagouni, A. D. (2013). *Streptomyces rochei* ACTA1551, an indigenous greek isolate studied as a potential biocontrol agent against *Fusarium oxysporum* f.sp. *lycopersici*. *BioMed Research International*. <https://doi.org/10.1155/2013/387230>
- Kanth, B. K., Liou, K., & Sohng, J. K. (2010). Homology modeling, binding site identification and docking in flavone hydroxylase CYP105P2 in *Streptomyces peucetius* ATCC 27952. *Computational Biology and Chemistry*, 34(4), 226–231. <https://doi.org/10.1016/j.compbiolchem.2010.08.002>
- Kautsar, S. A., Blin, K., Shaw, S., Weber, T., & Medema, M. H. (2020). BiG-FAM: the biosynthetic gene cluster families database. *Nucleic Acids Research*. <https://doi.org/10.1093/nar/gkaa812>
- Kemenkes RI. (2019). Tatalaksana Kasus Malaria Terkini. *Kementerian Kesehatan RI*.
- Khan, T., Lawrence, A. J., Azad, I., Raza, S., & Khan, A. R. (2018). Molecular docking simulation with special reference to flexible docking approach. *JSM Chem*, 6(1), 1053. <http://zinc.docking.org/>
- Kinfe, H. H., Moshapo, P. T., Makolo, F. L., Gammon, D. W., Ehlers, M., & Schmuck, C. (2014). Preparation and antimalarial activity of a novel class of carbohydrate-derived, fused thiochromans. *European Journal of Medicinal Chemistry* 87, 197 - 202. <https://doi.org/10.1016/j.ejmech.2014.09.060>
- Kinghorn, A. D., Chin, Y. W., & Swanson, S. M. (2009). Discovery of natural product anticancer agents from biodiverse organisms. In *Current Opinion in Drug Discovery and Development* 12(2), 189.
- Klapschinski, T. A., Rabe, P., & Dickschat, J. S. (2016). Pristinol, a sesquiterpene alcohol with an unusual skeleton from *Streptomyces pristinaespiralis*. *Angewandte Chemie - International Edition* 55(34), 10141 - 10144. <https://doi.org/10.1002/anie.201605425>

- Komaki, H., Sakurai, K., Hosoyama, A., Kimura, A., Igarashi, Y., & Tamura, T. (2018). Diversity of nonribosomal peptide synthetase and polyketide synthase gene clusters among taxonomically close *Streptomyces* strains. *Scientific Reports* 8(1), 1 - 11. <https://doi.org/10.1038/s41598-018-24921-y>
- Kong, F., & Carter, G. T. (2003). Structure determination of glycosins A to D, further evidence for the cyclic structure of the amphotycin antibiotics. *Journal of Antibiotics*, 56(6), 557–564. <https://doi.org/10.7164/antibiotics.56.557>
- Krogstad, D. J., Schlesinger, P. H., & Herwaldt, B. L. (1988). Antimalarial agents: Mechanism of chloroquine resistance. *Antimicrobial Agents and Chemotherapy*, 32(6), 799–801. <https://doi.org/10.1128/AAC.32.6.799>
- Kruk, J., Aboul-Enein, B., Bernstein, J., & Marchlewicz, M. (2017). Dietary alkylresorcinols and cancer prevention: a systematic review. *European Food Research and Technology*, 243(10), 1693–1710. <https://doi.org/10.1007/s00217-017-2890-6>
- Kumar, N., Afjei, R., Massoud, T. F., & Paulmurugan, R. (2018). Comparison of cell-based assays to quantify treatment effects of anticancer drugs identifies a new application for Bodipy-L-cystine to measure apoptosis. *Scientific Reports*, 8(1), 1–11. <https://doi.org/10.1038/s41598-018-34696-x>
- Kumar, R., Musiyenko, A., & Barik, S. (2003). The heat shock protein 90 of *Plasmodium falciparum* and antimalarial activity of its inhibitor, geldanamycin. *Malaria Journal*, 2, 1–11. <https://doi.org/10.1186/1475-2875-2-1>
- Kumar, S., Stecher, G., Li, M., Knyaz, C., & Tamura, K. (2018). MEGA X: Molecular evolutionary genetics analysis across computing platforms. *Molecular Biology and Evolution*. <https://doi.org/10.1093/molbev/msy096>
- Kumar, V., Bharti, A., Gusain, O., & Bisht, G. S. (2011). Scanning electron microscopy of *Streptomyces* without use of any chemical fixatives. *Scanning*, 33(6), 446–449. <https://doi.org/10.1002/sca.20261>
- Lai, Z., Yu, J., Ling, H., Song, Y., Yuan, J., Ju, J., Tao, Y., & Huang, H. (2018). Grincamycins I-K, cytotoxic cngucycline glycosides derived from marine-derived Actinomycete *Streptomyces lusitanus* SCSIO LR32. *Planta Medica*. <https://doi.org/10.1055/s-0043-119888>
- Lambros, C., & Vanderberg, J. P. (1979). Synchronization of *Plasmodium falciparum* erythrocytic stages in culture. *Journal of Parasitology*. <https://doi.org/10.2307/3280287>
- LI, C., LI, X., TANG, C., YI, H., & DUAN, C. (2006). Screen biomarkers of human lung squamous carcinoma by serological proteome analysis of HTB-182. *Transactions of Nonferrous Metals Society of China*, 16(30500558), s839–s844. [https://doi.org/10.1016/s1003-6326\(06\)60311-7](https://doi.org/10.1016/s1003-6326(06)60311-7)
- Li, L., Ma, T., Liu, Q., Huang, Y., Hu, C., & Liao, G. (2013). Improvement of daptomycin production in *Streptomyces roseosporus* through the acquisition of pleuromutilin resistance. *BioMed Research International*, 2013. <https://doi.org/10.1155/2013/479742>
- Liang, J. Bin, Chen, Y. Q., Lan, C. Y., Tam, N. F. Y., Zan, Q. J., & Huang, L. N. (2007). Recovery of novel bacterial diversity from mangrove sediment.

