# ZHAO Honghao

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## EDUCATION

**Hainan University, School of Life and Health Sciences** **Hainan, China**
Bachelor of Science in Biotechnology 2020.09 - 2024.07

- **GPA:** 89.33 /100
- **Core Courses:** Bioinformatics, Computer and Artificial Intelligence, Biostatistics, Probability and Statistics, Higher Mathematics, Inorganic Chemistry, Ordinary biology, Analytical Chemistry, Biochemistry, Biochemistry Experiment, Organic Chemistry, Cell Biology, Cell Biology Experiment, Cell Engineering, Genetic engineering, Genetics Experiment
- **Awards:** Dari Inspirational Scholarship, First-Class Comprehensive Scholarship, Second-Class Comprehensive Scholarship

## PUBLICATIONS

- **Zhao, H.**, Ma, J., Tang, Y., Ma, X., Li, J., Li, H., & Liu, Z. (2024). Genome-wide DNA N6-methyladenosine in *Aeromonas veronii* and *Helicobacter pylori*. *BMC Genomics, 25*(1), 161.
- Ma, J., **Zhao, H.**, Mo, S., Li, J., Ma, X., Tang, Y., Li, H., & Liu, Z. (2023). Acquisition of Type I methyltransferase via horizontal gene transfer increases the drug resistance of *Aeromonas veronii*. *Microbial Genomics*, *9*(9), 001107.

## RESEARCH EXPERIENCE

**Hainan University One Health Collaborative Innovation Center**

Laboratory Assistant, **Advisor:** *Prof.* Li Hong 2021.07 – 2024.7

➢ **Project:** *Acquisition of Type I methyltransferase via horizontal gene transfer increases the drug resistance of Aeromonas veronii.*
➢ **Published in *Microbial Genomics***

- Conducted an extensive analysis of the pan-genome of 233 *A. veronii* strains, revealing an 'open' pan-genome structure indicative of rapid adaptation and evolution, potentially contributing to drug resistance.
- Identified one Type I methyltransferase (MTase), AveC4I, and two complete Type I restriction-modification (RM) systems (AveC4II and AveC4III) in *A. veronii* strain C4, with AveC4I being exclusive to this strain.
- Utilized phylogenetic analysis to trace the origin of AveC4I to horizontal gene transfer from *Thiocystis violascens* and gene exchange with the human pathogen *Comamonas kerstersii*.
- Applied single molecule real-time sequencing to identify the unique motif methylated by AveC4I, not recognized by any reported MTases in the REBASE database.
- Annotated the functions and pathways of genes containing the AveC4I-methylated motif, revealing potential control of drug resistance in *A. veronii* C4.

➢ **Project:** *Genome-wide DNA N6-methyladenosine in Aeromonas veronii and Helicobacter pylori.*
➢ **Published in *BMC genomics***

- Conducted an in-depth analysis of DNA N6-methyladenosine (6mA) distribution in the genomes of two pathogenic bacteria, *Aeromonas veronii* and *Helicobacter pylori*.
- Revealed widespread distribution of 6mA in both strains, with distinct patterns: enrichment at the 3’ end of protein-coding genes in *A. veronii* and at the 5’ end in *H. pylori*.
- Identified a potential inhibitory effect of 6mA on gene expression in *A. veronii*, particularly for genes with high 6mA density at the 3’ end, while in *H. pylori*, 6mA sites were associated with enhanced gene expression.
- Established a connection between 6mA density and specific gene functions, such as genes with low 6mA density in *A. veronii* being linked to cell motility, and in *H. pylori*, low 6mA density genes were closely related to defense mechanisms.
- Provided valuable insights into the epigenetic regulation and functional characteristics of *A. veronii* and *H. pylori*, emphasizing the role of 6mA in gene expression modulation.

**Ocean University of China, Institution of Biodiversity and Evolution**

Laboratory Assistant, **Advisor:** *Prof.* Jin SUN 2024.09 – 2025.12

➢ **Project:** *Genomics-based investigation of biodiversity adaptation in the special environments*

- Using comparative genomics to elucidate the adaptation mechanisms of Deep-Sea mussels to chemosynthetic environments.
- Genomic analysis of Osteopeltidae indet. and elucidate genes related to chitinase.

## HONORS AND AWARDS

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| First Prize in the China Undergraduate Life Sciences Contest(CULSC), National Student Life Science Competition Committee | 07/2024 |
| Third Prize in the Fourth "Huashu Cup" National College Student Mathematical Modeling Competition, The Big Data and Mathematical Models Professional Committee of the China Future Research Society | 08/2023 |
| Third Prize in the Provincial Competition of the National College Student English Essay Competition, The International English Foreign Language Teachers Association and the China English Foreign Language Teachers Association | 06/2023 |
| Third Prize in the Provincial Competition of the National College Student Mathematics Competition (Non-Mathematics Category), The China Mathematical Society | 12/2021 |

## SKILLS & INTERESTS

**Dry Lab:** Python, R, Perl, Linux, Adobe Illustrator, Xshell, Xftp, Genomic analysis, Phylogenomic analysis, Omics data analysis etc.

**Wet Lab:** SMRT-seq, Polymerase Chain Reaction, Gel Electrophoresis, Western Blot, Molecular Cloning, Protein Purification etc.