

DAFTAR PUSTAKA

- Ahmad, M., Fauzi. 2010. Percobaan Pemijahan Ikan Puyu (*Anabas testudineus*). Jurnal Perikanan dan Kelautan 15(10): 16-24.
- Alimuddin, I. Lesmana, A. O. Sudrajat, O. Carman, I. Faizal. 2010. Production and Bioactivity of Three Recombinant Growth Hormones of Farmed Fish. Indonesian Agriculture Journal 5(1): 11-17.
- Arunan, E., G. R. Desiraju, R. A. Klein, J. Sadlej, S. Scheiner, I. Alkorta, D. C. Clary, R. H. Crabtree, J. J. Dannenberg, P. Hobza. H. G. Kjaergaard, A. C. Legon, B. Mennucci, D. J. Nesbitt. 2011. Definition of the hydrogen bond (IUPAC Recommendation 2011). Pure Appl. Chem. 83(8): 1637-1641.
- Baek, M., T. Park, L. Heo, C. Park, C. Seok. 2017. GalaxyHomomer: a web server for protein homo-oligomer structure prediction from a monomer sequence or structure. Nucleic Acids Res. 45: W320-W324.
- Bastolla, U., L. Demetrius. 2005. Stability constraints and protein evolution: the role of chain length, composition, and disulfide bonds. Protein Eng. Des. Sel. 18(9): 405-415.
- Berg, J. M., J. L. Tymoczko, G. J. Gatto Jr., L. Stryer. 2015. Biochemistry 8th Edition. New York: W. H. Freeman & Company.
- Bergan-Roller, H. E., M. A. Sheridan. 2018. The growth hormone signaling system: Insights into coordinating the anabolic and catabolic actions of growth hormone. Gen. Comp. Endocrinol. 258: 119-133.
- Britz, R., N. Dahanukar, V. K. Anoop, S. Philip, B. Clark, R. Raghavan, L. Rüber. 2020. Aenigmachannidae, a new family of snakehead fishes (Teleostei: Channoidei) from subterranean waters of South India. Scientific Reports 10(1): 16081.
- Brooks, A. J., M. J. Waters. 2010. The growth hormone receptor: mechanism of activation and clinical application. Nat. Rev. Endocrinol. 6: 515-525.
- Bulaj, G. 2005. Formation of disulfide bonds in proteins and peptides. Biotechnol. Adv. 23(1): 87-92.
- Calduch-Giner, J., H. Duval, F. Chesnel, G. Boeuf, J. Pèrez-Sanchèz, D. Boujard. 2000. Fish Growth Hormone Receptor: Molecular Characterization of Two Membrane-Anchored Forms. Endocrinology 142(7): 3269-3273.
- Chan, A. W. E., E. G. Hutchinson, D. Harris, J. M. Thorntorn. 1993. Identification, classification, and analysis of beta-bulges in protein. Protein Science 2(10): 1574-1590.
- Chasanah, E., M. Nurilmala, A. R. Purnamasari, D. Fithriani. 2015. Komposisi Kimia, Kadar Albumin, dan Bioaktivitas Ekstrak Protein Ikan Gabus (*Channa striata*) Alam dan Hasil Budidaya. Jurnal Pascapanen dan Bioteknologi Kelautan dan Perikanan 10 (2): 123-132.
- Collins, R. A., R. Britz, L. Rüber. 2015. Phylogenics systematics of leaffishes (Teleostei: Polycentridae, Nandidae). J. Zoolog. Syst. Evol. Res. 53(4): 259-272.

- Darmawan, J., E. Tahapari, Suharyanto. 2018. Kinerja Pertumbuhan Patin Siam (*Pangasianodon hypophthalmus* Sauvage, 1878) Hasil Seleksi di KJA Waduk Darma Kuningan, Jawa Barat. Limnotek: Perairan Darat Tropis di Indonesia 25(2): 88-96.
- Davis, I. W., A. Leaver-Fay, V. B. Chen, J. N. Block, G. J. Kapral, X. Wang, L. W. Murray, W. B. Arendall III, J. Snoeyink, J. S. Richardson, D. C. Richardson. 2007. MolProbity: all-atom contacts and structure validation for protein and nucleic acids. Nucleic Acid Res. 35: W375-W383.
- Daza, D. O., D. Larhammar. 2018a. Evolution of the growth hormone, prolactin, erythropoietin, and thrombopoietin in relation of the vertebrate tetraploidizations. Gen. Comp. Endocrinol. 257: 143-160.
