UNIVERSITAS
GADJAH MADA
DETEKSI GEN NON-RIBOSOMAL PEPTIDE SYNTHASE (nrps) PADA MARINE AKTINOBAKTERIA YANG BERASOSIASI DENGAN SPONS DAN AKTIVITAS METABOLITNYA PADA VIBRIO
WISNU ADHI SUSILA, Noer Kasanah, S.Si., Apt., M.Si., Ph.D. ; Dr. Ir. Triyanto, M.Si
Universitas Gadjah Mada, 2018 | Diunduh dari http://etd.repository.ugm.ac.id/

DAFTAR PUSTAKA

Austin, B. 2010. Vibrios as causal agents of zoonoses. *Vet. Microbiol*. 140: 310-317.

Austin, B., Stobie, M., Robertson, P. A. W., Glass, H. G., Stark, J. R., and Mudarris, M. 1993. *Vibrio alginolyticus*: the cause of gill disease leading to progressive low-level mortalities among juvenile turbot, *Scophthalmus maximus* L., in a Scottish aquarium. *J. Fish Dis*. 16: 277-280.

Austin, B., and Zhang, X. H. 2006. *Vibrio harveyi*: a significant pathogen of marine vertebrates and invertebrates. *Lett. Appl. Microbiol*. 43: 119-124.

Ayuso-Sacido, A., and Genilloud, O. 2005. New PCR primers for the screening of NRPS and PKS-I systems in actinomycetes: detection and distribution of these biosynthetic gene sequences in major taxonomic groups. *Microb. Ecol*. 49: 10-24.

Bode, H.B., Bethe, B., Höfs, R. and Zeeck, A. 2002. Big effects from small changes: possible ways to explore nature's chemical diversity. *Chem. Bio. Chem*. 3: 619-627.

Bose, U., Hewavitharana, A. K., Ng, Y. K., Shaw, P. N., Fuerst, J. A., and Hodson, M. P. 2015. LC-MS-Based metabolomics study of marine bacterial secondary metabolite and antibiotic production in *Salinispora arenicola*. *Mar. Drugs*. 13: 249-266.

Bruno, D. W., Griffiths, J., Petrie, J., and Hastings, T. S. 1998. *Vibrio viscosus* in farmed Atlantic salmon *Salmo salar* in Scotland: field and experimental observations. *Dis. Aquat. Organ*. 34: 161-166.

Bull, A. T. and Stach, J. E. 2007. Marine actinobacteria: new opportunities for natural product search and discovery. *Trends. Microbiol*. 15: 491-499.

Candeias, L., MacFarlane, D. S., McWhinnie, S. W., Maidwell, N., Roeschlaub, C. and Sammes, P. 1998. The catalysed NADH reduction of resazurin to resorufin. *J. Chem. Soc., Perkin Trans. 2*. 11: 2333-2334.

Case, R. J., Boucher, Y., Dahllöf, I., Holmström, C., Doolittle, W. F., and Kjelleberg, S. 2007. Use of 16S rRNA and rpoB genes as molecular markers for microbial ecology studies. *Appl. Environ. Microbiol.* 73: 278-288.

Chen, J. L., Steele, T. W. and Stuckey, D. C. 2015. Modeling and application of a rapid fluorescence-based assay for biotoxicity in anaerobic digestion. *Environ. Sci. Technol*. 49: 13463-13471.

Chen, P., Zhang, L., Wang, J., Ruan, J., Han, X. and Huang, Y. 2016. *Brevibacterium sediminis* sp. nov., isolated from deep-sea sediments from the Carlsberg and Southwest Indian Ridges. *Int. J. Syst. Evol. Microbiol*. 66: 5268-5274.

Choi, E.J., Kwon, H.C., Ham, J. and Yang, H.O. 2009. 6-Hydroxymethyl-1-phenazine-carboxamide and 1, 6-phenazinedimethanol from a marine bacterium, *Brevibacterium* sp. KMD 003, associated with marine purple vase sponge. *J. Antibiot*. 62: 621-624.

Das, M., Royer, T. V., and Leff, L. G. 2007. Diversity of fungi, bacteria, and actinomycetes on leaves decomposing in a stream. *Appl. Environ. Microbiol.* 73: 756-767.

