



REFERENCES

- Abdel-Messih, H. A., R. A. H. Ishak, A. S. Geneidi, and S. Mansour. 2019. Tailoring novel soft nano-vesicles ‘Flexosomes’ for enhanced transdermal drug delivery: Optimization, characterization and comprehensive *ex vivo - in vivo* evaluation. *Internation Journal of Pharmaceutics* 560: 101-115.
- Amaro-Ortiz, A., B. Yan, and J. A. D’Orazio. 2014. Ultraviolet radiation, aging and the skin: prevention of damage by topical cAMP manipulation. *Molecules* 19(5): 6202-6219.
- Arda, O., N. Goksugur, and Y. Tuzun. 2014. Basic histological structure and functions of facial skin. *Clinics in Dermatology* 32: 3-13.
- Bancroft, J. D. and H. C. Cook. 1984. Manual of histological techniques. Longman Group Limited. New York
- Chen, Q. 2009. Evaluate the effectiveness of the natural cosmetic product. *International Journal of Chemistry* 1(2): 57-59.
- Cho, S., S. Kang, J. Cho, A. Kim, S. Park, and Y. Hong. 2007. The antioxidant properties of brown seaweed (*Sargassum siliquastrum*) extracts. *Journal of Medical Food* 10(3): 479-485.
- Choi, C. P., Y. I. Kim, J. W. Lee, and M. H. Lee. 2006. The effect of narrowband ultraviolet B on the expression of matrix metalloproteinase-1, transforming growth factors- β 1 and type I collagen in human skin fibroblast. *Clinical and Experimental Dermatology* 32: 180-185.
- Coelho, S.G., W. Choi, M. Bernner, Y. Miyamura, Y. Yamaguchi, R. Wolber, C. Smuda, J. Batzer, L. Kolbe, S. Ito, *et al.* 2009. Short- and long- term effects of UV radiation on the pigmentation of human skin. *J. Invetig. Dermatol. Symp. Proc* 14: 32-35.
- Dirman, A. 2016. Uji aktivitas antioksidan dan anti penuaan dini rumput laut coklat (*Padina australis* Hauck). Universitas Gadjah Mada. Yogyakarta.
- D’Orazio, J., S. Jarret, A. Amaro-Ortiz, and T. Scott. 2013. UV radiation and the skin. *Int. J. Mol. Sci.* 14: 12222-12248.
- Doren, S. R. 2015. Matrix metalloproteinase interactions with collagen and elastin. *Matrix Biology* 0: 224-231.
- Fisher, G. J., S. Kang, J. Varani, Z. Bata-Csorgo, Y. Wan, S. Datta, and J. J. Voorhees. 2002. Mechanism of photoaging and chronological skin aging. *Arch Dermatol* 138: 1462-1470.
- Fleurence, J. and I. Levine. 2016. *Seaweed in health and disease prevention*. Academic Press. USA.
- Gammone, M. A. and N. D’Orazio. 2015. Anti-obesity activity of the marine carotenoid fucoxanthin. *Marine Drugs* 13: 2196-2214.
- Gartner, L. P. and J. L. Hiatt. 2007. Color textbook of histology dalam: Arda, O., N. Goksugur, and Y. Tuzun. 2014. Basic histological structure and functions of facial skin. *Clinics in Dermatology* 32: 3-13.



