

DAFTAR PUSTAKA

- Alrefaei, A. F., Albeshr, M. F., & Pizzio, G. A. (2022). 16S rRNA gene identification and phylogenetic analysis of dhofar toad (*Bufo dhufarensis*) from riyadh province, saudi arabia. *Journal of King Saud University - Science*, 34(4), 101972. <https://doi.org/10.1016/j.jksus.2022.101972>
- Barakat, K. M., Ismail, M. M., Abou El Hassayeb, H. E., El Sersy, N. A., & Elshobary, M. E. (2022). Chemical characterization and biological activities of ulvan extracted from *Ulva fasciata* (Chlorophyta). *Rendiconti Lincei*, 33(4), 829–841. <https://doi.org/10.1007/s12210-022-01103-7>
- Bäumgen, M., Dutschei, T., Bartosik, D., Suster, C., Reisky, L., Gerlach, N., Stanetty, C., Mihovilovic, M. D., Schweder, T., & Hehemann, J. (2021). RESEARCH ARTICLE A new carbohydrate-active oligosaccharide dehydratase is involved in the degradation of ulvan. *Journal of Biological Chemistry*, 297(4), 101210. <https://doi.org/10.1016/j.jbc.2021.101210>
- Cao, T. T. H., Tran, N. H. V., Nguyen, T. T., Vo, T. D. T., Hoang, H. H., Ngo, T. D. N., Phan, T. H. T., Huynh, H. N. K., Tran, V. H., Tran, T. T. Van, & Pham, D. T. (2025). Diversity of seaweed-derived marine bacteria producing sulfated polysaccharide-degrading enzymes: Isolation, Screening, and Identification. *Vietnam Journal of Marine Science and Technology*, 25(2), 141–150. <https://doi.org/10.15625/1859-3097/22729>
- Carlson, R. R., Evans, L. J., Foo, S. A., Grady, B. W., Li, J., Seeley, M., Xu, Y., & Asner, G. P. (2021). Synergistic benefits of conserving land-sea ecosystems. *Global Ecology and Conservation*, 28(November 2020), e01684. <https://doi.org/10.1016/j.gecco.2021.e01684>
- Chen, H., Zhou, D., Luo, G., Zhang, S., & Chen, J. (2015). *Macroalgae for biofuels production : Progress and perspectives*. 47, 427–437. <https://doi.org/10.1016/j.rser.2015.03.086>
- Costa, M. M., Pio, L. B., Bule, P., Cardoso, V. A., Duarte, M., Alfaia, C. M., Coelho, D. F., Brás, J. A., Fontes, C. M. G. A., & Prates, J. A. M. (2022). Recalcitrant cell wall of *Ulva lactuca* seaweed is degraded by a single ulvan lyase from family 25 of polysaccharide lyases. *Animal Nutrition*,

9, 184–192. <https://doi.org/10.1016/j.aninu.2022.01.004>

Davis, W. W., & Stout, T. R. (1971). Disc plate method of microbiological antibiotic assay. II. Novel procedure offering improved accuracy. *Applied Microbiology*, 22(4), 666–670.

<https://doi.org/10.1128/aem.22.4.666-670.1971>

Diallo, M., Simons, A. D., Wal, H. Van Der, Collas, F., Houweling-tan, B., & Food, W. (2018). L-Rhamnose metabolism in *Clostridium beijerinckii* strain DSM 6423. *Appl Environ Microbiol*, 85:e02656-(December).

<https://doi.org/10.1128/AEM.02656-18>

Duarte, C. M., Wu, J., Xiao, X., Bruhn, A., & Krause-jensen, D. (2017). Can Seaweed Farming Play a Role in Climate Change Mitigation and Adaptation ? *Frontiers in Marine Science*, 4(April), Article 100.