- Marine Biology* 150(5), 739-747. <https://doi.org/10.1007/s00227-006-0377-2>
- Lin, X., & Cane, D. E. (2009). Biosynthesis of the sesquiterpene antibiotic albaflavenone in *Streptomyces coelicolor*. mechanism and stereochemistry of the enzymatic formation of epi-isozizaene. *Journal of the American Chemical Society* 131(18), 6332-6333. <https://doi.org/10.1021/ja901313v>
- Lisewski, A. M., Quiros, J. P., Mittal, M., Putluri, N., Sreekumar, A., Haeggström, J. Z., & Lichtarge, O. (2018). Potential role of *Plasmodium falciparum* exported protein 1 in the chloroquine mode of action. *International Journal for Parasitology: Drugs and Drug Resistance*, 8(1), 31–35. <https://doi.org/10.1016/j.ijpddr.2017.12.003>
- López-Terrada, D., Cheung, S. W., Finegold, J. M., & Knowles, B. B. (2009). Hep G2 is a hepatoblastoma-derived cell line. *Human Pathology*, 40(10), 1510–1512. <https://doi.org/10.1016/j.humpath.2009.06.015>
- Low, Z. J., Pang, L. M., Ding, Y., Cheang, Q. W., Hoang, K. L. M., Tran, H. T., Li, J., Liu, X. W., Kanagasundaram, Y., Yang, L., & Liang, Z. X. (2018). Identification of a biosynthetic gene cluster for the polyene macrolactam sceliphrolactam in a *Streptomyces* strain isolated from mangrove sediment. *Scientific Reports* 8(1), 1-13. <https://doi.org/10.1038/s41598-018-20018-8>
- Luo, L., Cai, J., Wang, C., Lin, J., Du, X., Zhou, A., & Xiang, M. (2016). Purification and characterization of an alkaliphilic endo-xylanase from *Streptomyces althioticus* LMZM and utilization in the pulp paper industry. *Journal of Chemical Technology and Biotechnology* 91(4), 1093-1098. <https://doi.org/10.1002/jctb.4690>
- Machado, M., Murtinheira, F., Lobo, E., & Nogueira, F. (2016). Whole-cell SYBR Green I assay for antimalarial activity assessment. *Ann Clin Med Microbio*, 2(1), 1010.
- Madumo, G. K., Moshapo, P. T., & Kinfe, H. H. (2018). Effects of lipophilicity, protecting group and stereochemistry on the antimalarial activity of carbohydrate-derived thiochromans. *Medicinal Chemistry Research* 27(3), 817 - 833. <https://doi.org/10.1007/s00044-017-2105-5>
- Mandala, S. M., Thornton, R. A., Milligan, J., Rosenbach, M., Garcia-Calvo, M., Bull, H. G., Harris, G., Abruzzo, G. K., Flattery, A. M., Gill, C. J., Bartizal, K., Dreikorn, S., & Kurtz, M. B. (1998). Rustmicin, a potent antifungal agent, inhibits sphingolipid synthesis at inositol phosphoceramide synthase. *Journal of Biological Chemistry*, 273(24), 14942–14949. <https://doi.org/10.1074/jbc.273.24.14942>
- Mangoyi, R., Hayeshi, R., Ngadjui, B., Ngandeu, F., Bezabih, M., Abegaz, B., Razafimahefa, S., Rasoanaivo, P., & Mukanganyama, S. (2010a). Glutathione transferase from *Plasmodium falciparum* - Interaction with malagashanine and selected plant natural products. *Journal of Enzyme Inhibition and Medicinal Chemistry* 25(6), 854 - 862. <https://doi.org/10.3109/14756366.2010.486793>
- Mangoyi, R., Hayeshi, R., Ngadjui, B., Ngandeu, F., Bezabih, M., Abegaz, B., Razafimahefa, S., Rasoanaivo, P., & Mukanganyama, S. (2010b). Glutathione transferase from *Plasmodium falciparum* - Interaction with malagashanine and selected plant natural products. *Journal of Enzyme*

- Inhibition and Medicinal Chemistry*, 25(6), 854–862.  
<https://doi.org/10.3109/14756366.2010.486793>
- Mansoori, B., Mohammadi, A., Davudian, S., Shirjang, S., & Baradaran, B. (2017). The different mechanisms of cancer drug resistance: A brief review. *Advanced Pharmaceutical Bulletin*, 7(3), 339–348.  
<https://doi.org/10.15171/apb.2017.041>
- Matsuura, K., & Wakae, O. (1977). *Streptomyces novoguineensis* sp. Nov., an amipurimycin producer, and antimicrobial activity of amipurimycin. *The Journal of Antibiotics* 30(1), 1-10. <https://doi.org/10.7164/antibiotics.30.1>
- Mbaba, M., de la Mare, J. A., Sterrenberg, J. N., Kajewole, D., Maharaj, S., Edkins, A. L., Isaacs, M., Hoppe, H. C., & Khanye, S. D. (2019). Novobiocin–ferrocene conjugates possessing anticancer and antiplasmodial activity independent of HSP90 inhibition. *Journal of Biological Inorganic Chemistry* 24(2), 139 - 149. <https://doi.org/10.1007/s00775-018-1634-9>
- McAlpine, J. B., Bachmann, B. O., Pirae, M., Tremblay, S., Alarco, A. M., Zazopoulos, E., & Farnet, C. M. (2005). Microbial genomics as a guide to drug discovery and structural elucidation: ECO-02301, a novel antifungal agent, as an example. *Journal of Natural Products*, 68(4), 493–496. <https://doi.org/10.1021/np0401664>
- Meier-Kolthoff, J. P., & Göker, M. (2019). TYGS is an automated high-throughput platform for state-of-the-art genome-based taxonomy. *Nature Communications*. <https://doi.org/10.1038/s41467-019-10210-3>
- Mikuni, K., Nakanishi, K., Hara, K., Hara, K., Iwatani, W., Amano, T., Nakamura, K., Tsuchiya, Y., Okumoto, H., & Mandai, T. (2008). In vivo antitumor activity of novel water-soluble taxoids. *Biological and Pharmaceutical Bulletin*. <https://doi.org/10.1248/bpb.31.1155>
- Mirabelli, P., Coppola, L., & Salvatore, M. (2019). Cancer cell lines are useful model systems for medical research. *Cancers*, 11(8). <https://doi.org/10.3390/cancers11081098>
- Morrissey, E. M., Mau, R. L., Schwartz, E., McHugh, T. A., Dijkstra, P., Koch, B. J., Marks, J. C., & Hungate, B. A. (2017). Bacterial carbon use plasticity, phylogenetic diversity and the priming of soil organic matter. *ISME Journal* 11(8), 1890 - 1899. <https://doi.org/10.1038/ismej.2017.43>
- Mout, R., Xu, Z. D., Wolf, A. K. H., Jo Davisson, V., & Jarori, G. K. (2012). Anti-malarial activity of geldanamycin derivatives in mice infected with *Plasmodium yoelii*. *Malaria Journal*, 11, 1–10. <https://doi.org/10.1186/1475-2875-11-54>
- Mukanganyama, S., Widersten, M., Naik, Y. S., Mannervik, B., & Hasler, J. A. (2002). Inhibition of glutathione S-transferases by antimalarial drugs possible implications for circumventing anticancer drug resistance. *International Journal of Cancer*, 97(5), 700–705. <https://doi.org/10.1002/ijc.10054>
- Müller, S. (2015). Role and regulation of glutathione metabolism in *plasmodium falciparum*. *Molecules*, 20(6), 10511–10534. <https://doi.org/10.3390/molecules200610511>
- Mustofa, Sholikhah, E. N., & Wahyuono, S. (2007). *In vitro* and *in vivo*