- Daza, D. O., D. Larhammar. 2018b. Evolution of the growth hormone, prolactin, prolactin 2, and somatolactin family. Gen. Comp. Endocrinol. 264: 94-112.
- Dehkhoda, F., C. M. M. Lee, J. Medina, A. J. Brooks. 2018. The Growth Hormone Receptor: Mechanism of Receptor Activation, Cell Signaling, and Physiological Aspects. Frontiers in endocrinology.
- Deller, M. C., B. Rupp. 2015. Models of protein-ligand crystal structure: trust, but verify. J. Comput. Aid. Mol. Des. 29: 817-836.
- De Vos, A. M., M. Ultsch, A. A. Kossiakoff. 1998. Human Growth Hormone and Extracellular Domain of Its Receptor: Crystal Structure of the Complex. Science 255: 306-312.
- Diana, F., E. Safutra. 2018. Pengaruh Pemberian Pakan Alami yang Berbeda pada Benih Ikan Tawes (*Barbonymus gonionotus*) Terhadap Pertumbuhan dan Kelangsungan Hidup. Akuakultura 2(1): 1-9.
- Edgar, R. C. 2004. MUSCLE: multiple sequence alignment with high accuracy and high throughput. Nucleic Acids Res. 32(5): 1792-1797.
- Fan, J., A. Fu, L. Zhang. 2019. Progress in molecular docking. Quantitative Biology 7(2): 83-89.
- Felsenstein, J. 1985. Confidence limits on phylogenies: An approach using the bootstrap. Evolution 39: 783-791.
- FAO. 2024. The State of World Fisheries and Aquaculture 2024: Blue Transformation in Action. Roma: FAO.
- Gohlke, H., M. Hendlich, G. Klebe. 2000. Predicting binding modes, binding affinities, and 'hot spots' for protein-ligand complexes using knowledge-based scoring function. Perspect. Drug Discov. Des. 20: 115-144.
- Hadid, Y., M. Syaifudin, M. Amin. 2014. Pengaruh Salinitas Terhadap Daya Tetas Telur Ikan Baung (*Hemibagrus nemurus* Blkr.). Jurnal Akuakultur Rawa Indonesia 2(1): 78-92.
- Handayani, S., Kurniawati, S. Putra, A. Tarmizi. 2024. Pengaruh Penambahan Kuning Telur Dengan Dosis yang Berbeda Pada Media Pengencer NaCl Fisiologis Dalam Proses Penyimpanan Sperma Terhadap Kualitas Sperma Lele Lokal (*Clarias batrachus*). Al-Qalbu: Jurnal Pendidikan, Sosial, dan Sains 1(1): 11-16.

- Ho, W. K., W. H. Tsang, N. P. Dias. 1989. Cloning of the grass carp growth hormone cDNA. *Biochem. Biophys. Res. Commun.* 161(3): 1239-1243.
- Honorato, R.V., P.I. Koukos, B. Jimenez-Garcia, A. Tsaregorodtsev, M. Verlato, A. Giachetti, A. Rosato and A.M.J.J. Bonvin (2021). Structural biology in the clouds: The WeNMR-EOSC Ecosystem. *Frontiers Mol. Biosci.* 8: 729513.
- Honorato, R. V., M. E. Trellet, B. Jiménez-García, J. J. Schaarschmidt, M. Giulini, V. Reys, P. I. Koukos, J. P. G. L. M. Rodrigues, E. Karaca, G. C. P. van Zundert, J. Roel-Touris, C. W. van Noort, Z. Jandová, A. S. J. Melquiond, A. M. J. J. Bonvin. 2024. The HADDOCK2.4 web server: A leap forward in integrative modelling of biomolecular complexes. *Nature Prot.* 19: 3219-3241.
- Irmawati, Alimuddin, M. Zairin Jr., M. A. Suprayudi, A. T. Wahyudi. 2012. Peningkatan laju pertumbuhan benih ikan gurame (*Osphronemus goramy* Lac.) yang direndam dalam air yang mengandung hormon pertumbuhan ikan mas. *J. Iktiologi Indones.* 12(1): 13-23.
- Jiao, X., X. Jin, Y. Ma, Y. Yang, J. Li, L. Liang, R. Liu, Z. Li. 2021. A comprehensive application: Molecular docking and network pharmacology for the prediction of bioactive constituent and elucidation of mechanisms of action in component-based Chinese medicine. *Computational Biology and Chemistry* 90: 107402.
- Jones, D. T., W. R. Taylor, J. M. Thornton. 1992. The rapid generation of mutation data matrices from protein sequences. *Comput. Appl. Biosci.* 8: 275-282.
