Curriculum Vitae

朱慧君 （Wai-Kwan Chu）

應徵職級：博士後研究員
專長領域：魚類基因編輯、分子生物技術、魚類生殖生理
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Education Background

Ph.D.	**National Taiwan Ocean University**, Taiwan
2020-2025	Department of Aquaculture
M.S.	**National Taiwan Ocean University**, Taiwan
2017-2019	Department of Aquaculture
B.S.	**National Taiwan Ocean University**, Taiwan
2013-2017	Department of Aquaculture

Working Experiences

2019/08-2020/01	Research Assistant, Department of Aquaculture (Te-Hua Hsu's Lab), National Taiwan Ocean University
2020/02-2020/08	Research Assistant, Center of Excellence for the Oceans, National Taiwan Ocean University

Research Interests

Genetics and Molecular Biotechnology:

- Functional gene analysis via targeted mutagenesis (CRISPR/Cas9).
- In vivo cell lineage tracing and visualization (*Tol2* transgenic system).

Reproductive Biology and Physiology:

- Regulation and tracking of primordial germ cell (PGC) migration.
- Molecular mechanisms underlying reproductive regulation and sex development in teleost fishes.

Metabolic Physiology and Microbiome Dynamics:

- Profiling and functional analysis of fatty acid metabolism associated with sex and reproductive status.
- Exploration of gut microbiome composition and its physiological interactions using omics approaches (16S rRNA sequencing).

Aquaculture Biotechnology and Applications:

- Development of genetic tools and biotechnological strategies for breeding improvement and reproductive control in aquaculture species.

Technical Expertise

Gene Editing and Genetic Manipulation:

- ✓ CRISPR/Cas9 genome editing
- ✓ Transgenic systems (*Tol2* transposon system, Tet-inducible system)
- ✓ Transcription Factor Binding Site Prediction

Molecular and Cellular Analysis:

- ✓ Quantitative real-time PCR (qRT-PCR), transcriptomic analysis (RNA-seq)
- ✓ In situ hybridization (ISH), histological techniques (H&E, Trichrome staining)
- ✓ Enzyme-linked immunosorbent assay (ELISA)

Metabolic and Microbiome Profiling:

- ✓ Gut microbiota analysis (16S rRNA sequencing and microbiome analytics)
- ✓ Fatty acid profiling (Gas Chromatography-Fatty Acid Methyl Ester, GC-FAME analysis)

Projects Involved

1. Establishment and analysis of infertility control technology in zebrafish and freshwater angelfish (**Primary contributor**)
   - ✓ Tasks: Designed and conducted CRISPR/Cas9 gene editing experiments; performed phenotypic analysis and molecular validation.
2. Establishment of collagen tissue-targeted fluorescent fish strain (**Leader**)
   - ✓ Tasks: Initiated and directed project development; coordinated transgenic construct design, generation, and screening processes.
3. Maintenance and analysis of myostatin-targeted mutagenesis in Tilapia, including growth performances, reproductive ability, fatty acid metabolisms, and immunity (**Leader and supported analysis**)
   - ✓ Tasks: Led experimental design, fish maintenance protocols; contributed to analyzing growth performance, reproductive biology, fatty acid metabolism, and immune response assessments.
4. Establish the in vivo tracking system for specific PGC-labeling in zebrafish and freshwater angelfish (**Primary contributor**)
   - ✓ Tasks: Developed and validated fluorescent transgenic lines for primordial germ cell visualization; executed in vivo imaging and data interpretation.
5. Analysis of transgenic tilapia with fatty acid elongase to enhance fatty acid accumulation (**collaborated**)

- ✓ Tasks: Participated in experimental design and fatty acid profile analyses; collaborated on data interpretation.

Publications

✧ **Thesis**

Chu, W. K., (2019). Targeted mutagenesis of *dead end* (*dnd1*) gene for infertility control of zebrafish and angelfish by CRISPR/Cas9 genome editing. Master's Thesis. National Taiwan Ocean University, Keelung, Taiwan. Supervisor: Prof. Hong-Yi Gong, Ching-Fong Chang.