- antiplasmodial activity and cytotoxicity of extracts of *Phyllanthus niruri* L. herbs traditionally used to treat malaria in Indonesia. *Southeast Asian Journal of Tropical Medicine and Public Health*, 38(4), 609–615.
- Na, M., Meujo, D. F. ., Kevin, D., Hamann, M. T., Andersonc, M., & Hill, R. T. (2008). A new antimalarial polyether from a marine *Streptomyces* sp. H668. *Tetrahedron Letters*, 49(44), 6282–6285. <https://doi.org/10.1038/jid.2014.371>
- Naoki, O., Arihiro, K., Toshiyuki, Y., Noriko, H., Fumio, K., Suyoshi, S., Makoto, K., Kentaro, H., & Hattori, M. (2014). The genome landscape of the African Green Monkey kidney-derived vero cell line. *DNA Research*, 21(6), 673–683. <https://doi.org/10.1093/dnares/dsu029>
- Negi, A., Bhandari, N., Shyamlal, B. R. K., & Chaudhary, S. (2018). Inverse docking based screening and identification of protein targets for Cassiarin alkaloids against *Plasmodium falciparum*. *Saudi Pharmaceutical Journal* 26(4), 546 - 567. <https://doi.org/10.1016/j.jsps.2018.01.017>
- Neznanov, N., Gorbachev, A. V., Neznanova, L., Komarov, A. P., Gurova, K. V., Gasparian, A. V., Banerjee, A. K., Almasan, A., Fairchild, R. L., & Gudkov, A. V. (2009). Anti-malaria drug blocks proteotoxic stress response: Anti-cancer implications. *Cell Cycle*, 8(23), 3960–3970. <https://doi.org/10.4161/cc.8.23.10179>
- Nguyen, H. T., Pokhrel, A. R., Nguyen, C. T., Pham, V. T. T., Dhakal, D., Lim, H. N., Jung, H. J., Kim, T. S., Yamaguchi, T., & Sohng, J. K. (2020). *Streptomyces* sp. VN1, a producer of diverse metabolites including non-natural furan-type anticancer compound. *Scientific Reports* 10(1), 1 - 14. <https://doi.org/10.1038/s41598-020-58623-1>
- Nishanth, S. K., Nambisan, B., & Dileep, C. (2014). Three bioactive cyclic dipeptides from the *Bacillus* sp. N strain associated with entomopathogenic nematode. *Peptides* 53, 59-69. <https://doi.org/10.1016/j.peptides.2013.11.017>
- Noguchi, P., Wallace, R., Johnson, J., Earley, E. M., O'Brien, S., Ferrone, S., Pellegrino, M. A., Milstien, J., Needy, C., Browne, W., & Petriccioni, J. (1979). Characterization of WiDr: A human colon carcinoma cell line. *In Vitro*, 15(6), 401–408. <https://doi.org/10.1007/BF02618407>
- Nurjismi, R., & Widada, J. (2009). Diversity of Actinomycetes at several forest types in Wanagama I Yogyakarta and their potency as a producer of antifungal compound. *Indonesian Journal of Biotechnology*, 14(2), 1196–1205. <https://doi.org/10.22146/ijbiotech.7813>
- Nzila, A., Okombo, J., Becker, R. P., Chilengi, R., Lang, T., & Niehues, T. (2010). *Anticancer agents against malaria : time to revisit ? January*, 125–129. <https://doi.org/10.1016/j.pt.2009.12.002>
- Okuhara, T., Ishikawa, H., Urakubo, A., Hayakawa, M., Yamaki, C., Takayama, T., & Kiuchi, T. (2018). Cancer information needs according to cancer type: A content analysis of data from Japan's largest cancer information website. *Preventive Medicine Reports*, 12(April), 245–252. <https://doi.org/10.1016/j.pmedr.2018.10.014>
- Olanrewaju, O. S., & Babalola, O. O. (2019). *Streptomyces*: implications and interactions in plant growth promotion. *Applied Microbiology and*



