

## DAFTAR PUSTAKA

1. Wakefield J, Hassan HM, Jaspars M, Ebel R, Rateb ME. Dual induction of new microbial secondary metabolites by fungal bacterial co-cultivation. *Front Microbiol.* 2017;8(Jul):1–10.
2. Newman DJ, Cragg GM. Natural Products as Sources of New Drugs over the Nearly Four Decades from 01/1981 to 09/2019. *J Nat Prod.* 2020;83(3):770–803.
3. Proksch P, Ebel R, Edrada RA, Schupp P, Lin WH, Sudarsono, et al. Detection of pharmacologically active natural products using ecology. Selected examples from indopacific marine invertebrates and sponge-derived fungi. *Pure Appl Chem.* 2003;75(2–3):343–52.
4. Akondi KB, Lakshmi V V. Emerging trends in genomic approaches for microbial bioprospecting. *Omi A J Integr Biol.* 2013;17(2):61–70.
5. Berdy J. Thoughts and facts about antibiotics: Where we are now and where we are heading. *J Antibiot.* 2012;65(8):385–95.
6. Cragg GM, Newman DJ. Natural products: A continuing source of novel drug leads. *Biochim Biophys Acta - Gen Subj* [Internet]. 2013;1830(6):3670–95.
7. Abdalla MA, Sulieman S, McGaw LJ. Microbial communication: A significant approach for new leads. *South African J Bot.* 2017;113:461–70.
8. Scherlach K, Hertweck C. Triggering cryptic natural product biosynthesis in microorganisms. *Org Biomol Chem.* 2009;7(9):1753–60.
9. Harvey AL, Edrada-Ebel R, Quinn RJ. The re-emergence of natural products for drug discovery in the genomics era. *Nat Rev Drug Discov.* 2015;14(2):111–29.
10. Zuck KM, Shipley S, Newman DJ. by Co-culture with Streptomyces peucetius. *J Nat Prod.* 2011;1653–7.
11. Bode HB, Bethe B, Höfs R, Zeeck A. Big effects from small changes: Possible ways to explore nature's chemical diversity. *ChemBioChem.* 2002;3(7):619–27.
12. Frey-Klett P, Burlinson P, Deveau A, Barret M, Tarkka M, Sarniguet A. Bacterial-Fungal Interactions: Hyphens between Agricultural, Clinical, Environmental, and Food Microbiologists. *Microbiol Mol Biol Rev.* 2011;75(4):583–609.
13. Volker Schroeckha,<sup>1</sup>, Kirstin Scherlachb,<sup>1</sup>, Hans-Wilhelm Nu<sup>tzmann</sup>a,c, Ekaterina Shelestd, Wolfgang Schmidt-Heckd, Julia Schuemannb, Karin Martine, Christian Hertweckb,c,2, and Axel A. Brakhagea,c 2. Intimate

bacterial-fungal interaction triggers biosynthesis of archetypal polyketides in *Aspergillus nidulans*. PNAS. 2009;106.