Chu, W. K., (2025). Tracking of primordial germ cells migration and the effects of *dnd1* targeted mutagenesis induced germ cell ablation by CRISPR/Cas9 on sex development and lipid metabolism in freshwater angelfish (*Pterophyllum scalare*). Ph.D. Thesis. National Taiwan Ocean University, Keelung, Taiwan. Supervisor: Prof. Hong-Yi Gong, Ching-Fong Chang.

✧ **Peer-reviewed articles**

Chu, W. K., Huang, S. C., Chang, C. F., Wu, J. L., Gong, H. Y., (2023). Infertility control of transgenic fluorescent zebrafish with targeted mutagenesis of the *dnd1* gene by CRISPR/Cas9 genome editing. *Frontiers in Genetics*, 14, 1029200. (Impact Factor: 2.8)

Chu, W. K., Huang, S. C., Chang, C. F., Wu, J. L., Gong, H. Y., (2025). Migration of primordial germ cells and their relationship of PGCs with sex development in transgenic germline-specific fluorescent freshwater angelfish (*Pterophyllum scalare*). *Scientific Reports*, 15 (1), 1308. (Impact Factor: 3.8)

Chu, W. K., Huang, S. C., Chang, C. F., Lin, Y. H., Wu, J. L., Gong, H. Y., (2025). Knockout of *dead end 1* by CRISPR/Cas9 leads to loss of germ cells and male-biased sex development in freshwater angelfish (*Pterophyllum scalare*). *Aquaculture*, 742180. (Impact Factor: 3.9)

✧ **Other Publications (Book chapters)**

Gong, H. Y., **Chu, W. K.**, Yu, J. H., Zeng, C. A., Huang, T. Y., Huang, Y. T., Huang, C. W., Hsu, T. H., Wu, J. L. Advancing Aquaculture Breeding: The Potential of Genome Editing. Tilapia and its Aquaculture in Taiwan (ISBN: 9786269871445). May, 2025: 153-182.

王榮華, 古新梅, **朱慧君**, 吳金洌, 吳信志, 吳東鴻, 吳佩真, 李宏泰, 李長沛, 杜 宜殷, 杜清富, 林奐妤, 林彥宏, 林盈仲, 林雅琪, 林耀正, 徐德華, 高崇峰, 張 立, 許鈺群, 陳冠宇, 陳盈嵐, 陳荷明, 陳龍昇, 陸玥妤, 陸振岡, 陸

祥家，曾昱，曾鈺茜，黃秀琳，黃建誌，黃致閔，黃章文，黃雅鈴，黃瀚輝，楊明德，葉信宏，葉 錫東，趙治平，蔡欣原，蔡燿全，賴明信，賴牧謙，戴宏宇，顏信沐，龔紘毅 （2023）。精準育種科技之應用及發展（ISBN：978-986-96453-6-2）（1）。台灣：精準健康產業跨領域人才培育計畫-精準農業教學推動中心

✧ **Communications of the International Conference**

Chu, W. K., Huang, S. C., Gong, H. Y., (2019). Establishment of infertile angelfish (*Pterophyllum scalare*) with mutated *dead end* gene by CRISPR/Cas9 genome editing technology. The Fisheries Society of Taiwan, Taiwan. (Poster presentation)

Chu, W. K., Chang, C. F., Gong, H. Y., (2019). Targeted mutagenesis of *dead end* (*dnd1*) gene for infertility control of zebrafish and angelfish by CRISPR/Cas9 genome editing. Taiwan Marine Biotechnology Society, Taiwan. (Poster presentation)

Chu, W. K., Huang, S. C., Lin, Y. H., Wu, J. L., Chang, C. F., Gong, H. Y., (2019). Targeted mutagenesis of *dead end* (*dnd1*) gene for infertility control of zebrafish and angelfish by CRISPR/Cas9 genome editing. Marine Biotechnology Conference 2019, Joint Conference of the 12th International Marine Biotechnology Conference and the 12th Asia Pacific Marine Biotechnology Conference, Shizuoka, Japan. (Poster presentation)