- Biotechnology*, 103(3), 1179–1188. <https://doi.org/10.1007/s00253-018-09577-y>
- Otoguro, K., Ishiyama, A., Kobayashi, M., Sekiguchi, H., Izuhara, T., Sunazuka, T., Tomoda, H., Yamada, H., & Omura, S. (2004). *In vivo* and *in vivo* antimalarial activities of a carbohydrate antibiotic, prumycin, against drug-resistant strains of Plasmodia. In *Journal of Antibiotics*. <https://doi.org/10.7164/antibiotics.57.400>
- Overbeek, R., Olson, R., Pusch, G. D., Olsen, G. J., Davis, J. J., Disz, T., Edwards, R. A., Gerdes, S., Parrello, B., Shukla, M., Vonstein, V., Wattam, A. R., Xia, F., & Stevens, R. (2014). The SEED and the Rapid Annotation of microbial genomes using Subsystems Technology (RAST). *Nucleic Acids Research* 42(1), 206–214. <https://doi.org/10.1093/nar/gkt1226>
- Pandey, M. R., & Guo, H. (2014). Evaluation of cytotoxicity, genotoxicity and embryotoxicity of insecticide propoxur using flounder gill (FG) cells and zebrafish embryos. *Toxicology in Vitro*, 28(3), 340–353. <https://doi.org/10.1016/j.tiv.2013.11.010>
- Patel, S. K., Jasrai, Y. T., George, L. B., & Highland, H. N. (2012). Virtual screening of Xanthenes in combating malaria targeting *Plasmodium falciparum* erythrocyte membrane protein 1 (PfEMP1). *Asian Journal of Biomedical and Pharmaceutical Sciences*, 2(6), unpaginated. <http://www.jbiopharm.com/index.php/ajbps/article/view/31>
- Paulus, C., Rebets, Y., Tokovenko, B., Nadmid, S., Terekhova, L. P., Myronovskiy, M., Zotchev, S. B., Rückert, C., Braig, S., Zahler, S., Kalinowski, J., & Luzhetskyy, A. (2017). New natural products identified by combined genomics-metabolomics profiling of marine *Streptomyces* sp. MP131-18. *Scientific Reports*, 7(February), 1–11. <https://doi.org/10.1038/srep42382>
- Penna-Coutinho, J., Cortopassi, W. A., Oliveira, A. A., França, T. C. C., & Krettli, A. U. (2011). Antimalarial activity of potential inhibitors of *Plasmodium falciparum* lactate dehydrogenase enzyme selected by docking studies. *PLoS ONE*, 6(7). <https://doi.org/10.1371/journal.pone.0021237>
- Pereira, P. H. F., Macrae, A., Reinert, F., De Souza, R. F., Coelho, R. R. R., Pötter, G., Klenk, H. P., & Labeda, D. P. (2017). *Streptomyces odonnellii* sp. Nov., a proteolytic Streptomycete isolated from soil under cerrado (savanna) vegetation cover. *International Journal of Systematic and Evolutionary Microbiology*. <https://doi.org/10.1099/ijsem.0.002446>
- Pitt, J. J. (2009). Principles and applications of liquid chromatography-mass spectrometry in clinical biochemistry. *The Clinical Biochemist. Reviews*, 30(1), 19–34. <http://www.ncbi.nlm.nih.gov/pubmed/19224008> <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC2643089>
- Pljesa-Ercegovac, M., Savic-Radojevic, A., Matic, M., Coric, V., Djukic, T., Radic, T., & Simic, T. (2018). Glutathione transferases: Potential targets to overcome chemoresistance in solid tumors. *International Journal of Molecular Sciences*, 19(12). <https://doi.org/10.3390/ijms19123785>
- Pradines, B., Rogier, C., Fusai, T., Mosnier, J., Daries, W., Barret, E., & Parzy, D.

- (2001). In vitro activities of antibiotics against *Plasmodium falciparum* are inhibited by iron. *Antimicrobial Agents and Chemotherapy*. <https://doi.org/10.1128/AAC.45.6.1746-1750.2001>
- Pratima, N. A. (2018). Liquid chromatography-mass spectrometry and its applications: A brief review. *Archives of Organic and Inorganic Chemical Sciences*, 1(1), 26–34. <https://doi.org/10.32474/aoics.2018.01.000103>
- Qiu, L., Yao, M., Gao, M., & Zhao, Q. (2012). Doxorubicin and chloroquine coencapsulated liposomes: Preparation and improved cytotoxicity on human breast cancer cells. *Journal of Liposome Research*, 22(3), 245–253. <https://doi.org/10.3109/08982104.2012.684150>
- Rebello, M., Sousa, C., Shapiro, H. M., Mota, M. M., Grobusch, M. P., & Hänscheid, T. (2013). A novel flow cytometric hemozoin detection assay for real-time sensitivity testing of *Plasmodium falciparum*. *PLoS ONE*. <https://doi.org/10.1371/journal.pone.0061606>
- Ren, S., Zhou, F., Xu, C., & Li, B. (2015). Simple method for visual detection of glutathione S-transferase activity and inhibition using cysteamine-capped gold nanoparticles as colorimetric probes. *Gold Bulletin*, 48(3–4), 147–152. <https://doi.org/10.1007/s13404-015-0171-3>
- Ri, M., Tashiro, E., Oikawa, D., Shinjo, S., Tokuda, M., Yokouchi, Y., Narita, T., Masaki, A., Ito, A., Ding, J., Kusumoto, S., Ishida, T., Komatsu, H., Shiotsu, Y., Ueda, R., Iwawaki, T., Imoto, M., & Iida, S. (2012). Identification of Toyocamycin, an agent cytotoxic for multiple myeloma cells, as a potent inhibitor of ER stress-induced XBP1 mRNA splicing. *Blood Cancer Journal*. <https://doi.org/10.1038/bcj.2012.26>
- Richter, M., & Rosselló-Móra, R. (2009). Shifting the genomic gold standard for the prokaryotic species definition. *Proceedings of the National Academy of Sciences of the United States of America*, 106(45), 19126–19131. <https://doi.org/10.1073/pnas.0906412106>
- Richter, M., Rosselló-Móra, R., Oliver Glöckner, F., & Peplies, J. (2016). JSpeciesWS: A web server for prokaryotic species circumscription based on pairwise genome comparison. *Bioinformatics*. <https://doi.org/10.1093/bioinformatics/btv681>
- Riss, T. L., Moravec, R. A., Niles, A. L., Duellman, S., Benink, H. A., Worzella, T. J., & Minor, L. (2004). Cell viability assays. *Assay Guidance Manual*, Md, 1–25. <http://www.ncbi.nlm.nih.gov/pubmed/23805433>
- Ruoß, M., Damm, G., Vosough, M., Ehret, L., Grom-Baumgarten, C., Petkov, M., Naddalin, S., Ladurner, R., Seehofer, D., Nussler, A., & Sajadian, S. (2019). Epigenetic modifications of the liver tumor cell line HepG2 increase their drug metabolic capacity. *International Journal of Molecular Sciences*, 20(2). <https://doi.org/10.3390/ijms20020347>
- Sadaka, C., Ellsworth, E., Hansen, P. R., Ewin, R., Damborg, P., & Watts, J. L. (2018). Review on abyssomicins: Inhibitors of the chorismate pathway and folate biosynthesis. In *Molecules* 26(3), 1371. <https://doi.org/10.3390/molecules23061371>
- Saha, S., Priyadharshini, A., Dhanasekaran, D., Thajuddin, N., Chandraleka, S., Chandramohan, G., & Panneerselvam, A. (2012). Preclinical evaluation and