14. Tan ZQ, Leow HY, Lee DCW, Karisnan K, Song AAL, Mai CW, et al. Co-Culture Systems for the Production of Secondary Metabolites: Current and Future Prospects. Open Biotechnol J. 2019;13(1):18–26.
15. Oh DC, Kauffman CA, Jensen PR, Fenical W. Induced production of emericellamides A and B from the marine-derived fungus *Emericella* sp. in competing co-culture. J Nat Prod. 2007;70(4):515–20.
16. Oh DC, Jensen PR, Kauffman CA, Fenical W. Libertellenones A-D: Induction of cytotoxic diterpenoid biosynthesis by marine microbial competition. Bioorganic Med Chem. 2005;13(17):5267–73.
17. Cueto M, Jensen PR, Kauffman C, Fenical W, Lobkovsky E, Clardy J. Pestalone, a new antibiotic produced by a marine fungus in response to bacterial challenge. J Nat Prod. 2001;64(11):1444–6.
18. Park HB, Kwon HC, Lee CH, Yang HO. Glionitrin A, an antibiotic - Antitumor metabolite derived from competitive interaction between abandoned mine microbes. J Nat Prod. 2009;72(2):248–52.
19. Alexander Fleming FRCS. On The Antibacterial Action Of Cultures Of a Penicillium, With Special Reference To Their Use In The Isolation Of *B. Influenzae*. Br J Exp Pathol. 1929;10:226–36.
20. Konig CC, Scherlach K, Schroechk V, Horn F, Nietzsche S, Brakhage AA, et al. Bacterium Induces Cryptic Meroterpenoid Pathway in the Pathogenic Fungus *Aspergillus fumigatus*. ChemBioChem. 2013;14(8):938–42.
21. Ebrahim W, El-Neketi M, Lewald LI, Orfali RS, Lin W, Rehberg N, et al. Metabolites from the Fungal Endophyte *Aspergillus austroafricanus* in Axenic Culture and in Fungal-Bacterial Mixed Cultures. J Nat Prod. 2016;79(4):914–22.
22. Rateb ME, Hallyburton I, Houssen WE, Bull AT, Goodfellow M, Santhanam R, et al. Induction of diverse secondary metabolites in *Aspergillus fumigatus* by microbial co-culture. RSC Adv. 2013;3(34):14444–50.
23. Handayani D, Artasasta MA, Safirna N, Ayuni DF, Tallei TE, Hertiani T. Fungal isolates from marine sponge *Chelonaplysilla* sp.: Diversity, antimicrobial and cytotoxic activities. Biodiversitas. 2020;21(5):1954–60.
24. Aprillita S. Isolasi Aktinomisetes dari Tanaman Mangrove *Aegiceras corniculatum* (L.) Blanco dan Uji Aktivitas Antibakteri. 2019.
25. Bertrand S, Bohni N, Schnee S, Schumpp O, Gindro K, Wolfender JL. Metabolite induction via microorganism co-culture: A potential way to enhance chemical diversity for drug discovery. Biotechnol Adv [Internet].

2014;32(6):1180–204.

26. Strobel G, Daisy B. Bioprospecting for Microbial Endophytes and Their Natural Products. *Microbiol Mol Biol Rev*. 2003;67(4):491–502.
27. De Roy K, Marzorati M, Van den Abbeele P, Van de Wiele T, Boon N. Synthetic microbial ecosystems: an exciting tool to understand and apply microbial communities. *Environ Microbiol*. 2014;16(6):1472–81.
28. Wilson MC, Mori T, Rückert C, Uria AR, Helf MJ, Takada K, et al. An environmental bacterial taxon with a large and distinct metabolic repertoire. *Nature*. 2014;506(7486):58–62.
29. Abdelmohsen UR, Grkovic T, Balasubramanian S, Kamel MS, Quinn RJ, Hentschel U. Elicitation of secondary metabolism in actinomycetes. *Biotechnol Adv [Internet]*. 2015;33(6):798–811.
30. Moody SC. Microbial co-culture: Harnessing intermicrobial signaling for the production of novel antimicrobials. *Future Microbiol*. 2014;9(5):575–8.
31. Onaka H, Mori Y, Igarashi Y, Furumai T. Mycolic acid-containing bacteria induce natural-product biosynthesis in *Streptomyces* species. *Appl Environ Microbiol*. 2011;77(2):400–6.
32. Burgess JG, Jordan EM, Bregu M, Mearns-Spragg A, Boyd KG. Microbial antagonism: A neglected avenue of natural products research. *J Biotechnol*. 1999;70(1–3):27–32.
33. Ueda K, Kawai S, Ogawa HO, Kiyama A, Kubota T, Kawanobe H, et al. Wide distribution of interspecific stimulatory events on antibiotic production and sporulation among *Streptomyces* species. *J Antibiot (Tokyo)*. 2000;53(9):979–82.
34. Carlson S, Tanouye U, Omarsdottir S, Murphy BT. Phylum-specific regulation of resistomycin production in a *streptomyces* sp. via microbial coculture. *J Nat Prod*. 2015;78(3):381–7.
35. Goers L, Freemont P, Polizzi KM. Co-culture systems and technologies: Taking synthetic biology to the next level. *J R Soc Interface*. 2014;11(96).
36. Okada BK, Seyedsayamdst MR. Antibiotic dialogues: Induction of silent biosynthetic gene clusters by exogenous small molecules. *FEMS Microbiol Rev*. 2017;41(1):19–33.
37. Paola A. Martínez-Buitrago FAR and LC. Binary Co-culture selection from Marine-Derived Microorganisms for differential Production of Specialized Metabolites. *Quim Nov*. 2019;42(7):713–9.
38. Seyedsayamdst MR, Traxler MF, Clardy J, Kolter R. Old meets new: Using interspecies interactions to detect secondary metabolite production in actinomycetes [Internet]. 1st ed. Vol. 517, Methods in Enzymology. Elsevier Inc.; 2012. 89–109 p.