UNIVERSITAS
GADJAH MADA
DETEKSI GEN NON-RIBOSOMAL PEPTIDE SYNTHASE (nrps) PADA MARINE AKTINOBAKTERIA YANG BERASOSIASI DENGAN SPONS DAN AKTIVITAS METABOLITNYA PADA VIBRIO
WISNU ADHI SUSILA, Noer Kasanah, S.Si., Apt., M.Si., Ph.D. ; Dr. Ir. Triyanto, M.Si
Universitas Gadjah Mada, 2018 | Diunduh dari http://etd.repository.ugm.ac.id/

Das, S. 2014. Microbial Biodegradation and Bioremediation. Elsevier. pp 270.

Das, P., Mukherjee, S. and Sen, R., 2008. Antimicrobial potential of a lipopeptide biosurfactant derived from a marine *Bacillus circulans*. *J. Appl. Microbiol*. 104(6), pp.1675-1684.

Dechet, A. M., Patricia, A. Y., Koram, N., and Painter, J. 2008. Nonfoodborne *Vibrio* infections: an important cause of morbidity and mortality in the United States, 1997–2006. *Clin. Infect. Dis.* 46: 970-976.

Delgado, O., Quillaguamán, J., Bakhtiar, S., Mattiasson, B., Gessesse, A. and Hatti-Kaul, R. 2006. *Nesterenkonia aethiopica* sp. nov., an alkaliphilic, moderate halophile isolated from an Ethiopian soda lake. *Int. J. Syst. Evol. Microbiol*. 56: 1229-1232.

Demain, A. L., and Sanchez, S. 2009. Microbial drug discovery: 80 years of progress. *J. Antibio*t. 62: 5-16.

Departemen Kelautan dan Perikanan. 2009. Buku Saku Pengendalian Penyakit Ikan. Direktorat Jenderal Perikanan Budidaya Direktorat Kesehatan Ikan dan Lingkungan.

Desriac, F., Jégou, C., Balnois, E., Brillet, B., Chevalier, P. L., and Fleury, Y. 2013. Antimicrobial peptides from marine proteobacteria. *Mar. Drugs*. 11: 3632-3660.

Dharmaraj, S. 2010. Marine Streptomyces as a novel source of bioactive substances. *World J. Microbiol. Biotechnol*. 26: 2123-2139.

Eaves, L. E., and Ketterer, P. J. 1994. Mortalities in red claw crayfish *Cherax quadricarinatus* associated with systemic *Vibrio mimicus* infection. *Dis. Aquat. Organ*. 19: 233-237.

Elmahdi, S., Da Silva, L. V., and Parveen, S. 2016. Antibiotic resistance of *Vibrio parahaemolyticus* and *Vibrio vulnificus* in various countries: A review. *Food Microbiol.* 57: 128-134.

Essam, H. M., Abdellrazeq, G. S., Tayel, S. I., Torky, H. A., and Fadel, A. H. 2016. Pathogenesis of *Photobacterium damselae* subspecies infections in sea bass and sea bream. *Microb. Pathog*. 99: 41-50.

Esteve, C., Amaro, C., Biosca, E. G., and Garay, E. 1995. Biochemical and toxigenic properties of *Vibrio furnissii* isolated from a European eel farm. Aquaculture. 132: 81-90.

Feling, R. H., Buchanan, G. O., Mincer, T. J., Kauffman, C. A., Jensen, P. R., and Fenical, W. 2003. Salinosporamide A: a highly cytotoxic proteasome inhibitor from a novel microbial source, a marine bacterium of the new genus *Salinospora*. *Angew. Chem. Int. Ed.* 42: 355-357.

Fenical, W. and Jensen, P. R. 2006. Developing a new resource for drug discovery: marine actinomycete bacteria. *Nat. Chem. Biol*. 2: 666-673.

Finkelstein, R., and Oren, I. 2011. Soft tissue infections caused by marine bacterial pathogens: epidemiology, diagnosis, and management. *Curr. Infect. Dis. Rep*. 13: 470-477.

Frans, I., Michiels, C. W., Bossier, P., Willems, K. A., Lievens, B., and Rediers, H. 2011. *Vibrio anguillarum* as a fish pathogen: virulence factors, diagnosis and prevention. *J. Fish Dis*. 34: 643-661.