EMA DAMAYANTI, Prof. Dr. Mustofa, Apt., M.Kes.; Ir. Jaka Widada, M.P., Ph.D.; Achmad Dinoto, Ph.D.  
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- molecular docking of 4-phenyl-1-Naphthyl phenyl acetamide (4PINPA) from *Streptomyces* sp. DPTB16 as a potent antifungal compound. *Computers in Biology and Medicine*, 42(5), 542–547. <https://doi.org/10.1016/j.combiomed.2012.01.007>
- Saitou, N., & Nei, M. (1987). The neighbor-joining method: a new method for reconstructing phylogenetic trees. *Molecular Biology and Evolution*, 4(4). <https://doi.org/10.1093/oxfordjournals.molbev.a040454>
- Sakuda, S., Ze-Zhou, Y., & Yamada, Y. (1994). Structure of a novel disulfide of 2-(N-Acetylcysteinyl)amido-2-deoxy-a-D-glucopyran-osyl-fftyo-inositol Produced by *Streptomyces* sp. *Bioscience, Biotechnology, and Biochemistry* 58(7), 1347 - 1348. <https://doi.org/10.1271/bbb.58.1347>
- Salazar, G., & Sunagawa, S. (2017). Marine microbial diversity. In *Current Biology* 27(11), 489 - 494. <https://doi.org/10.1016/j.cub.2017.01.017>
- Salcedo-sora, J. E., Caamano-gutierrez, E., Ward, S. A., & Biagini, G. A. (2014). The proliferating cell hypothesis : a metabolic framework for *Plasmodium* growth and development. *Trend in Parasitology* 30(4), 170 - 175. <https://doi.org/10.1016/j.pt.2014.02.001>
- Sandlin, R. D., Carter, M. D., Lee, P. J., Auschwitz, J. M., Leed, S. E., Johnson, J. D., & Wright, D. W. (2011). Use of the NP-40 detergent-mediated assay in discovery of inhibitors of β-hematin crystallization. *Antimicrobial Agents and Chemotherapy*, 55(7), 3363–3369. <https://doi.org/10.1128/AAC.00121-11>
- Saneyoshi, M., Tokuzen, R., & Fukuoka, F. (2008). Antitumor activities and structural relationship of tubercidine, toyocamycin, and their derivatives. *GANN Japanese Journal of Cancer Research*, 56(2), 219–222. [https://doi.org/10.20772/cancersci1959.56.2\\_219](https://doi.org/10.20772/cancersci1959.56.2_219)
- Sanz, L. M., Crespo, B., De-Cózar, C., Ding, X. C., Llergo, J. L., Burrows, J. N., García-Bustos, J. F., & Gamo, F. J. (2012). *P. falciparum* in vitro killing rates allow to discriminate between different antimalarial mode-of-action. *PLoS ONE*, 7(2). <https://doi.org/10.1371/journal.pone.0030949>
- Sathishkumar, N., Sathiyamoorthy, S., Ramya, M., Yang, D. U., Lee, H. N., & Yang, D. C. (2012). Molecular docking studies of anti-apoptotic BCL-2, BCL-XL, and MCL-1 proteins with ginsenosides from *Panax ginseng*. *Journal of Enzyme Inhibition and Medicinal Chemistry* 27(5), 685 - 692. <https://doi.org/10.3109/14756366.2011.608663>
- Seipke, R. F. (2015). Strain-level diversity of secondary metabolism in *Streptomyces albus*. *PLoS ONE* 10(1), e0116457. <https://doi.org/10.1371/journal.pone.0116457>
- Sembiring, L. (2009). Molecular phylogenetic classification of Streptomycetes isolated from the rhizosphere of tropical legume (*Paraserianthes falcataria*) (L.) Nielsen. *HAYATI Journal of Biosciences* 16(3), 100 - 108. <https://doi.org/10.4308/hjb.16.3.100>
- Shaala, L. A., Youssef, D. T. A., McPhail, K. L., & Elbandy, M. (2013). Malynгамide 4, a new lipopeptide from the Red Sea marine cyanobacterium *Moorea producens* (formerly *Lyngbya majuscula*). *Phytochemistry Letters*, 6(2), 183–188. <https://doi.org/10.1016/j.phytol.2013.01.002>