39. Tang YJ, Zhu LW, Li HM, Li DS. Submerged culture of mushrooms in bioreactors - Challenges, current state-of-the-art, and future prospects. *Food Technol Biotechnol*. 2007;45(3):221–9.
40. Žnidaršič P, Pavko A. The Morphology of Filamentous Fungi in Submerged Cultivations as a Bioprocess Parameter. *Food Technol Biotechnol*. 2001;39(3):237–52.
41. Mendes R, Garbeva P, Raaijmakers JM. The rhizosphere microbiome: Significance of plant beneficial, plant pathogenic, and human pathogenic microorganisms. *FEMS Microbiol Rev*. 2013;37(5):634–63.
42. Kumar RS, Moorthy IMG, Baskar R. Modeling and optimization of glutamic acid production using mixed culture of *corynebacterium glutamicum* ncim2168 and *pseudomonas reptilivora* ncim2598. *Prep Biochem Biotechnol*. 2013;43(7):668–81.
43. Verhoeven AB, Durham-Colleran MW, Pierson T, Boswell WT, Van Hoek ML. *Francisella philomiragia* biofilm formation and interaction with the aquatic protist *Acanthamoeba castellanii*. *Biol Bull*. 2010;219(2):178–88.
44. Cheng YF, Jin W, Mao SY, Zhu WY. Rodution of citrate by anaerobic fungi in the presence of co-culture methanogens as revealed by <sup>1</sup>H NMR spectrometry. *Asian-Australasian J Anim Sci*. 2013;26(10):1416–23.
45. Zhu F, Lin Y. Marinamide, a novel alkaloid and its methyl ester produced by the application of mixed fermentation technique to two mangrove endophytic fungi from the South China Sea. *Chinese Sci Bull*. 2006;51(12):1426–30.
46. Pettit RK. Mixed fermentation for natural product drug discovery. *Appl Microbiol Biotechnol*. 2009;83(1):19–25.
47. Deepika VB, Murali TS, Satyamoorthy K. Modulation of genetic clusters for synthesis of bioactive molecules in fungal endophytes: A review. *Microbiol Res* [Internet]. 2016;182:125–40. Available from: <http://dx.doi.org/10.1016/j.micres.2015.10.009>
48. Ebada SS, El-Neketi M, Ebrahim W, Mándi A, Kurtán T, Kalscheuer R, et al. Cytotoxic secondary metabolites from the endophytic fungus *Aspergillus versicolor* KU258497. *Phytochem Lett* [Internet]. 2018;24(January):88–93.
49. Rusli, Rahmaniar D. Penelusuran Potensi Mikroba Endofit dari Rimpang Paku Kepala Tupai (*Drynaria quercifolia* J.Smith) Sebagai Penghasil Senyawa Antibiotik. *As-Syifaa*. 2013;5(2):128–39.
50. Murniasih T. Potensi Mikroorganisme Sebagai Sumber Bahan Obat-obatan Dari Laut Yang Dapat Dibudidayakan. *Oseana*. 2004;XXIX(1):1–7.
51. Handayani D, Artasasta MA. Antibacterial and cytotoxic activities