<https://doi.org/10.3389/fmars.2017.00100>

Dutschei, T., Zühlke, M. K., Welsch, N., Eisenack, T., Hilkmann, M., Krull, J., Stühle, C., Brott, S., Dürwald, A., Reisky, L., Hehemann, J. H., Becher, D., Schweder, T., & Bornscheuer, U. T. (2022). Metabolic engineering enables *Bacillus licheniformis* to grow on the marine polysaccharide ulvan. *Microbial Cell Factories*, 21(1), 1–14.

<https://doi.org/10.1186/s12934-022-01931-0>

Florencio, C., Couri, S., & Farinas, C. S. (2012). Correlation between agar plate screening and solid-state fermentation for the prediction of cellulase production by trichoderma strains. *Enzyme Research*, 2012.

<https://doi.org/10.1155/2012/793708>

Fu, Z., Wang, W., & Lv, S. (2026). International Journal of Biological Macromolecules Mechanistic insights into catalysis of a novel polysaccharide lyase family 40 ulvan lyase from *Thalassomonas* sp .

LD5. *International Journal of Biological Macromolecules*, 336(P1), 149298. <https://doi.org/10.1016/j.ijbiomac.2025.149298>

Funaoka, Y., & , Haruna Hiromoto , Daichi Morimoto , Michiko Takahashi , Kei Wada, and K. N. et. a. (2023). Diversity in Infection Specificity between the Bloom-forming Microalga *Heterosigma akashiwo* and Its dsDNA Virus , *Heterosigma akashiwo* Virus. *Microbes Environments*, 38(2), 1–7. <https://doi.org/10.1264/jsme2.ME23036>

Furqon, M., Ismail, A., Putih, J. P., & Utara, J. (2020). *Sebaran Spasial Suhu , Salinitas dan Densitas di Perairan Kepulauan Sangihe Talaud Sulawesi*

Utara. 23(2), 191–198.

Guterres, A. (2018). *The Sustainable Development Goals Report 2018* (L. Jensen (ed.); United Nat). the Department of Economic and Social Affairs ISBN:

Hartmans, H. J. R. S. (2001). *Plate screening methods for the detection of polysaccharase-producing microorganisms*. 143–149.
<https://doi.org/10.1007/s002530000477>

He, C., Muramatsu, H., Kato, S. I., & Ohnishi, K. (2017). Characterization of an *Alteromonas* long-type ulvan lyase involved in the degradation of ulvan extracted from *Ulva ohnoi*. *Bioscience, Biotechnology and Biochemistry*, 81(11), 2145–2151.
<https://doi.org/10.1080/09168451.2017.1379352>

Hiraoka, M. (2021). Massive *Ulva* green tides caused by inhibition of biomass allocation to sporulation. *Plants*, 10(11).
<https://doi.org/10.3390/plants10112482>

Ivanova, E. P., & Lo, M. (2015). Ecophysiological diversity of a novel member of the genus *Alteromonas*, and description of *Alteromonas mediterranea*. *Antonie van Leeuwenhoek*, 119–132.
<https://doi.org/10.1007/s10482-014-0309-y>

Jian Gao, Chunying Du, Yongzhou Chi, Siqi Zuo, H. Y. and P. W. (2019). Cloning, Expression, and Characterization of a New PL25 Family Ulvan Lyase from Marine Bacterium. *Mar. Drugs* 2019, 1–11.

Kepel, R. C., Mantiri, D. M. H., Rumengan, A., & Nasprianto. (2016). Biodiversitas Makroalga Di Perairan Pesisir Desa Blongko, Kecamatan Sinonsayang, Kabupaten Minahasa Selatan. *Jurnal Ilmiah Platax*, 6(1), 174–187.