- Shacka, J. J., Klocke, B. J., & Roth, K. A. (2006). Autophagy, bafilomycin and cell death: The “A-B-Cs” of plecomacrolide-induced neuroprotection. *Autophagy*, 2(3), 228–230. <https://doi.org/10.4161/auto.2703>
- Shentu, X. P., Cao, Z. Y., Xiao, Y., Tang, G., Ochi, K., & Yu, X. P. (2018). Substantial improvement of toyocamycin production in *Streptomyces diastatochromogenes* by cumulative drug-resistance mutations. *PLoS ONE* 13(8), e0203006. <https://doi.org/10.1371/journal.pone.0203006>
- Sholikhah, E. N., Wijayanti, M. A., Susidarti, R. A., Purwantini, I., Hestiyani, R. A. N., Yusuf, H., & Mustofa. (2016). Stage specificity of eurycomanone isolated from *Eurycoma longifolia* on *Plasmodium falciparum* cycles. *American Journal of Pharmacology and Toxicology*, 11(1), 1–7. <https://doi.org/10.3844/ajptsp.2016.1.7>
- Singh, J., Mansuri, R., Vijay, S., Sahoo, G. C., Sharma, A., & Kumar, M. (2019). Docking predictions based *Plasmodium falciparum* phosphoethanolamine methyl transferase inhibitor identification and *in vitro* antimalarial activity analysis. *BMC Chemistry*, 13(1), 1–13. <https://doi.org/10.1186/s13065-019-0551-5>
- Sottorff, I., Wiese, J., Lipfert, M., Preußke, N., Sönnichsen, F. D., & Imhoff, J. F. (2019). Different secondary metabolite profiles of phylogenetically almost identical *Streptomyces griseus* strains originating from geographically remote locations. *Microorganisms* 7(6), 166. <https://doi.org/10.3390/microorganisms7060166>
- Srinivasan, R., Karaoz, U., Volegova, M., MacKichan, J., Kato-Maeda, M., Miller, S., Nadarajan, R., Brodie, E. L., & Lynch, S. V. (2015). Use of 16S rRNA gene for identification of a broad range of clinically relevant bacterial pathogens. *PLoS ONE*, 10(2), 1–22. <https://doi.org/10.1371/journal.pone.0117617>
- Srivastava, P., Puri, S. K., Kamboj, K. K., & Pandey, V. C. (1999). Glutathione-S-transferase activity in malarial parasites. *Tropical Medicine and International Health*, 4(4), 251–254. <https://doi.org/10.1046/j.1365-3156.1999.00387.x>
- Studio, D. (2015). Dassault Systemes BIOVIA, Discovery Studio Modelling Environment, Release 4.5. *Accelrys Software Inc.*
- Sumanadasa, S. D. M., Goodman, C. D., Lucke, A. J., Skinner-Adams, T., Saham, I., Haque, A., Do, T. A., McFadden, G. I., Fairlie, D. P., & Andrews, K. T. (2012). Antimalarial activity of the anticancer histone deacetylase inhibitor SB939. *Antimicrobial Agents and Chemotherapy*, 56(7), 3849–3856. <https://doi.org/10.1128/AAC.00030-12>
- Sun, F., Xu, S., Jiang, F., & Liu, W. (2018). Genomic-driven discovery of an amidinohydrolase involved in the biosynthesis of mediomycin A. *Applied Microbiology and Biotechnology*, 102(5), 2225–2234. <https://doi.org/10.1007/s00253-017-8729-z>
- Sun, Y., Zhou, X., Tu, G., & Deng, Z. (2003). Identification of a gene cluster encoding meilingmycin biosynthesis among multiple polyketide synthase contigs isolated from *Streptomyces nanchangensis* NS3226. *Archives of Microbiology*, 180(2), 101–107. <https://doi.org/10.1007/s00203-003-0564-1>

- Tajuddeen, N., & Van Heerden, F. R. (2019). Antiplasmodial natural products: An update. *Malaria Journal*, 18(1), 1–62. <https://doi.org/10.1186/s12936-019-3026-1>
- Také, A., Matsumoto, A., Omura, S., & Takahashi, Y. (2015). *Streptomyces lactacystinicus* sp. nov. and *Streptomyces cyclabdanicus* sp. nov., producing lactacystin and cyclabdan, respectively. *Journal of Antibiotics* 68(5), 322 - 327. <https://doi.org/10.1038/ja.2014.162>
- Tamura, K., Nei, M., & Kumar, S. (2004). Prospects for inferring very large phylogenies by using the neighbor-joining method. *Proceedings of the National Academy of Sciences of the United States of America*, 101(30). <https://doi.org/10.1073/pnas.0404206101>
- Taymaz-Nikerel, H., Karabekmez, M. E., Eraslan, S., & Kırdar, B. (2018). Doxorubicin induces an extensive transcriptional and metabolic rewiring in yeast cells. *Scientific Reports*, 8(1), 1–14. <https://doi.org/10.1038/s41598-018-31939-9>
- Thompson, J. D., Gibson, T. J., Plewniak, F., Jeanmougin, F., & Higgins, D. G. (1997). The CLUSTAL X windows interface: Flexible strategies for multiple sequence alignment aided by quality analysis tools. *Nucleic Acids Research*. <https://doi.org/10.1093/nar/25.24.4876>
- Tidjani, A. R., Lorenzi, J. N., Toussaint, M., Van Dijk, E., Naquin, D., Lespinet, O., Bontemps, C., & Leblond, P. (2019). Massive gene flux drives genome diversity between sympatric *Streptomyces conspecifics*. *MBio*. <https://doi.org/10.1128/mBio.01533-19>
- Townsend, D. M., & Tew, K. D. (2003). The role of glutathione-S-transferase in anti-cancer drug resistance. *Oncogene*, 22(47), 7369–7375. <https://doi.org/10.1038/sj.onc.1206940>
- Trager, W., & Jensen, J. B. (2005). Human malaria parasites in continuous culture. *Journal of Parasitology* 193(4254) 673 - 675. [https://doi.org/10.1645/0022-3395\(2005\)091\[0484:HMPICC\]2.0.CO;2](https://doi.org/10.1645/0022-3395(2005)091[0484:HMPICC]2.0.CO;2)
- Tresner, H. D., Davies, M. C., & Backus, E. J. (1961). Electron microscopy of *Streptomyces* spore morphology and its role in species differentiation. *Journal of Bacteriology* 81(1), 70 - 90. <https://doi.org/10.1128/jb.81.1.70-80.1961>
- Trott oleg, & Arthur J. Olson. (2010). AutoDock Vina: improving the speed and accuracy of docking with a new scoring function, efficient optimization, and multithreading. *Journal of Computational Chemistry* 31(2), 455 - 461. <https://doi.org/10.1002/jcc>
- Undabarrena, A., Ugalde, J. A., Seeger, M., & Cámara, B. (2017). Genomic data mining of the marine actinobacteria *Streptomyces* sp. H-KF8 unveils insights into multi-stress related genes and metabolic pathways involved in antimicrobial synthesis. *PeerJ*, 2017(2). <https://doi.org/10.7717/peerj.2912>
- Usoltseva, R. V., Anastyuk, S. D., Ishina, I. A., Isakov, V. V., Zvyagintseva, T. N., Thinh, P. D., Zadorozhny, P. A., Dmitrenok, P. S., & Ermakova, S. P. (2018). Structural characteristics and anticancer activity in vitro of fucoidan from brown alga *Padina boryana*. *Carbohydrate Polymers* 184, 260 - 268. <https://doi.org/10.1016/j.carbpol.2017.12.071>