- screening of symbiotic fungi extract isolated from marine sponge *Neopetrosia chaliniformis* AR-01. *J Appl Pharm Sci.* 2017;7(5):66–9.
52. Radjasa OK, Sabdono A, Zocchi J, Zocchi E. Richness of secondary metabolite-producing marine bacteria associated with sponge *Haliclona* sp. *Int J Pharmacol.* 2007;3(3):275–9.
  53. Thomas TRA, Kavlekar DP, LokaBharathi PA. Marine drugs from sponge-microbe association - A review. *Mar Drugs.* 2010;8(4):1417–68.
  54. Robert.V., Stegehuis G. SJ. Mycobank.
  55. Christensen M, Raper KB. Synoptic key to *Aspergillus nidulans* group species and related *Emericella* species. *Trans Br Mycol Soc* [Internet]. 1978;71(2):177–91.
  56. Handayani D, Rendowati A, Aminah I, Ariantari NP, Proksch P. Bioactive compounds from marine sponge derived fungus *aspergillus unguis* WR8. *Rasayan J Chem.* 2020;13(4):2633–8.
  57. Agrios G. Plant pathology: Fifth edition. Vol. 9780080473, Plant Pathology: Fifth Edition. 2004. 1-922 p.
  58. Bérdy J. Bioactive Microbial Metabolites. *JThe J Antibiot.* 2005;58(1).
  59. Elleuch L, Shaaban M, Smaoui S, Mellouli L, Karray-Rebai I, Fourati-Ben Fguira L, et al. Bioactive secondary metabolites from a new terrestrial streptomyces sp. TN262. *Appl Biochem Biotechnol.* 2010;162(2):579–93.
  60. Sudiyani Y, Triwahyuni E, Burhani D, Muryanto M, Aimani S, Amriani F, et al. Perkembangan Bioetanol G2: Teknologi dan Perspektif [Internet]. 2019. 354 p. Available from: [lipipress.lipi.go.id](http://lipipress.lipi.go.id)
  61. Zaharia C, Suteu D, Bilba D. the Recovery of Streptomycin From Industrial Effluents. *Bull Transilv Univ Brasov.* 2009;1(51):231–5.
  62. Phillip L.R. Bonner AJH. Basic Bioscience Laboratory: A Pocket Guide.
  63. Mitsubishi Chemical Corporation. DIAIONTM Technical Manual - Synthetic adsorbents: DiaionTM and SepabeadsTM. 2009;(1-1-NaN-103):2009.
  64. Handa SS. An Overview of Extraction Techniques for Medicinal and Aromatic Plants. *Extr Technol Med Aromat Plants* [Internet]. 2008;(January 2008):25.
  65. Zhang QW, Lin LG, Ye WC. Techniques for extraction and isolation of natural products: A comprehensive review. *Chinese Med (United Kingdom)* [Internet]. 2018;13(1):1–26. Available from: <https://doi.org/10.1186/s13020-018-0177-x>
  66. Mukhtarini. “Ekstraksi, pemisahan senyawa, dan identifikasi senyawa

aktif.” J Pharm. 2011;V:361.

67. Balouiri M, Sadiki M, Ibnsouda SK. Methods for in vitro evaluating antimicrobial activity: A review. J Pharm Anal [Internet]. 2016;6(2):71–9. Available from: <http://dx.doi.org/10.1016/j.jpha.2015.11.005>
68. Pratiwi SUT. Mikrobiologi Farmasi. Jakarta: Erlangga; 2008.
69. Simoes-Pires CA, Hmicha B, Marston A, Hostettmann K. A TLC bioautographic method for the detection of  $\alpha$ - and  $\beta$ -glucosidase inhibitors in plant extracts. Phytochem Anal. 2009;20(6):511–5.
70. Saikat Dewanjeea, Moumita Gangopadhyayb, Niloy Bhattacharyaa, Ritu Khanraa TKD. Bioautography and its scope in the field of natural product chemistry. J Pharm Anal [Internet]. 2015;5(2):75–84. A
71. Garrity GM, Bell JA, Lilburn TG, Lansing E. Taxonomic Outline of the Prokaryotes Bergey'S Manual® of Systematic Bacteriology, Second Edition. 2004;(May).
72. Desmarchelier P, Fegan N. Pathogens in Milk: Escherichia coli [Internet]. Reference Module in Food Science. Elsevier; 2016. 1-8 p.
73. Gnanamani A, Hariharan P, Paul-Satyaseela M. Staphylococcus aureus: Overview of Bacteriology, Clinical Diseases, Epidemiology, Antibiotic Resistance and Therapeutic Approach. Front Staphylococcus aureus. 2017;
74. Fuda C, Suvorov M, Vakulenko SB, Mobashery S. The basis for resistance to  $\beta$ -lactam antibiotics by penicillin-binding protein 2a of methicillin-resistant Staphylococcus aureus. J Biol Chem [Internet]. 2004;279(39):40802–6.
75. Parasuraman S, Rao A, Balamurugan S, Muralidharan S, Jayaraj Kumar K, Vijayan V. An Overview of Liquid Chromatography-Mass Spectroscopy Instrumentation. Pharm Methods. 5(2):47–55.
76. Pratima NA. Liquid Chromatography-Mass Spectrometry and Its Applications: A Brief Review. Arch Org Inorg Chem Sci. 2018;1(1):26–34.
77. Primer A. Basics of LC/MS.
78. Safirna N. Isolasi Jamur dari Spons Laut Chelonaplysilla sp. dan Uji Aktivitas Antimikroba. 2019.
79. Kjer J, Debbab A, Aly AH, Proksch P. Methods for isolation of marine-derived endophytic fungi and their bioactive secondary products. Nat Protoc. 2010;5(3):479–90.
80. Laboratories H. Actinomycete Isolation Agar. 2011;2. Available from: <http://imedialabs.com/TD/M490.pdf>
81. AthalyeE M, Lacey J, Goodfellow M. Selective Isolation and Enumeration