Chu, W. K., Huang, S. C., Lin, Y. H., Wu, J. L., Chang, C. F., Gong, H. Y., (2021). Develop infertility control technology and explore the regulation of primordial germ cells and sex determination in freshwater angelfish. The Fisheries Society of Taiwan, Taiwan. (Poster presentation)

Chu, W. K., Huang, S. C., Lin, Y. H., Wu, J. L., Chang, C. F., Gong, H. Y., (2021). Develop infertility control technology and explore the regulation of primordial germ cells and sex determination in freshwater angelfish. The Control of Aquatic Animal Diseases. (Poster presentation)

Chu, W. K., Huang, S. C., Lin, Y. H., Wu, J. L., Chang, C. F., Gong, H. Y., (2021). Develop infertility control technology and explore the regulation of primordial germ cells and sex determination in freshwater angelfish. Taiwan Marine Biotechnology Society, Taiwan. (Poster presentation)

Chu, W. K., Huang, S. C., Lin, Y. H., Wu, J. L., Chang, C. F., Gong, H. Y., (2022). Develop infertility control technology and explore the regulation of primordial germ cells and sex determination in freshwater angelfish. 13th Asian Fisheries and Aquaculture Forum (13th AFAF). (Poster presentation)

Chu, W. K., Huang, S. C., Lin, Y. H., Wu, J. L., Chang, C. F., Gong, H. Y., (2022). Visualization of the primordial germ cells and their migration route in PGC-specific transgenic fluorescent angelfish (*Pterophyllum scalare*). Taiwan Marine

Biotechnology Society, Taiwan. (Poster presentation)

Chu, W. K., Huang, S. C., Lin, Y. H., Wu, J. L., Chang, C. F., Gong, H. Y., (2022). Roles of *dnd1* on primordial germ cells and sex determination in freshwater angelfish (*Pterophyllum scalare*). Taiwan Marine Biotechnology Society, Taiwan. (Poster presentation)

Huang, Y. T., **Chu, W. K.**, Chen, H. T., Wu, J. L., Gong, H. Y., (2023). Establishment of transgenic fish by tilapia type I collagen *col1a1a* promoter. The Fisheries Society of Taiwan, Taiwan. (Poster presentation)

Chu, W. K., Huang, S. C., Lin, Y. H., Wu, J. L., Chang, C. F., Gong, H. Y., (2023). *dnd1* is essential for maintenance of primordial germ cells and sex determination in freshwater angelfish (*Pterophyllum scalare*). The Fisheries Society of Taiwan, Taiwan. (Poster presentation)

Chu, W. K., Huang, S. C., Lin, Y. H., Wu, J. L., Chang, C. F., Gong, H. Y., (2023) *dnd1* is essential for maintenance of primordial germ cells and sex determination in freshwater angelfish (*Pterophyllum scalare*). 9th International Conference of Brain and Gonadal Biology, Taiwan. (Oral presentation)

Chu, W. K., Huang, S. C., Lin, Y. H., Wu, J. L., Chang, C. F., Gong, H. Y., (2023). Establishment of PGC-specific fluorescent angelfish lines to trace the numbers and migration route of PGCs in freshwater angelfish (*Pterophyllum scalare*). Asia-Pacific Marine Biotechnology Conference (APMBC) and Australia New Zealand Marine Biotechnology Society Conference (ANZMBS), Adelaide, Australia. (Poster presentation)

Chu, W. K., Huang, S. C., Pan, Y. J., Chang, C. F., Gong, H. Y., (2024). An infertility model in freshwater angelfish: unraveling *dnd1* gene role and the interplay of germ cells, sex development, and adipose tissue accumulation in reproduction. The 10th International Symposium on Fish Endocrinology, Baltimore, USA. (Oral presentation)