- Valdés, A. F. C., Martínez, J. M., Lizama, R. S., Gaitén, Y. G., Rodríguez, D. A., & Payrol, J. A. (2010). Actividad antimalárica in vitro y citotoxicidad de algunas plantas medicinales *Cubanas seleccionadas*. *Revista Do Instituto de Medicina Tropical de Sao Paulo*, 52(4), 197–201. <https://doi.org/10.1590/S0036-46652010000400006>
- Van Arnam, E. B., Ruzzini, A. C., Sít, C. S., Horn, H., Pinto-Tomás, A. A., Currie, C. R., & Clardy, J. (2016). Selvamycin, an atypical antifungal polyene from two alternative genomic contexts. *Proceedings of the National Academy of Sciences of the United States of America*, 113(46), 12940–12945. <https://doi.org/10.1073/pnas.1613285113>
- van Biljon, R., Niemand, J., van Wyk, R., Clark, K., Verlinden, B., Abrie, C., von Grüning, H., Smidt, W., Smit, A., Reader, J., Painter, H., Llinás, M., Doerig, C., & Birkholtz, L. M. (2018). Inducing controlled cell cycle arrest and re-entry during asexual proliferation of *Plasmodium falciparum* malaria parasites. *Scientific Reports*, 8(1), 1–14. <https://doi.org/10.1038/s41598-018-34964-w>
- Vega-Rodríguez, J., Pastrana-Mena, R., Crespo-Lladó, K. N., Ortiz, J., Ferrer-Rodríguez, I., & Serrano, A. E. (2015). Implications of glutathione levels in the plasmodium berghei response to chloroquine and artemisinin. *PLoS ONE*, 10(5), 1–15. <https://doi.org/10.1371/journal.pone.0128212>
- Vijayabharathi, R., Bruheim, P., Andreassen, T., Raja, D. S., Devi, P. B., Sathyabama, S., & Priyadarisini, V. B. (2011). Assessment of resistomycin, as an anticancer compound isolated and characterized from *Streptomyces aurantiacus* AAA5. *Journal of Microbiology*, 49(6), 920–926. <https://doi.org/10.1007/s12275-011-1260-5>
- Viola, G., Bortolozzi, R., Hamel, E., Moro, S., Brun, P., Castagliuolo, I., Ferlin, M. G., & Basso, G. (2012). MG-2477, a new tubulin inhibitor, induces autophagy through inhibition of the Akt/mTOR pathway and delayed apoptosis in A549 cells. *Biochemical Pharmacology*, 83(1), 16–26. <https://doi.org/10.1016/j.bcp.2011.09.017>
- Walker, J. M. (2013). Metabolomics Tools for Natural Product Discovery IN Series Editor. In *Metabolomics Tools*.
- Wang, X. J., Yan, Y. J., Zhang, B., An, J., Wang, J. J., Tian, J., Jiang, L., Chen, Y. H., Huang, S. X., Yin, M., Zhang, J., Gao, A. L., Liu, C. X., Zhu, Z. X., & Xiang, W. S. (2010). Genome sequence of the milbemycin-producing bacterium *Streptomyces bingchenggensis*. In *Journal of Bacteriology* 192(17), 4526 - 4527. <https://doi.org/10.1128/JB.00596-10>
- Ward, A. C., & Allenby, N. E. (2018). Genome mining for the search and discovery of bioactive compounds: The *Streptomyces* paradigm. In *FEMS Microbiology Letters* 365(24),. <https://doi.org/10.1093/femsle/fny240>
- Weber, T., Charusanti, P., Musiol-Kroll, E. M., Jiang, X., Tong, Y., Kim, H. U., & Lee, S. Y. (2015). Metabolic engineering of antibiotic factories: New tools for antibiotic production in actinomycetes. *Trends in Biotechnology*, 33(1), 15–26. <https://doi.org/10.1016/j.tibtech.2014.10.009>
- Weber, T., & Kim, H. U. (2016). The secondary metabolite bioinformatics portal: Computational tools to facilitate synthetic biology of secondary metabolite

- production. *Synthetic and Systems Biotechnology*, 1(2), 69–79. <https://doi.org/10.1016/j.synbio.2015.12.002>
- Wei, F., Wang, Z., Lu, C., Li, Y., Zhu, J., Wang, H., & Shen, Y. (2019). Targeted discovery of pentaketide ansamycin aminoansamycins A-G. *Organic Letters*. <https://doi.org/10.1021/acs.orglett.9b02804>
- Werdyani, S., Wijayanti, N., Fitria, A., & Rahmawati, S. (2017). Cytotoxic effects of ethyl acetate fractions from secondary metabolites of *Streptomyces* sp. GMY01 on human breast cancer MCF7 cell lines. *Asian Journal of Pharmaceutical and Clinical Research*, 10(Special Issue August), 9–11. <https://doi.org/10.22159/ajpcr.2017v10s3.21351>
- WHO. (2015). Global technical strategy for malaria 2016-2030. In *World Health Organization*.
- WHO. (2016). Accelerating progress on HIV, tuberculosis, malaria, hepatitis and neglected tropical diseases. *Publication*.
- WHO Report. (2017). World Malaria Report 2017. In *World Health Organization*.
- Wongsiridetchai, C., Jonjaroen, V., Sawangwan, T., Charoenrat, T., & Chantorn, S. (2021). Evaluation of prebiotic manooligosaccharides obtained from spent coffee grounds for nutraceutical application. *Lwt*, 148(February). <https://doi.org/10.1016/j.lwt.2021.111717>
- Wu, C., Shang, Z., Lemetre, C., Ternei, M. A., & Brady, S. F. (2019). Cadasides, calcium-dependent acidic lipopeptides from the soil metagenome that are active against multidrug-resistant bacteria. *Journal of the American Chemical Society*, 141(9), 3910–3919. <https://doi.org/10.1021/jacs.8b12087>
- Wu, X., Flatt, P. M., Xu, H., & Mahmud, T. (2009). Biosynthetic gene cluster of cetoniacytone A, an unusual aminocyclitol from the endosymbiotic bacterium actinomyces sp. Lu 9419. *ChemBioChem*, 10(2), 304–314. <https://doi.org/10.1002/cbic.200800527>
- Xie, J. H., Liu, X., Shen, M. Y., Nie, S. P., Zhang, H., Li, C., Gong, D. M., & Xie, M. Y. (2013). Purification, physicochemical characterisation and anticancer activity of a polysaccharide from *Cyclocarya paliurus* leaves. *Food Chemistry* 136, 1453 - 1460. <https://doi.org/10.1016/j.foodchem.2012.09.078>
- Xu, H., Chater, K. F., Deng, Z., & Tao, M. (2008). A cellulose synthase-like protein involved in hyphal tip growth and morphological differentiation in streptomyces. *Journal of Bacteriology* 190(14), 4971-4978. <https://doi.org/10.1128/JB.01849-07>
- Xu, L., Ye, K. X., Dai, W. H., Sun, C., Xu, L. H., & Han, B. N. (2019). Comparative genomic insights into secondary metabolism biosynthetic gene cluster distributions of marine *Streptomyces*. *Marine Drugs* 17(9), 498. <https://doi.org/10.3390/md17090498>
- Yang, L., Hou, L., Li, H., & Li, W. (2019). Antibiotic angucycline derivatives from the deepsea-derived *Streptomyces lusitanus*. *Natural Product Research* 34(24), 3444 - 3450. <https://doi.org/10.1080/14786419.2019.1577835>
- Yoon, S. H., Ha, S. M., Kwon, S., Lim, J., Kim, Y., Seo, H., & Chun, J. (2017). Introducing EzBioCloud: A taxonomically united database of 16S rRNA gene sequences and whole-genome assemblies. *International Journal of Systematic and Evolutionary Microbiology* 67(5), 1613