- of Actinomycetes using Rifampicin. J Appl Bacteriol. 1981;51(2):289–97.
82. Himedia. Actinomyces Broth. Tech Data. 2015;(2).
83. Katili AS, Retnowati Y. Isolation of Actinomycetes from mangrove ecosystem in Torosiaje, Gorontalo, Indonesia. Biodiversitas. 2017;18(2):826–33.
84. D. Salomo Hutahean M.SI. D. Seminar Nasional Biologi. In: Pengembangan Ilmu dan Teknologi kayu Mendukung Implementasi Program Perubahan Iklim. 2014. p. 978–9.
85. Dian Handayani, Esa Afero R. Isolasi Senyawa Kimia Utama dan Uji Aktivitas Antibakteri dari Fraksi Etil Asetat Spon Laut Petrosia nigrans. J Sains dan Teknol Farm. 2009;14.
86. Sukmawaty E, Hafsan, Masri M, Shintia I, Wahyuni S, Amir Una. Skrining Fitokimia Dan Aktivitas Antioksidan Ekstrak Etil Asetat Cendawan Endofit Aspergillus sp. J Biot. 2020;8(2):218–31.
87. Faskalia, Wibowo MA. Skrining Fitokimia, Uji Aktivitas, Antioksidan Dan Uji Sitotoksik Ekstrak Metanol Pada Akar Dan Kulit Batang Soma (*Ploiarium alternifolium*). Jkk. 2014;3(3):1–6.
88. Fajriaty I, Ih H, Setyaningrum R. Skrining Fitokimia dan Analisis Kromatografi Lapis Tipis Dari Ekstrak Etanol Daun Bintangur (*Calophyllum soulattii* Burm .F.). 2018;7(1):54–67.
89. Yuniarsty T, Rosanty A. Pemanfaatan Sari Pati Buah Sukun (*Artocarpus atlitis*) Sebagai Alternatif Media Pertumbuhan *Aspergillus niger*. Biog J Ilm Biol. 2017;5(2):117–21.
90. Corporation MD, Hudson B, Gosnell GR. United States Patent [19]. 1992;458(1972):8–11.
91. Rante H-, Alam G, Usman U, Wahid SNAA. Isolasi Actinomycetes Simbion Sponge Pulau Barrang Caddi Makassar Sebagai Penghasil Senyawa Antimikroba. Maj Farm dan Farmakol. 2020;24(1):25–8.
92. Ventura M, Canchaya C, Tauch A, Chandra G, Fitzgerald GF, Chater KF, et al. Uji Awal Aktivitas Antimikroba dari Actinomycetes 9ISP1 dari Spons Asal Perairan Pulau Randayan. E-Jurnal Ilmu dan Teknol Kelaut Trop [Internet]. 2016;1(1):1–7.
93. Dewi AK. Aktivitas Antifungi Isolat Actinomycetes dari Sampel Pasir Gunung Merapi dengan Lama Fermentasi yang Berbeda Terhadap *Candida albicans*. Universitas Muhammadiyah Surakarta; 2014.
94. Rendowaty A, Djamaan A, Handayani D. Waktu Kultivasi Optimal dan Aktivitas Antibakteri dari Ekstrak Etil Asetat Jamur Simbion *Aspergillus unguis* (WR8) dengan *Halliclona fascigera*. J Sains Farm Klin. 2017;4(1):49.