UNIVERSITAS
GADJAH MADA
DETEKSI GEN NON-RIBOSOMAL PEPTIDE SYNTHASE (nrps) PADA MARINE AKTINOBAKTERIA YANG BERASOSIASI DENGAN SPONS DAN AKTIVITAS METABOLITNYA PADA VIBRIO
WISNU ADHI SUSILA, Noer Kasanah, S.Si., Apt., M.Si., Ph.D. ; Dr. Ir. Triyanto, M.Si
Universitas Gadjah Mada, 2018 | Diunduh dari http://etd.repository.ugm.ac.id/

Fouz, B., Larsen, J. L., and Amaro, C. 2006. *Vibrio vulnificus* serovar A: an emerging pathogen in *European anguilliculture*. *J. Fish Dis*. 29: 285-291.

Gontang, E.A., Gaudêncio, S.P., Fenical, W. and Jensen, P.R., 2010. Sequence-based analysis of secondary-metabolite biosynthesis in marine actinobacteria. *Appl. Environ. Microbiol*. 76: 2487-2499.

Gribble, G. W. 2004. Natural organohalogens: a new frontier for medicinal agents?. *J. Chem. Educ*. 81: 1441-1449.

Gulder, T. A., and Moore, B. S. 2009. Chasing the treasures of the sea—bacterial marine natural products. *Curr. Opin. Microbiol*. 12: 252-260.

Heaton, M. P., and Neuhaus, F. C. 1992. Biosynthesis of D-alanyl-lipoteichoic acid: cloning, nucleotide sequence, and expression of the *Lactobacillus casei* gene for the D-alanine-activating enzyme. *J. Bacteriol.* 174: 4707-4717.

Helmke, E., and Weyland, H. 1984. *Rhodococcus marinonascens* sp. nov., an actinomycete from the sea. *Int. J. Syst. Evol. Microbiol.* 34: 127-138.

Hemphill, C.F.P., Sureechatchaiyan, P., Kassack, M.U., Orfali, R.S., Lin, W., Daletos, G. and Proksch, P. 2017. OSMAC approach leads to new fusarielin metabolites from *Fusarium tricinctum*. *J. Antibiot*. 70: 1-7.

Heuer, H., Krsek, M., Baker, P., Smalla, K., and Wellington, E. M. 1997. Analysis of actinomycete communities by specific amplification of genes encoding 16S rRNA and gel-electrophoretic separation in denaturing gradients. *Appl. Environ. Microbiol.* 63: 3233-3241.

Hughes, C. C., and Fenical, W. 2010. Antibacterials from the sea. *Chem. Eur. J*. 16: 12512-12525.

Hur, G. H., Vickery, C. R., and Burkart, M. D. 2012. Explorations of catalytic domains in non-ribosomal peptide synthetase enzymology. *Nat. Prod. Rep*. 29: 1074-1098.

Ikeda, H., Shin-ya, K. and Omura, S. 2014. Genome mining of the *Streptomyces avermitilis* genome and development of genome-minimized hosts for heterologous expression of biosynthetic gene clusters. *J. Ind. Microbiol. Biotechnol*. 41: 233-250.

Imhoff, J. F., and Stöhr, R. 2003. Sponge-associated bacteria: general overview and special aspects of bacteria associated with *Halichondria panicea*. In Sponges (Porifera). Springer Berlin Heidelberg. pp. 35-57.

Ishimaru, K., Akagawa-Matsushita, M., and Muroga, K. 1995. *Vibrio penaeicida* sp. nov., a pathogen of kuruma prawns (*Penaeus japonicus*). *Int. J. Syst. Evol. Microbiol*. 45: 134-138.

Ishimaru, K., Akagawa-Matsushita, M., and Muroga, K. 1996. *Vibrio ichthyoenteri* sp. nov., a pathogen of Japanese flounder (*Paralichthys olivaceus*) larvae. *Int. J. Syst. Evol. Microbiol*. 46: 155-159.

Itoh, T., Kinoshita, M., Aoki, S., and Kobayashi, M. 2003. Komodoquinone A, a novel neuritogenic anthracycline, from marine *Streptomyces* sp. KS3. *J. Nat. Prod*. 66: 1373-1377.

Janda, J. M., and Abbott, S. L. 2007. 16S rRNA gene sequencing for bacterial identification in the diagnostic laboratory: pluses, perils, and pitfalls. *J. Clin. Microbiol*. 45: 2761-2764.