- <https://doi.org/10.1099/ijsem.0.001755>
- Yuan, G., Xu, L., Xu, X., Li, P., Zhong, Q., Xia, H., Hu, Y., Li, P., Song, X., Li, J., & Liu, Q. (2019). Azalomycin F 5a, a polyhydroxy macrolide binding to the polar head of phospholipid and targeting to lipoteichoic acid to kill methicillin-resistant *Staphylococcus aureus*. *Biomedicine and Pharmacotherapy*, 109(November 2018), 1940–1950. <https://doi.org/10.1016/j.biopha.2018.11.067>
- Yun, C. W., & Lee, S. H. (2018). The roles of autophagy in cancer. In *International Journal of Molecular Sciences* 19(11), 3466. <https://doi.org/10.3390/ijms19113466>
- Yvette, O. M., Malan, S. F., Taylor, D., Kapp, E., & Joubert, J. (2018). Adamantane amine-linked chloroquinoline derivatives as chloroquine resistance modulating agents in *Plasmodium falciparum*. *Bioorganic and Medicinal Chemistry Letters*, 28(8), 1287–1291. <https://doi.org/10.1016/j.bmcl.2018.03.026>
- Zhang, G., Zhang, H., Li, S., Xiao, J., Zhang, G., Zhu, Y., Niu, S., Ju, J., & Zhang, C. (2012). Characterization of the amicetin biosynthesis gene cluster from *Streptomyces vinaceusdrappus* NRRL 2363 implicates two alternative strategies for amide bond formation. *Applied and Environmental Microbiology*, 78(7), 2393–2401. <https://doi.org/10.1128/AEM.07185-11>
- Zhang, L., Wang, J., Li, T., Li, P., Wang, Y., Yang, M., Liu, J., & Liu, J. (2019). Determination of the chemical components and phospholipids of velvet antler using UPLC/QTOF-MS coupled with UNIFI software. *Experimental and Therapeutic Medicine*, 3789–3799. <https://doi.org/10.3892/etm.2019.7372>
- Zhang, Z., Schwartz, S., Wagner, L., & Miller, W. (2000). A greedy algorithm for aligning DNA sequences. In *Journal of Computational Biology*. <https://doi.org/10.1089/10665270050081478>
- Zhao, B., Lin, X., Lei, L., Lamb, D. C., Kelly, S. L., Waterman, M. R., & Cane, D. E. (2008). Biosynthesis of the sesquiterpene antibiotic albaflavenone in *Streptomyces coelicolor* A3(2). *Journal of Biological Chemistry*. <https://doi.org/10.1074/jbc.M710421200>
- Zheng, D., Ding, N., Jiang, Y., Zhang, J., Ma, J., Chen, X., Liu, J., Han, L., & Huang, X. (2016). Albaflavenoid, a new tricyclic sesquiterpenoid from *Streptomyces violascens*. *Journal of Antibiotics*, 69(10), 773–775. <https://doi.org/10.1038/ja.2016.12>
- Zhou, Z., Gu, J., Li, Y. Q., & Wang, Y. (2012). Genome plasticity and systems evolution in *Streptomyces*. *BMC Bioinformatics* 13(10), 1 - 17. <https://doi.org/10.1186/1471-2105-13-S10-S8>
- Zhu, M., Zhang, H., & Humphreys, W. G. (2011). Drug metabolite profiling and identification by high-resolution mass spectrometry. *Journal of Biological Chemistry*, 286(29), 25419–25425. <https://doi.org/10.1074/jbc.R110.200055>
- Ziemert, N., Alanjary, M., & Weber, T. (2016). The evolution of genome mining in microbes-a review. In *Natural Product Reports* 33(8), 988 - 1005. <https://doi.org/10.1039/c6np00025h>

Website:

Globocan, 2020a. New Global Cancer Data. <https://www.uicc.org/news/globocan-2020-new-global-cancer-data> (accessed: 08012021).

Globocan, 2020b. Indonesia: Number of New Cases in 2020, both sexes, all ages. <https://gco.iarc.fr/today/data/factsheets/populations/360-indonesia-fact-sheets.pdf> (accessed: 080121)

<https://www.thermofisher.com>. Liquid Chromatography Mass Spectrometry (LC-MS) Information. <https://www.thermofisher.com/id/en/home/industrial/mass-spectrometry/mass-spectrometry-learning-center/liquid-chromatography-mass-spectrometry-lc-ms-information.html> (accessed: 150521)

<https://lupinepublishers.com>. Liquid Chromatography-Mass Spectrometry and Its Application: A Brief Review. N. A. Pratima and R. Gadikar, 2018. <https://lupinepublishers.com/chemistry-journal/fulltext/liquid-chromatography-mass-spectrometry-and-its-applications-a-brief-review.ID.000103.php> (accessed: 150521)

<https://www.eag.com>. Liquid Chromatography-Tandem Mass Spectrometry (LC-MS-MS). <https://www.eag.com/techniques/mass-spec/lc-ms-ms/> (accessed: 150221).