Huang, T. Y., Huang, S. J., **Chu, W. K.**, Pan, Y. J., Wu, J. L., Gong, H. Y., (2024). Transgenic tilapia expressing fat1 omega-3 desaturase in liver and muscle for enhancement of n-3 PUFA and cold resistance. The Fisheries Society of Taiwan, Taiwan. (Poster presentation)

Zeng, C. A., **Chu, W. K.**, Huang, T. Y., Yu, J. H., Gong, H. Y., (2024). Generation of mighty tilapia strain with obvious double-muscle phenotype and low FCR by targeted mutagenesis of *myostatin b* gene. The Fisheries Society of Taiwan, Taiwan. (Poster presentation)

Cheng, C. L., **Chu, W. K.**, Huang, S. C., Wu, J. L., Gong, H. Y., (2024). Efficient mass production of infertile transgenic angelfish by establishment of germline-specific inducible disruption of PGCs with NTR system. The Fisheries Society of Taiwan,

Taiwan. (Poster presentation)

Chu, W. K., Huang, S. C., Wu, J. L., Chang, C. F., Gong, H. Y., (2024). A cichlid model for study of primordial germ cells: A comprehensive record reveals unique migration route of PGCs and relationship with sex development in germline-specific fluorescent freshwater angelfish. The Fisheries Society of Taiwan, Taiwan. (Poster presentation)

Huang, T. Y., **Chu, W. K.**, Pan, Y. J., Wu, J. L., Gong, H. Y., (2025). Impacts of *myostatin b* gene mutation on innate immune response and disease resistance in Nile tilapia (*Oreochromis niloticus*). The Fisheries Society of Taiwan, Taiwan. (Poster presentation)

Zeng, C. A., **Chu, W. K.**, Huang, T. Y., Yu, J. H., Huang, C. W., Wu, J. L., Gong, H. Y., (2025). Effects of targeted mutagenesis in *myostatin b* gene on skeletal muscle, skeleton and reproduction of tilapia. The Fisheries Society of Taiwan, Taiwan. (Poster presentation)

Teaching Experience

✧ **Undergraduate and Master's Students**

-Provided **hands-on experiment supervision**, offering **guidance in laboratory techniques** including transgenic, gene editing, molecular biology analysis, and histological assays.

-Delivered **comprehensive research guidance** from experimental design, troubleshooting, data analysis, and interpretation of results.

-Conducted specialized **presentation skills training**, improving students' abilities to communicate scientific concepts in oral and poster presentations clearly.

✧ **Invited Lecturer (Sharing)**

2024-**Fish Reproductive Physiology** (Master's level), NTOU

Topics: Unlocking the Power of Genetic Engineering: Exploring CRISPR/Cas9 Technology and its Applications

2025-**Molecular Biology** (Undergraduate level), NTOU

Topics: Applications of genetic engineering: Are we able to shape our new future? From global issues to gene editing innovations

Scholarships and Awards

✧ **Certifications**

2017 Honorable Mention Award, The Fisheries Society of Taiwan (Poster Award)

2017 Third Place, Taiwan Marine Biotechnology Society (Poster Award)

2019 MBC Student Poster Award, Marine Biotechnology Conference (Poster Award)
2019 First Place, The Fisheries Society of Taiwan (Poster Award)
2021 First Place, The Control of Aquatic Animal Disease (Poster Award)
2021 Third Place, Taiwan Marine Biotechnology Society (Poster Award)
2022 AFAF First Prize, Asian Fisheries and Aquaculture Forum (Poster Award)
2022 First Place, The Fisheries Society of Taiwan (Poster Award)
2024 ISFE Travel Awards 2024, International Society for Fish Endocrinology

✧ **Scholarship**

2020-2024 Outstanding Overseas Chinese Student Scholarship, Ministry of Education
2022 Scholarship of Taiwan-Hong Kong Exchange Association
2023 Scholarship of Taiwan-Hong Kong Exchange Association
2023 Funding for Attending an International Academic Conference of NSTC
2024 Funding for Attending an International Academic Conference of NSTC