UNIVERSITAS
GADJAH MADA
DETEKSI GEN NON-RIBOSOMAL PEPTIDE SYNTHASE (nrps) PADA MARINE AKTINOBAKTERIA YANG BERASOSIASI DENGAN SPONS DAN AKTIVITAS METABOLITNYA PADA VIBRIO
WISNU ADHI SUSILA, Noer Kasanah, S.Si., Apt., M.Si., Ph.D. ; Dr. Ir. Triyanto, M.Si
Universitas Gadjah Mada, 2018 | Diunduh dari http://etd.repository.ugm.ac.id/

Janda, J. M., Newton, A. E., and Bopp, C. A. 2015. Vibriosis. *Clin. Lab. Med*. 35: 273-288.

Jensen, P.R., 2016. Natural products and the gene cluster revolution. *Trend. Microbiol*. 24: 968-977.

Jensen, P. R., Gontang, E., Mafnas, C., Mincer, T. J., and Fenical, W. 2005. Culturable marine actinomycete diversity from tropical Pacific Ocean sediments. *Environ. Microbiol.* 7: 1039-1048.

Jensen, S., Samuelsen, O. B., Andersen, K., Torkildsen, L., Lambert, C., Choquet, G., Paillard, C and Bergh, Ø. 2003. Characterization of strains of *Vibrio splendidus* and *V. tapetis* isolated from corkwing wrasse *Symphodus melops* suffering vibriosis. *Dis. Aquat. Org*. 53: 25-31.

Ji, R., Zou, W., Hu, S., and Yan, Q. 2008. Vaccination in three different ways against vibriosis of *Seriola dumerili* caused by *Vibrio hollisae*. *Chin. J. Oceanol. Limn*. 26: 233-237.

Jiang, S., Li, X., Zhang, L., Sun, W., Dai, S., Xie, L., Liu, Y. and Lee, K. J., 2008. Culturable actinobacteria isolated from marine sponge *Iotrochota* sp. *Mar. Biol*. 153: 945-952.

Jiang, S., Sun, W., Chen, M., Dai, S., Zhang, L., Liu, Y., Lee., K. J. and Li, X. 2007. Diversity of culturable actinobacteria isolated from marine sponge *Haliclona* sp. *Antonie Van Leeuwenhoek*, 92: 405-416.

Jun, L. and Woo, N.Y.S. 2003. Pathogenicity of vibrios in fish: An overview. *J. Ocean Univ. China*. 2: 117-128.

Kang, C. H., Shin, Y., Jang, S., Jung, Y., and So, J. S. 2016. Antimicrobial susceptibility of *Vibrio alginolyticus* isolated from oyster in Korea. *Environ. Sci. Pollut. Res*. 23: 21106-21112.

Kasanah, N., Rao, K. V., Yousaf, M., Wedge, D. E., Hill, R. T. and Hamann, M. T. 2004. Biotransformation studies of the manzamine alkaloid. *Mar. Biotechnol*. 6: 68-72.

Kennedy, J., Marchesi, J., R., and Dobson, A. D. W. 2007. Metagenomic approaches to exploit the biotechnological potential of the microbial consortia of marine sponges. *Appl. Microbiol. Biotechnol*. 75: 11–20.

Kim, T.K., Hewavitharana, A.K., Shaw, P.N. and Fuerst, J.A., 2006. Discovery of a new source of rifamycin antibiotics in marine sponge actinobacteria by phylogenetic prediction. *Appl. Environ. Microbiol*. 72: 2118-2125.

Konz, D., Doekel, S. and Marahiel, M. A. 1999. Molecular and biochemical characterization of the protein template controlling biosynthesis of the lipopeptide lichenysin. *J. Bacteriol*. 181: 133-140.

Kurian, A. and Sankar, M.A., 2007. Medicinal plants (Vol. 2). New India Publishing.

Labella, A., Vida, M., Alonso, M. C., Infante, C., Cardenas, S., Lopez-Romalde, S., Manchado, M. and Borrego, J. J. 2006. First isolation of *Photobacterium damselae* ssp. *damselae* from cultured redbanded seabream, *Pagrus auriga* Valenciennes, in Spain. *J. Fish Dis*. 29: 175-179.

Lam, K. S. 2006. Discovery of novel metabolites from marine actinomycetes. *Curr. Opin. Microbiol*. 9: 245-251.