95. Khattab AI, Babiker EH, Saeed HA. Streptomyces: isolation, optimization of culture conditions and extraction of secondary metabolites. *Int Curr Pharm J.* 2016;5(3):27–32.
96. Rante H, Alam CPG, Si M. Isolasi dan Karakterisasi Actinomycetes-Asosiasi Spns Penghasil Antibiotik Koleksi Pulau Barrang Lombo Makassar. Universitas Gadjah Mada; 2012.
97. Lee JC, Park HR, Park DJ, Lee HB, Kim YB, Kim CJ. Improved production of teicoplanin using adsorbent resin in fermentations. *Lett Appl Microbiol.* 2003;37(3):196–200.
98. Richardson PM, Harborne JB. Phytochemical Methods. Vol. 37, Brittonia. 1985. 309 p.
99. Senjaya YA, Surakusumah W. Potensi Ekstrak Daun Pinus (*Pinus merkusii* Jungh. et de Vriese) Sebagai Bioherbisida Penghambat Perkecambahan *Echinochloa colonum* L. DAN *Amaranthus viridis*. Perennial. 2008;4(1):1.
100. Trisia A, Philyria R, Toemon AN. Antibacterial Activity Test of Ethanol Extract from Kalanduyung Leaf (*Guazuma ulmifolia* Lam.) on *Staphylococcus aureus* Growth with Difussion Method (Kirby-Bauer). *Anterior J [Internet].* 2018;17(2):1–8.
101. Maryati, Sutrisna EM. Potensi Sitotoksik Tanaman Ceplukan (*Physalis angulata* L) Terhadap Sel HeLa. *Pharmacon.* 2007;8(1):1–6.
102. Nofiani R. Urgensi dan Mekanisme Biosintesis Metabolit Sekunder Mikroba Laut. *J Natur Indones.* 2012;10(2):120.
103. Davis WW, Stout TR. Disc plate method of microbiological antibiotic assay. II. Novel procedure offering improved accuracy. *Appl Microbiol.* 1971;22(4):666–70.
104. Vaghasiya Y, Patel H, Chanda S. Antibacterial activity of mangifera indica l. seeds against some human pathogenic bacterial strains. *African J Biotechnol.* 2011;10(70):15788–94.
105. Darsana I, Besung I, Mahatmi H. Potensi Daun Binahong (Anredera Cordifolia (Tenore) Steenis) Dalam Menghambat Pertumbuhan Bakteri Escherichia Coli Secara in Vitro. *Indones Med Veterinus.* 2012;1(3):337–51.
106. Karou D, Savadogo A, Canini A, Yameogo S, Montesano C, Simpore J, et al. Antibacterial activity of alkaloids from *Sida acuta*. *African J Biotechnol.* 2005;4(12):1452–7.
107. Hendra R, Ahmad S, Sukari A, Shukor MY, Oskoueian E. Flavonoid analyses and antimicrobial activity of various parts of *Phaleria macrocarpa* (Scheff.) Boerl fruit. *Int J Mol Sci.* 2011;12(6):3422–31.
108. Gonzalez M. Spongiane Diterpenoids. *Curr Bioact Compd.* 2007;3(1):1–

36.

109. Keifer G, Effenberger F. Uji Aktivitas Antifungi Ekstrak Etanol Gal Makjakani (*Quercus infectoria*) terhadap *Candida albicans*. *Angew Chemie Int Ed*. 1967;6(11):951–2.
110. Seger C, Salzmann L. After another decade: LC–MS/MS became routine in clinical diagnostics. *Clin Biochem* [Internet]. 2020;82:2–11. Available from: <https://doi.org/10.1016/j.clinbiochem.2020.03.004>
111. Gritti F, Guiochon G. Effect of the endcapping of reversed-phase high-performance liquid chromatography adsorbents on the adsorption isotherm. *J Chromatogr A*. 2005;1098(1–2):82–94.
112. Yu M, Li Y, Banakar SP, Liu L, Shao C, Li Z, et al. New metabolites from the Co-culture of marine-derived actinomycete *streptomyces rochei* MB037 and fungus *rhinocladiella similis*35. *Front Microbiol*. 2019;10(MAY):1–11.