- Kamenskaya, D. N., V. A. Brykov. 2020. Fish Growth Hormone Genes: Structure and Divergence. *Russ. J. Mar. Biol.* 46(4): 233-424.
- Karimah, U., I. Samidjan, Pinandoyo. 2018. Performa pertumbuhan dan kelulushidupan ikan nila GIFT (*Oreochromis niloticus*) yang diberi jumlah pakan yang berbeda. *Journal of Aquaculture Management and Technology* 7(1): 128-135
- Khaerunnisa, S., Suharti, R. Awaluddin. 2020. Penelitian *In Silico* Untuk Pemula. Surabaya: Airlangga University Press.
- Kumar, S., R. Nussinov. 1999. Salt bridge stability in monomeric proteins. *J Mol. Biol.* 293(5): 1241-1255.
- Kusmini, I. I., R. Gustiano, V. A. Prakoso, M. H. F. Ath-thar. 2016. *Budidaya Ikan Gabus*. Jakarta: Penebar Swadaya.
- Laskowski, R. A., E. G. Hutchinson, A. D. Michie, A. C. Wallace, M. L. Jones, J. M. Thornton. 1997. PDBsum: a Web-based database of summaries and analyses of all PDB structures. *Trends Biochem. Sci* 22(12): 488-490.
- Lestari, T. P., E. Dewantoro. 2018. Pengaruh Suhu Media Pemeliharaan Terhadap Laju Pemangsaan dan Pertumbuhan Larva Ikan Lele Dumbo (*Clarias gariepinus*). *Ruaya* 6(1): 14-22.
- Lima, E. R., R. P. Freire, M. F. Suzuki, J. E. Oliveira, V. L. Yosidaki, C. N. Peroni, T. Sevilhano, M. Zorzeto, L. S. Torati, C. R. J. Soares, I. D. D. M. Lima, T. Kronenberger, V. G. Maltarollo, P. Bartolini. 2023. Isolation and Characterization of the *Arapaima gigas*

Growth Hormone (ag-GH) cDNA and Three-Dimensional Modeling of This Hormone in Comparison with the Human Hormone (hGH). *Biomolecules* 13(1): 158.

- Ma, X., X. Li, Y. Zhuang, P. Zhu, W. Ye, H. Lin. 2007. Two growth hormone receptors in Nile tilapia (*Oreochromis niloticus*): molecular characterization, tissue distribution and expression profiles in the gonad during the reproductive cycle. *Comp. Biochem. Physiol. B. Biochem. Mol. Biol.* 147(2): 325-339.
- Ma'arif, A. S. 2017. Cara Sukses Budidaya Ikan Gurami. Yogyakarta: Bio Genesis.
- Mayden, R. L., W. J. Chen, H. L. Bart, M. H. Doosey, A. M. Simons, K. V. Tang, R. M. Wood, M. K. Agnew, L. Yang, M. V. Hirt, M. D. Clements, K. Saitoh, T. Sado, M. Miya, M. Nishida. 2009. Reconstructing the phylogenetic relationships of the earth's most diverse clade of freshwater fishes--order Cypriniformes (Actinopterygii: Ostariophysi): a case study using multiple nuclear loci and the mitochondrial genome. *Mol. Phylogenet. Evol.* 51(3): 500-514.
- Moriyama, S., H. Yamamoto, S. Sugimoto T. Abe, T. Hirano, H. Kawauchi. 1993. Oral administration of recombinant growth hormone to rainbow trout, *Oncorhynchus mykiss*. *Aquaculture* 112: 99-106.
- Muslim. 2019. Teknologi Pembenihan Ikan Betok (*Anabas testudineus*). Bandung: PT. Panca Terra Firma
- Muslim, M. Zairin Jr., M. A. Suprayudi, Alimuddin, A. Boediono, I. Diatin. 2019. Adaptasi Ikan Sepatung (*Pristolepis grootii*) dalam Wadah Budidaya. Ponorogo: Uwais Inspirasi Indonesia.
- Mustofa, A., S. Hastuti, D. Rachmawati. 2018. Pengaruh Periode Pemuaasaan Terhadap Efisiensi Pemanfaatan Pakan, Pertumbuhan, dan Kelulushidupan Ikan Mas (*Cyprinus carpio*). *Pena Akuatika* 17(2): 41-58.
- Némethy, G., M. P. Printz. 1972. The γ Turn, a Possible Folded Conformation of the Polypeptide Chain. Comparison with the β Turn. *Macromolecules* 5(6): 755-758.