- Gilchrest, B. A. and M. Yaar. 1992. Ageing and photoaging of the skin: observations at the cellular and molecular level. *British Journal of Dermatology* 41 (127): 25-30.
- Gomez-Ordóñez, E., A. Jiménez-Escríg, and P. Ruperez. 2010. Dietary fibre and physicochemical properties of several edible seaweeds from the northwestern Spanish coast. *Food Research International* 43: 2289-2294.
- Grant, W. B. 2008. The effect of solar UVB doses and vitamin D production, skin cancer action spectra, and smoking in explaining links between skin cancers and solid tumors. *European Journal of Cancer* 44(1): 12-15.
- Guiry, M. D. and G. M. Guiry. 2017. *AlgaeBase*. World-wide electronic publication, National University of Ireland, Galway. <http://www.algaebase.org> accessed in 13 December 2017.
- Handayani, T., Sutarno, dan D. Setyawan. 2004. Analisis komposisi nutrisi rumput laut *Sargassum crassifolium* J. Agardh. *Biofarmasi* 2(2): 45-52.
- Harman, D. 1992. Free radical theory of aging. *Mutation Research* 275: 257-266.
- Harman, D. 1956. Aging: a theory based on free radical and radiation chemistry. *Journal of Gerontology* 11(3): 298-300.
- He, J., Y. Xu, H. Chen, and P. Sun. 2016. Extraction, Structural Characterization, and Potential Antioxidant Activity of the Polysaccharides from Four Seaweeds. *International Journal of Molecular Sciences* 17(11)
- Heo, S., E. Park, K. Lee, and Y. Jeon. 2005. Antioxidant activities of enzymatic extracts from brown seaweed. *Bio-resource Technology* 96: 1613-1623.
- Hurd, C. L., P. J. Harrison, K. Bischof, and C. S. Lobban. 2014. *Seaweed ecology and physiology*, 2nd edition. Cambridge University Press. UK.
- James, W. D., T. G. Berger, and D. M. Elston. 2006. *Andrew's diseases of the skin: Clinical dermatology*. Elsevier Saunders. Philadelphia.
- Jusuf, N. K. 2005. Kulit menua. *Majalah kedokteran nusantara* 38(2): 184-188.
- Kadi, A. 2004. Potensi rumput laut beberapa perairan pantai Indonesia. *Oseana* 4: 25-36.
- Kningt, J., and Y. Nigam. 2008. The anatomy and physiology of ageing. Part 1-the cardiovascular system. *Nursing Times* 104(31): 26-27.
- Krause, W. J. 2005. *Krause's essential human histology for medical students*. Universal Publisher. USA.
- Kylin, H. 1913. Zur Biochemie der Meeresalgen dalam: Fleurence, J. and I. Levine. 2016. *Seaweed in health and disease prevention*. Academic Press. USA.
- Lesnik, R. H., L. H. Kligman, and A. M. Kligman. Agents that cause enlargement of sebaceous glands in hairless mice: II. Ultraviolet radiation. *Arch Dermatol Res* 284(2): 106-108.
- Lopez-Mosquera, M. E., E. Fernandez-Lema, R. Villares, R. Corral, B. Alonso, and C. Blanco. 2011. Composting fish waste and seaweed to produce a fertilizer for use in organic agriculture. *Procedia Environmental Sciences* 9: 113-117.
- Matio, L and C. E. Payri. 2009. Taxonomic revision of *Sargassum* species (Fucales, Phaeophyceae) from New Caledonia based on morphological and molecular analyses. *Phycological Society of America* 45: 1374-1388.



- Mescher, A. L. 2013. *Junqueira's basic histology text and atlas*. McGraw-Hill Education.
- Moore, K. L. and T. V. N. Persaud. 1998. The developing human dalam: Arda, O., N. Goksugur, and Y. Tuzun. 2014. Basic histological structure and functions of facial skin. *Clinics in Dermatology* 32: 3-13.
- Mouritsen, G. 2013. *Seaweed edible, available and sustainable*. The University of Chicago Press, Ltd. Hong Kong.
- Munir, N., N. Sharif, S. Naz, and F. Manzoor. 2013. Algae: a potent antioxidant source. *Sky Journal of Microbiology Research* 1(3): 22-31.
- Nigam, Y., J. Knight, S. Bhattacharya, and A. Bayer. 2012. Physiological changes associated with aging and immobility. *Journal of Aging Reseacrh* : 1-2.
- Paraeng, P., D. M. H. Mantiri, dan A. Rumengan. 2016. Uji aktivitas antioksidan pada makro alga cokelat *Hydroclathrus clathratus* (C. Agardh) hower dan *Padina minor* yamada. *Jurnal pesisir dan laut tropis* 2(1): 37-43.
- Pfeifer, G. P. and A. Besaratinia. 2011. UV wavelength-dependent DNA damage and human melanoma skin cancer. *Photochem. Photobiol. Sci.* 11: 90-97.
- Qin, Y. 2018. *Bioactive seaweeds for food applications: natural ingredients for healthy diets*. Academic Press. UK.
- Saarialho-Kere, U., E. Kerkela, L. Jeskanen, T. Hasan, R. Pierce, B. Starcher, R. Raudasoja, A. Ranki, A. Oikarinen, and M. Vaalamo. 1999. Accumulation of matrilysin (MMP-7) and macrophage metallo-elastase (MMP-12) in actinic damage. *J Invest Dermatol* 113(4): 664-672.
- Saenz, S. M., M. J. R. Gomez, F. M. Moreno, and M. M. Morillo. 2010. Cellular aging: theories and technological influence. *Braz. Arch. Boil. Technol* 53(6): 1319-1332.
- Safia, R.A. 1013. Jenis dan Sebara Makroalga di Zona Intertidal Pantai Ngandong dan Pantai Drini Kabupaten Gunungkidul. Fakultas Pertanian. Universitas Gadjah Mada. Yogyakarta. Skripsi.
- Sahubawa, L., N. Khakim, and M. Lasindrang. 2015. Kajian sebaran potensi ekonomi sumber daya kelautan di pantai selatan Daerah Istimewa Yogyakarta sebagai upaya percepatan investasi. *Jurnal Teknosains* 2(4): 101-198.
- Sander, C. S., H. Chang, S. Salzmann, C. S. Muller, S. Ekanayake-Mudiyanselage, P. Elsner, and J. J. Thiele. 2002. Photoaging is associated with protein oxidation in human skin *in vivo*. *J Invest Dermatol* 119: 618-625.
- Scott, T. L., P. A. Christian, M. V. Kesler, K M. Donohue, B. Shelton, K. Wakamatsu, S. Ito, J. D'Orazio. 2012. Pigment-independent cAMP-mediated epidermal thickening protects against cutaneous UV injury by keratinocyte proliferation. *Exp. Dematol* 21: 771-777.
- Scudamore, C. 2014. *A practical guide to the histology of the mouse*. John Wiley & Sons, Ltd. UK.
- Septiana, A. T. dan A. Asnani. 2012. Kajian sifat fisikokimia ekstrak rumput laut coklat *Sargassum duplicatum* menggunakan berbagai pelarut dan metode ekstraksi. *Agrointek* 6(1): 22-28.