UNIVERSITAS
GADJAH MADA
DETEKSI GEN NON-RIBOSOMAL PEPTIDE SYNTHASE (nrps) PADA MARINE AKTINOBAKTERIA YANG BERASOSIASI DENGAN SPONS DAN AKTIVITAS METABOLITNYA PADA VIBRIO
WISNU ADHI SUSILA, Noer Kasanah, S.Si., Apt., M.Si., Ph.D. ; Dr. Ir. Triyanto, M.Si
Universitas Gadjah Mada, 2018 | Diunduh dari http://etd.repository.ugm.ac.id/

Lasa, A., Avendaño-Herrera, R., Estrada, J. M., and Romalde, J. L. 2015. Isolation and identification of *Vibrio toranzoniae* associated with diseased red conger eel (*Genypterus chilensis*) farmed in Chile. *Vet. Microbiol*. 179: 327-331.

Leaño, E. M., Lavilla-Pitogo, C. R., and Paner, M. G. 1998. Bacterial flora in the hepatopancreas of pond-reared *Penaeus monodon* juveniles with luminous vibriosis. *Aquaculture*. 164: 367-374.

Lee, K. K. 1995. Pathogenesis studies on *Vibrio alginolyticus* in the grouper, *Epinephelus malabaricus*, Bloch et Schneider. *Microb. Pathog*, 19: 39-48.

Lee, T.V., Johnson, R.D., Arcus, V.L. and Lott, J.S. 2015. Prediction of the substrate for nonribosomal peptide synthetase (NRPS) adenylation domains by virtual screening. Proteins: Structure, Function, and Bioinformatics. 83: 2052-2066.

Liu, B. X., Guo, Q., Peng, G. T., He, X. X., Chen, X. J., Lei, L .F., Deng, Y., Jun Su, X. and Zhang, C. X. 2016. New cyclic tetrapeptide from the coral-derived endophytic bacteria *Brevibacterium* sp. L-4 collected from the South China Sea. *Nat. Prod. Res*. 30: 7-12.

Liu, C. H., Cheng, W., Hsu, J. P., and Chen, J. C. 2004. *Vibrio alginolyticus* infection in the white shrimp *Litopenaeus vannamei* confirmed by polymerase chain reaction and 16S rDNA sequencing. *Dis. Aquat. Organ*, 61: 169-174.

Liu, P. C., Lin, J. Y., Hsiao, P. T., and Lee, K. K. 2004. Isolation and characterization of pathogenic *Vibrio alginolyticus* from diseased cobia *Rachycentron canadum*. J. *Basic Microbiol*. 44: 23-28.

Manivasagan, P., Kang, K. H., Sivakumar, K., Li-Chan, E. C., Oh, H. M., and Kim, S. K. 2014. Marine actinobacteria: An important source of bioactive natural products. *Environ. Toxicol. Pharmacol*. 38: 172-188.

Manivasagan, P., Venkatesan, J., Sivakumar, K., and Kim, S. K. 2013. Marine actinobacterial metabolites: current status and future perspectives. *Microbiol. Res*. 168: 311-332.

McIntosh, J. A., Donia, M. S., & Schmidt, E. W. 2009. Ribosomal peptide natural products: bridging the ribosomal and nonribosomal worlds. *Nat. Prod. Rep*. 26: 537-559.

Mincer, T. J., Fenical, W., and Jensen, P. R. 2005. Culture-dependent and culture-independent diversity within the obligate marine actinomycete genus *Salinispora*. *Appl. Environ. Microbiol*. 71: 7019-7028.

Molinski, T. F., Dalisay, D. S., Lievens, S. L., and Saludes, J. P. 2009. Drug development from marine natural products. *Nat. Rev. Drug Discov*. 8: 69-85.

Nitimulyo, K. H., Isnanstyo, A., Triyanto, dan Murdjani, M. 2005. Isolasi, identifikasi dan karakterisasi Vibrio spp. patogen penyebab vibriosis pada kerapu di Balai Budidaya Air Payau Situbondo. *J. Perikanan*. 7: 80-94.

Neumann, C. S., Fujimori, D. G., and Walsh, C. T. 2008. Halogenation strategies in natural product biosynthesis. *Chem. Biol*. 15: 99-109.