- Nelson, J. S., T. C. Grande, M. V. H. Wilson. 2016. *Fishes of the World* 5th Ed. Hoboken: John Wiley & Sons, Inc.
- Nugroho, A., M. Sugihartono, M. Ghofur. 2019. Laju Pertumbuhan Larva Ikan Koan (*Ctenopharyngodon idella*) Dengan Kepadatan yang Berbeda. *Jurnal Akuakultur Sungai dan Danau* 4(2): 35-39.
- Pais, F. S-M., P. D. C. Ruy, G. Oliveira, R. S. Coimbra. 2014. Assessing the efficiency of multiple sequence alignment programs. *Algorithms Mol. Biol.* 9 (4): 1-8.
- Parey, E., A. Louis, J. Montfort, O. Bouchez, C. Roques, C. Iampietro, J. Lluch, A. Castinel, C. Donnadieu, T. Desvignes, C. F. Bucuo, E. Jouanno, M. Wen, S. Mejri, R. Dirks, H. Jansen, C. Henkel, W-J. Chen, M. Zahm, C. Cabau, C. Klopp, A. W. Thompson, M. Robinson-Rechavi, I. Braasch, G. Lecointre, J. Bobe, J. H. Postlethwait, C. Berthelot, H. R. Crollius,

- Y. Guiguen. 2023. Genome structures resolve the early diversification of teleost fishes. *Science* 379 (6632): 572-575.
- Parsegian, V. A. 2006. *Van der Waals Forces: a Handbook for Biologists, Chemists, Engineers, and Physicists*. New York: Cambridge University Press.
- Pearson, W. R. 2013. An Introduction to Sequence Similarity (“Homology”) Searching. *Curr. Protoc. Bioinf.* 42: 3.1.1-3.1.8.
- Pettersen, E. F., T. D. Goddard, C. C. Huang, G. S. Couch, D. M. Greenblatt, E. C. Meng, T. E. Ferrin. 2004. UCSF Chimera — a visualization system for exploratory research and analysis. *J Comput. Chem.* 25(13): 1605-1612.
- Rentier-Delrue, F., D. Swennen, J. C. Philippart, C. L'Hoir, M. Lion, O. Benrubi, J. A. Martial. 1989. Tilapia growth hormone: molecular cloning of cDNA and expression in *Escherichia coli*. *DNA* 8(4): 271-278.
- Retnoaji, B., L. Nurhidayat, S. F. Pratama, B. L. Prakasa, A. Rachman, J. Laila, K. Anshori, D. M. Natalia. 2023. *Tata Cara Pemijahan Ikan Wader Pari (Rasbora lateristriata)*. Yogyakarta: Gadjah Mada University Press.
- Rubin, D. A., J. H. Youson, L. E. Marra, R. M. Dorres. 1996. Cloning of a gar (*Lepisosteus osseus*) GH cDNA: trends in actinopterygian GH structure. *J. Mol. Endocrinol.* 16(1): 73-80.
- Rustadi. 2018. *Manajemen Akuakultur Tawar*. Yogyakarta: Gadjah Mada University Press.
- Saito, A., S. Sekine, Y. Komatsu, M. Sato, T. Hirano, S. Itoh. 1988. Molecular cloning of eel growth hormone cDNA and its expression in *Escherichia coli*. *Gene* 73(2): 545-551.
- Saputra, F. A. A., A. Nikhlani, M. Ma'ruf. 2020. Pengaruh Pemberian Jenis Pakan yang Berbeda Terhadap Pertumbuhan dan Kelangsungan Hidup Benih Ikan Belawan (*Helostoma temminckii*). *Aquawarman* 6(1): 76-83.
- Sayers, E. W., E. E. Bolton, J. R. Brister, K. Canese, J. Chan, D. C. Comeau, R. Connor, K. Funk, C. Kelly, S. Kim, T. Madej, A. Marchler-Bauer, C. Lanczycki, S. Lathrop, Z. Lu, F. Thibaud-Nissen, T. Murphy, L. Phan, Y. Skripchenko, T. Tse, J. Wang, R. Williams, B. W. Trawick, K. D. Pruitt, S. T. Sherry. 2022. Database resources of the national center for biotechnology information. *Nucleic Acids Res.* 50(D1): D20-D26.
- Sheridan, M. A. 2011. Hormonal Control of Reproduction and Growth. *In*: A. P. Farrel, E. D. Steves, J. J. Chech Jr., J. G. Richards (Eds.) *Encyclopedia of Fish Physiology: From Genome to Environment Vol. 1: The Senses, Supporting Tissues, Reproduction, and Behavior*. Cambridge: Academic Press, p: 2016-2024.