- Shimoda, H., J. Tanaka, S. Shan, and T. Maoka. 2010. Anti-pigmentary activity off fucoxanthin and its influence on skin mRNA expression of melanogenic molecules. *Journal of Pharmacy and Pharmacology* 62: 1137-1145.
- Sohal, R. S. and U. T. Brunk. 1992. Mitochondrial production of pro-oxidants and cellular senescence. *Mutation Research* 275: 295-304.
- Sinurat, E. and R. Marliani. 2017. Karakterisasi Na-alginat dari rumput laut cokelat *Sargassum crassifolium* dengan perbedaan alat penyaring. *JPHPI* 20(2): 351-361.
- Sujadmiko, H., Sulastri, S, dan Sabbithah, S. 2015. *Taksonomi tumbuhan rendah*. Penerbit Universitas Terbuka. Tangerang Selatan.
- Sumena, K. B., K. M. Lucy, J. J. Chungath, N. Ashok, and K. R. Harshan. 2010. Regional histology of the subcutaneous tissue and the sweat glands of large white Yorkshire pigs. *Department of Veterinary Anatomy and Histology* 6(3): 128-135.
- Svobodava, A., D. Walterova, and J. Vostalova. 2006. Ultraviolet light induced alteration to the skin. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub* 150(1): 25-38.
- Thinh, P. D., R. V. Menshova, S. P. Ermakova, S. D. Anastyuk, B. M. Ly, and T. N. Zyvyagintseva. 2013. Structural characteristics and anticancer activity of fucoidan from the brown alga *Sargassum mcclrei*. *Marine Drugs* 11: 1456-1476.
- Tjitosoepomo, G. 2003. *Taksonomi tumbuhan*. Gadjah Mada University Press. Yogyakarta.
- Treuting, P. M., S. M. Dintzis, and K. S. Montine. 2018. *Comparative anatomy and histology*. Academic Press. USA.
- Trypuc, A. J., M. Matejczyk, and S. Rosochacki. 2016. Matrix metalloproteinases (MMPs), the main extracellular matrix (ECM) enzymes in collagen degradation, as a target for anticancer drugs. *Journal of Enzyme Inhibition and Medical Chemistry* 31: 177-183.
- Urikura, I., T. Sugawara, and T. Hirata. 2011. Protective effect of fucoxanthin against UVB-induced skin photoaging in hairless mice. *Bioscience, Biotechnology and Biochemistry* 75(4): 757-760.
- Vayalil, P. K., A. Mittal, Y. Hara, C. A. Elmets, and S. K. Katiyar. 2004. Green tea polyphenols prevent ultraviolet light-induced oxidative damage and matrix metalloproteinases. *J Invest Dermatol* 122: 1480-1487.
- Wahyuningsih, K. A. 2011. Astaxanthin memberikan efek proteksi terhadap photoaging. *Journal of Medicine* 11(3): 149-160.
- Wirasti. 2016. Uji aktivitas antioksidan dan anti penuaan dini rumput laut coklat (*Turbinaria decurrens* Bory). Universitas Gadjah Mada. Yogyakarta.
- Young, B., P. Woodford, and G. O'Dowd. 2014. *Wheater's functional histology: a text and colour atlas*. Chuchhill-Livingstone. USA.