UNIVERSITAS
GADJAH MADA
DETEKSI GEN NON-RIBOSOMAL PEPTIDE SYNTHASE (nrps) PADA MARINE AKTINOBAKTERIA YANG BERASOSIASI DENGAN SPONS DAN AKTIVITAS METABOLITNYA PADA VIBRIO
WISNU ADHI SUSILA, Noer Kasanah, S.Si., Apt., M.Si., Ph.D. ; Dr. Ir. Triyanto, M.Si
Universitas Gadjah Mada, 2018 | Diunduh dari http://etd.repository.ugm.ac.id/

O'brien, J., Wilson, I., Orton, T. and Pognan, F. 2000. Investigation of the Alamar Blue (resazurin) fluorescent dye for the assessment of mammalian cell cytotoxicity. *Eur. J. Biochem*. 267: 5421-5426.

Pathom-Aree, W., Stach, J. E., Ward, A. C., Horikoshi, K., Bull, A. T. and Goodfellow, M., 2006. Diversity of actinomycetes isolated from Challenger Deep sediment (10,898 m) from the Mariana Trench. *Extremophiles*. 10: 181-189.

Pedersen, K., Skall, H. F., Lassen-Nielsen, A. M., Bjerrum, L., and Olesen, N. J. 2009. *Photobacterium damselae* subsp. *damselae*, an emerging pathogen in Danish rainbow trout, *Oncorhynchus mykiss* (Walbaum), mariculture. *J. Fish Dis*. 32: 465-472.

Penn, K., and Jensen, P. R. 2012. Comparative genomics reveals evidence of marine adaptation in *Salinispora* species. *BMC genomics*, 13: 1-12.

Pesic, A., Baumann, H. I., Kleinschmidt, K., Ensle, P., Wiese, J., Süssmuth, R. D. and Imhoff, J. F. 2013. Champacyclin, a new cyclic octapeptide from Streptomyces strain C42 isolated from the Baltic Sea. *Mar. Drugs*. 11: 4834-4857.

Powers, E.M., 1995. Efficacy of the Ryu nonstaining KOH technique for rapidly determining gram reactions of food-borne and waterborne bacteria and yeasts. *Appl. Environ. Microbiol*. 61: 3756-3758.

Prado, S., Dubert, J., Romalde, J. L., Toranzo, A. E., and Barja, J. L. 2014. *Vibrio ostreicida* sp. nov., a new pathogen of bivalve larvae. *Int. J. Syst. Evol. Microbiol*. 64: 1641-1646.

Prieto, C., García-Estrada, C., Lorenzana, D., and Martín, J. F. 2012. NRPSsp: non-ribosomal peptide synthetase substrate predictor. *Bioinformatics* 28: 426-427.

Puder, C., Krastel, P. and Zeeck, A. 2000. Streptazones A, B1, B2, C, and D: new piperidine alkaloids from streptomycetes. *J. Nat. Prod*. 63: 1258-1260.

Puder, C., Loya, S., Hizi, A. and Zeeck, A. 2001. New co-metabolites of the streptazolin pathway. *J. Nat. Prod.* 64: 42-45.

Rao, K. V., Kasanah, N., Wahyuono, S., Tekwani, B. L., Schinazi, R. F., and Hamann, M. T. 2004. Three new manzamine alkaloids from a common indonesian sponge and their activity against infectious and tropical parasitic diseases. *J. Nat. Prod*. 67: 1314-1318.

Reimer, J. M., Aloise, M. N., Harrison, P. M., and Schmeing, T. M. 2016. Synthetic cycle of the initiation module of a formylating nonribosomal peptide synthetase. *Nature*. 529: 239-242.

Robbel, L., and Marahiel, M. A. 2010. Daptomycin, a bacterial lipopeptide synthesized by a nonribosomal machinery. *J. Biol. Chem*. 285: 27501-27508.

Rutledge, P. J. and Challis, G. L. 2015. Discovery of microbial natural products by activation of silent biosynthetic gene clusters. *Nat. Rev. Microbiol*. 13: 509-523.

Salomon, C. E., Magarvey, N. A., and Sherman, D. H. 2004. Merging the potential of microbial genetics with biological and chemical diversity: an even

UNIVERSITAS
GADJAH MADA
DETEKSI GEN NON-RIBOSOMAL PEPTIDE SYNTHASE (nrps) PADA MARINE AKTINOBAKTERIA YANG BERASOSIASI DENGAN SPONS DAN AKTIVITAS METABOLITNYA PADA VIBRIO
WISNU ADHI SUSILA, Noer Kasanah, S.Si., Apt., M.Si., Ph.D. ; Dr. Ir. Triyanto, M.Si
Universitas Gadjah Mada, 2018 | Diunduh dari http://etd.repository.ugm.ac.id/

brighter future for marine natural product drug discovery. *Nat. Prod. Rep*. 21: 105-121.