Kidgell, J. T., Magnusson, M., de Nys, R., & Glasson, C. R. K. (2019). Ulvan: A systematic review of extraction, composition and function. *Algal Research*, 39(September 2018), 101422.
<https://doi.org/10.1016/j.algal.2019.101422>

Kopel, M., Helbert, W., Belnik, Y., Buravenkov, V., Herman, A., & Banin, E. (2016). New family of ulvan lyases identified in three isolates from the alteromonadales order. *Journal of Biological Chemistry*, 291(11), 5871–5878. <https://doi.org/10.1074/jbc.M115.673947>

- Kuivanen, J., & Richard, P. (2016). Engineering a filamentous fungus for l - rhamnose extraction. *AMB Express*, 6–11.
<https://doi.org/10.1186/s13568-016-0198-8>
- Li, Q., Hu, F., Zhu, B., Ni, F., & Yao, Z. (2020). Insights into ulvan lyase: review of source, biochemical characteristics, structure and catalytic mechanism. *Critical Reviews in Biotechnology*, 40(3), 432–441.
<https://doi.org/10.1080/07388551.2020.1723486>
- Lu, D. C., Yuan, Y., Tan, X. Y., Liu, L., Teng, J. H., Cui, X., Liu, T. H., Zhang, J., Du, Z. J., & Wang, M. Y. (2025). Six new bacterial species isolated from the phycosphere of marine macroalgae: a joint analysis based on taxonomy and polysaccharide utilization loci. *Frontiers in Microbiology*, 16(July), 1–15. <https://doi.org/10.3389/fmicb.2025.1642517>
- Maruyama, Y., Nakamichi, Y., Itoh, T., Mikami, B., Hashimoto, W., & Murata, K. (2009). Substrate specificity of streptococcal unsaturated glucuronyl hydrolases for sulfated glycosaminoglycan. *Journal of Biological Chemistry*, 284(27), 18059–18069.
<https://doi.org/10.1074/jbc.M109.005660>
- Masson-Delmotte, V., P. Zhai, H.-O. et al. (2019). Global Warming of 1.5°C. In *Intergovernmental Panel on Climate Change*. <https://doi.org/10.1017/9781009157940>.
- Miyazawa, K., Fogelson, A. L., & Leiderman, K. (2023). Inhibition of platelet-surface-bound proteins during coagulation under flow II : Antithrombin and heparin. *Biophysj*, 122(1), 230–240.
<https://doi.org/10.1016/j.bpj.2022.10.038>
- Mondal, R., & Ohnishi, K. (2020). Characterization of Glaciecola sp. enzymes involved in the late steps of degradation of sulfated polysaccharide ulvan extracted from *Ulva ohnoi*. *Biochemical and Biophysical Research Communications*, 523(2), 441–445.
<https://doi.org/10.1016/j.bbrc.2019.12.081>
- Nakamura, M., Kumagai, N. H., Tamaoki, M., Bay, O., Bay, H., & Bay, H. (2019). Photosynthesis and growth of *Ulva ohnoi* and *Ulva pertusa* (Ulvophyceae) under high light and high temperature conditions , and implications for green tide in Japan. *Phycological Research*, September 2018. <https://doi.org/10.1111/pre.12410>
- Park, J., Lee, H., Saeger, J. De, Depuydt, S., Asselman, J., Janssen, C.,