- Sularto, E. Tahapasari, W. Hadie. 2011. Identifikasi Karakter Morfometrik Sebagai Penduga Fekunditas Ikan Patin Jambal (*Pangasius djambal*) Faktor Kunci Untuk Seleksi. *Jurnal Riset Akuakultur* 6(1): 7-16.
- Suyanto, S. R. 2007. *Budi Daya Ikan Lele*. Edisi Revisi. Jakarta: Penebar Swadaya.
- Tamura, K. 1992. Estimation of the number of nucleotide substitutions when there are strong transition-transversion and G+C content biases. *Mol. Biol. Evol.* 9(4): 678-687.

- Tamura, K., G. Stecher, S. Kumar. 2021. MEGA11: Molecular Evolutionary Genetics Analysis version 11. *Mol. Biol. and Evol.* 38: 3022-3027.
- Tan, M., J. W. Armbruster. 2018. Phylogenic classification of extant genera of fishes of the order Cypriniformes. *Zootaxa* 4476(1): 6-39.
- Teufel, F., J. J. A. Armeteros, A. R. Johansen, M. H. Gíslason, S. I. Pihl, K. D. Tsirigos, O. Winther, S. Brunak, G. von Heijne, H. Nielsen. 2022. SignalP 6.0 predicts all five types of signal peptides using protein language models. *Nat. Biotechnol.* 40: 1023-1025.
- Todeschini, R., V. Consonni. 2009. *Molecular Descriptors for Chemoinformatics: Volume 1: Alphabetical Listing*. Weinheim: Wiley-VCH.
- Triantaphyllopoulos, K. A., D. Cartas, H. Miliou. 2019. Factors influencing GH and IGF-I gene expression on growth in teleost fish: how can aquaculture industry benefit? *Rev. Aquacult.* 12(3): 1637-1662.
- The Uniprot Consortium. 2023. UniProt: The Universal Protein Knowledgebase in 2023. *Nucleic Acids Res.* 51: D523-D531.
- Urry, A. L., M. L. Cain, P. V. Minorsky, S. A. Wasserman, J. B. Reece. 2017. *Campbell Biology* 11th Ed. New York: Pearson Education, Inc.
- Valentine, R. Y. 2019. Isolasi dan Identifikasi Sekuens Homolog Gen Penyandi *Gonadotropin Releasing Hormone* pada Ikan Nilem Hijau (*Osteochilus hasselti*) dan Ikan Nilem Merah (*Osteochilus sp.*). *Jurnal Ilmiah Samudra Akuatika* 3(1): 23-29.
- Vélez, E. J., S. Azizi, A. Millàn-Cubillo, J. Fernández-Borràs, J. Blasco, S. J. Chan, J. A. Calduch-Giner, J. Pérez-Sánchez, I. Navarro, E. Capilla, J. Gutiérrez. 2016a. Effects of sustained exercise on GH-IGFs axis in gilthead sea bream (*Sparus aurata*). *Am. J Physiol. Regul. Integr. Comp. Physiol.* 310(4): R313-R322.
- Vélez, E. J., E. Lutfi, S. Azizi, M. Perelló, C. Salmerón, M. Riera-Codina, A. Ibarz, J. Fernández-Borràs, J. Blasco, E. Capilla, I. Navarro, J. Gutiérrez. 2016b. Understanding fish muscle growth regulation to optimize aquaculture production. *Aquaculture* 467: 28-40.
- Williams, C. J., J. J. Headd, N. W. Moriarty, M. G. Prisant, L. L. Videau, L. N. Deis, V. Verma, D. A. Keedy, B. J. Hintze, V. B. Chen, S. Jain, S. M. Lewis, W. B. Arendall III, J. Snoeyink, P. D. Adams, S. C. Lovell, J. S. Richardson, D. C. Richardson. 2018. MolProbity: More and better reference data for improved all-atom structure validation. *Protein Sci.* 27(1): 293-315.
- Vangone, A., A. M. M. J. Bonvin. 2015. Contact-based prediction of binding affinity in protein-protein complexes. *eLife* 4: e07454.
- Xue, L. C., J. P. Rodrigues, P. L. Kastitis, A. M. J. J. Bonvin, A. Vangone. 2016. PRODIGY: a web-server for predicting the binding affinity in protein-protein complexes. *Bioinformatics* 32(23): 3676-3678.
- Ye, W., W. Tian, B. Wang, J. Liang. 2024. CASTpFold: Computed Atlas of Surface Topography of the universe of protein Folds. *Nucleic Acids Res.* 52(W1): W194-W199.