Sarker, S. D., Nahar, L. and Kumarasamy, Y. 2007. Microtitre plate-based antibacterial assay incorporating resazurin as an indicator of cell growth, and its application in the in vitro antibacterial screening of phytochemicals. Methods. 42: 321-324.

Scarano, C., Spanu, C., Ziino, G., Pedonese, F., Dalmasso, A., Spanu, V., Virdis, S. and De Santis, E. P. 2014. Antibiotic resistance of *Vibrio* species isolated from *Sparus aurata* reared in Italian mariculture. *New Microbiol*. 37: 329-337.

Schneemann, I., Nagel, K., Kajahn, I., Labes, A., Wiese, J., and Imhoff, J. F. 2010. Comprehensive investigation of marine Actinobacteria associated with the sponge *Halichondria panicea*. *Appl. Environ. Microbiol*. 76: 3702-3714.

Schwarzer, D., Finking, R., and Marahiel, M. A. 2003. Nonribosomal peptides: from genes to products. *Nat. Prod. Rep*. 20: 275-287.

Schwarzer, D., and Marahiel, M. A. 2001. Multimodular biocatalysts for natural product assembly. *Naturwissenschaften*. 88: 93-101.

Silva-Rubio, A., Acevedo, C., Magariños, B., Jaureguiberry, B., Toranzo, A. E., and Avendaño-Herrera, R. 2008. Antigenic and molecular characterization of *Vibrio ordalii* strains isolated from Atlantic salmon *Salmo salar* in Chile. *Dis. Aquat. Organ*. 79: 27-35.

Spížek, J., Novotná, J., Řezanka, T., & Demain, A. L. 2010. Do we need new antibiotics? The search for new targets and new compounds. *J. Ind. Microbiol. Biotechnol*. 37: 1241-1248.

Stackebrandt, E. and Goebel, B. M., 1994. Taxonomic note: a place for DNA-DNA reassociation and 16S rRNA sequence analysis in the present species definition in bacteriology. *Int. J. Syst. Evol. Microbiol*. 44: 846-849.

Tang, S.K., Wang, Y., Schumann, P., Stackebrandt, E., Lou, K., Jiang, C.L., Xu, L.H. and Li, W.J. 2008. *Brevibacterium album* sp. nov., a novel actinobacterium isolated from a saline soil in China. *Int. J. Syst. Evol. Microbiol*. 58: 574-577.

Taylor, M. W., Radax, R., Steger, D., and Wagner, M. 2007. Sponge-Associated Microorganisms : Evolution , Ecology , and Biotechnological Potential. *Microbiol. Mol. Biol. Rev*. 71: 295–347.

Thompson, F. L., Iida, T., and Swings, J. 2004. Biodiversity of Vibrios. *Microbiol. Mol. Biol. Rev*. 68: 403-431.

Thompson, J. R., and Polz, M. F. 2006. *Dynamics of Vibrio populations and their role in environmental nutrient cycling*. *The Biology of Vibrio*. Washington: ASM Press

Trindade, M., van Zyl, L. J., Navarro-Fernández, J., and Elrazak, A. A. 2015. Targeted metagenomics as a tool to tap into marine natural product diversity for the discovery and production of drug candidates. *Front. Microbiol*. 6: 1-14.

Urakawa, H. and Rivera, I. N. G. 2006. Aquatic environment. The Biology of Vibrio. ASM Press. Washington. pp 175-189.

UNIVERSITAS
GADJAH MADA
DETEKSI GEN NON-RIBOSOMAL PEPTIDE SYNTHASE (nrps) PADA MARINE AKTINOBAKTERIA YANG BERASOSIASI DENGAN SPONS DAN AKTIVITAS METABOLITNYA PADA VIBRIO
WISNU ADHI SUSILA, Noer Kasanah, S.Si., Apt., M.Si., Ph.D. ; Dr. Ir. Triyanto, M.Si
Universitas Gadjah Mada, 2018 | Diunduh dari http://etd.repository.ugm.ac.id/

Villamil, L., Figueras, A., Toranzo, A. E., Planas, M., and Novoa, B. 2003. Isolation of a highly pathogenic *Vibrio pelagius* strain associated with mass mortalities of turbot, *Scophthalmus maximus* (L.), larvae. *J. Fish Dis*. 26: 293-303.