- Heynderickx, P. M., Wu, D., Ronsse, F., Tack, F. M. G., Hiraoka, M., Pandey, L. K., Mašek, O., Hung, Y., & Han, T. (2024). Harnessing green tide *Ulva* biomass for carbon dioxide sequestration. *Rev Environ Sci Biotechnol*, 1041–1061. <https://doi.org/10.1007/s11157-024-09705-3>
- Reisky, L., Préchoux, A., Zühlke, M., Bäumgen, M., Robb, C. S., Gerlach, N., Roret, T., Stanetty, C., Larocque, R., Michel, G., Song, T., Markert, S., Unfried, F., Mihovilovic, M. D., Trautwein-schult, A., Becher, D., Schweder, T., Bornscheuer, U. T., & Hehemann, J. (2019). A marine bacterial enzymatic cascade degrades the algal polysaccharide ulvan. *Nature Chemical Biology*, 15(August). <https://doi.org/10.1038/s41589-019-0311-9>
- Reisky, L., Stanetty, C., Mihovilovic, M. D., Schweder, T., Hehemann, J., & Bornscheuer, U. T. (2018). *Biochemical characterization of an ulvan lyase from the marine flavobacterium Formosa agariphila KMM 3901 T*.
- Ren, C. G., Zhong, Z. H., Liu, Z. Y., Lin, S., Luo, Y. K., & Qin, S. (2024). The ever-lasting green tides: What can we do ? . *Heliyon*, 10(3), e25220. <https://doi.org/10.1016/j.heliyon.2024.e25220>
- Rodrigues, V. J., Jouanneau, D., Fernandez-Fuentes, N., Onime, L. A., Huws, S. A., Odaneth, A. A., & Adams, J. M. M. (2024). Biochemical characterisation of a PL24 ulvan lyase from seaweed-associated *Vibrio* sp. FNV38. *Journal of Applied Phycology*, 36(2), 697–711. <https://doi.org/10.1007/s10811-023-03136-3>
- Salinas, A., & French, C. E. (2017). The enzymatic ulvan depolymerisation system from the alga-associated marine flavobacterium *Formosa agariphila*. *Algal Research*, 27(September), 335–344. <https://doi.org/10.1016/j.algal.2017.09.025>
- Tanaka, R., Kurishiba, Y., Miyake, H., & Shibata, T. (2022). Isolation, Diversity and Characterization of Ulvan-Degrading Bacteria Isolated from Marine Environments. *Molecules*, 27(11). <https://doi.org/10.3390/molecules27113420>
- Tang, T., Cao, S., Zhu, B., & Li, Q. (2021). Ulvan polysaccharide-degrading enzymes : An updated and comprehensive review of sources category , property , structure , and applications of ulvan lyases. *Algal Research*, 60(September), 102477. <https://doi.org/10.1016/j.algal.2021.102477>

- Tubalawony, S., Kalay, D. E., Hukubun, W. G., Hukubun, D., Langgur-, J., & Excel, M. (2023). Distribusi Spasial Suhu dan Salinitas di Perairan Selat Haruku Distribution of Temperature and Salinity in the Waters of the Haruku Strait. *Sumberdaya Akuatik Indopasifik*, 7(1), 13–22.
- Ulaganathan, T., Banin, E., Helbert, W., & Cygler, M. (2018). Structural and functional characterization of PL28 family ulvan lyase NLR48 from *Nonlabens ulvanivorans*. *Journal of Biological Chemistry*, 293(29), 11564–11573. <https://doi.org/10.1074/jbc.RA118.003659>
- Williams, T. A., & Heaps, S. E. (2014). An Introduction to Phylogenetics and the Tree of Life. In *Bacterial Taxonomy* (1st ed., Vol. 41). Elsevier Ltd. <https://doi.org/10.1016/bs.mim.2014.05.001>
- Xu, F., Dong, F., Sun, X., Cao, H., Fu, H., Li, C., & Zhang, X. (2021). Mechanistic Insights into Substrate Recognition and Catalysis of. *Applied and Environmental Microbiology*, 87(12), e00412-21.
- Zeng, Z., Yang, W., Liao, J., Wu, X., Lei, M., Lin, K., Xie, E., & Cui, J. (2025). Optimizing temperature , light intensity , and salinity conditions for the culture of an asexual population of *Ulva ohnoi*. *Aquaculture Reports*, 44(August), 103070. <https://doi.org/10.1016/j.aqrep.2025.103070>
- Zhao, X., Wang, X., Zhang, J., Feng, L., & Gao, G. (2025). International Journal of Biological Macromolecules Sustainable production of ulvan from green macroalgae and its potential in carbon sequestration : A critical review. *International Journal of Biological Macromolecules*, 330(P1), 147978. <https://doi.org/10.1016/j.ijbiomac.2025.147978>