Vior, N.M., Lacret, R., Chandra, G., Dorai-Raj, S., Trick, M. and Truman, A.W., 2018. Discovery and biosynthesis of the antibiotic bicyclomycin in distantly related bacterial classes. *Appl. Environ. Microbiol*. 84: 8-17.

Walsh, C. 2003. Where will new antibiotics come from? *Nat. Rev. Microbiol*. 1: 65-70.

Wan, X., Shen, H., Wang, L., and Cheng, Y. 2011. Isolation and characterization of *Vibrio metschnikovii* causing infection in farmed *Portunus trituberculatus* in China. *Aquac. Int*. 19: 351-359.

Wang, R. X., Wang, J. Y., Sun, Y. C., Yang, B. L., and Wang, A. L. 2015. Antibiotic resistance monitoring in *Vibrio* spp. isolated from rearing environment and intestines of abalone *Haliotis diversicolor*. *Marine Poll. Bull*. 101: 701-706.

Ward, A. C. and Bora, N. 2006. Diversity and biogeography of marine Actinobacteria. *Curr. Opin. Microbiol*. 9: 279-286.

Waters, A. L., Peraud, O., Kasanah, N., Sims, J. W., Kothalawala, N., Anderson, M. A., Abbas, S.H., Rao, V. R., Jupally, V. R., Kelly, M., Dass, A., Hill, R. T., and Hamann, M.T. 2014. An analysis of the sponge *Acanthostrongylophora ingens* microbiome yields an Actinomycete that produces the natural product manzamine A. *Front. Mar. Sci*. 1: 1-15.

Winn, M., Fyans, J. K., Zhuo, Y., and Micklefield, J. 2016. Recent advances in engineering nonribosomal peptide assembly lines. *Nat. Prod. Rep.* 33: 317-347.

Wu, Q., Zhang, G., Wang, B., Li, X., Yue, S., Chen, J., Zhang, H. and Wang, H. 2018. Production and Identification of Inthomycin B Produced by a Deep-Sea Sediment-Derived *Streptomyces* sp. YB104 Based on Cultivation-Dependent Approach. *Curr. Microbiol*. pp.1-10.

Xi, L., Ruan, J. and Huang, Y., 2012. Diversity and biosynthetic potential of culturable actinomycetes associated with marine sponges in the China seas. *Int. J. Mol. Sci*. 13: 5917-5932.

Xie, C.L., Liu, Q., Xia, J.M., Gao, Y., Yang, Q., Shao, Z.Z., Liu, G. and Yang, X.W. 2017. Anti-allergic compounds from the deep-sea-derived actinomycete *Nesterenkonia flava* MCCC 1K00610. *Mar Drugs*. 15: .2-8.

Yamanaka, K., Reynolds, K.A., Kersten, R.D., Ryan, K.S., Gonzalez, D.J., Nizet, V., Dorrestein, P.C. and Moore, B.S., 2014. Direct cloning and refactoring of a silent lipopeptide biosynthetic gene cluster yields the antibiotic taromycin A. *Proc. Natl. Acad. Sci*. 111: 1957-1962.

Yu, Q., Niu, M., Yu, M., Liu, Y., Wang, D., and Shi, X. 2016. Prevalence and antimicrobial susceptibility of *Vibrio parahaemolyticus* isolated from retail shellfish in Shanghai. *Food Control*. 60: 263-268.

Zhu, P., Li, Q., and Wang, G. 2008. Unique microbial signatures of the alien hawaiian marine sponge *Suberites zeteki*. *Microbial. Ecol*. 55: 406–414

UNIVERSITAS
GADJAH MADA
DETEKSI GEN NON-RIBOSOMAL PEPTIDE SYNTHASE (nrps) PADA MARINE AKTINOBAKTERIA YANG BERASOSIASI DENGAN SPONS DAN AKTIVITAS METABOLITNYA PADA VIBRIO
WISNU ADHI SUSILA, Noer Kasanah, S.Si., Apt., M.Si., Ph.D. ; Dr. Ir. Triyanto, M.Si
Universitas Gadjah Mada, 2018 | Diunduh dari http://etd.repository.ugm.ac.id/

Zotchev, S. B. 2012. Marine actinomycetes as an emerging resource for the drug development pipelines. *J. Biotechnol*. 158: 168-175.