BOYUE ZHANG

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EDUCATION

- **Zhejiang University** *Sep. 2023 - Jun. 2027 (Expected)*
  B.S. in Biological Sciences, GPA: 3.69/4.0 Hangzhou, China
  - **Coursework:** Computational Biology (98/100), Biophysics (96/100), Bioinformatics (97/100)
  - **Honors:** Professional Excellence Scholarship, Academic Excellence Model

- **The Chinese University of Hong Kong** *Sep 2026 - Dec 2026 (Upcoming)*
  Exchange Student, International Asian Studies Programme (IASP) Hong Kong, China

PROJECTS

- **Walter and Eliza Hall Institute (WEHI) InSPIRE Research Intern** *Jun 2026 - Present*
  Tools: Flow Cytometry, Degranulation Assay, HEK293T Culture, GROMACS, ΔG Prediction, Rosetta, ESM2 [🌐]
  - *Supervised by Dr. Emma Petley; PIs: Prof. Matt Call & A/Prof. Melissa Call, Fully-funded InSPIRE Program*
  - **Design:** Investigated whether redesigning a CAR-T costimulatory receptor (4-1BBζ) TMD into its natural trimeric form improves T cell activation, based on the lab's proCAR3 design hypothesis
  - **Wet Lab (Functional Validation):** Collaborated to optimize 4 TMD variants and executed flow cytometry and degranulation assays against 2 tumor cell lines, confirming surface expression (73–74
  - **Dry Lab (Computational Screening):** Independently executed 2 μs MD simulations across 4 designs to verify stable trimer assembly (achieving 85

- **Computational Design of CrtW and CrtZ for Enhanced Astaxanthin Biosynthesis** *Sep 2025 - Present*
  Tools: Rosetta, GROMACS, ESM2, PyMOL, AlphaFold3, HPLC [🕊]
  - *Advised by Dr. Yangwei Jiang, Qiushi Chair Prof. Ruhong Zhou's Lab, School of Life Sciences, Zhejiang University*
  - **Design (268 candidates):** Engineered CrtW (β-carotene ketolase), a rate-limiting enzyme in astaxanthin biosynthesis, combining structure-based (Rosetta FuncLib) and sequence-based (ESM2, ThermoMPNN) design to screen 320 residues
  - **Simulation (2 μs MD):** Evaluated the top 6 candidates; G142P+I192L formed the most extended substrate positioning and most stable ligand-binding pocket, outperforming static structural predictions with no loss of protein stability
  - **Validation (+46.7% yield):** Took the top mutant into the wet lab, confirming the predicted improvement in vitro over wild-type

- **LumaManta (ZJU-China iGEM 2025): Technical Lead** *Aug 2024 - Oct 2025*
  Tools: CRISPR-i/a, Optogenetics, Confocal Microscopy, Python, R, GROMACS, AlphaFold3 [🌐] [🕊]
  - *Advised by Prof. Ming Chen and Assoc. Prof. Fan Yang, School of Life Sciences, Zhejiang University*
  - **Leadership:** Led a 14-member interdisciplinary team (wet lab, dry lab, hardware, software) to a Silver Medal, building an all-in-one biosensing device for real-time water pollutant and eDNA monitoring
  - **Biosensor design:** Engineered *BiChromaLogic*, a light-controlled genetic circuit that converts 2 light inputs into 4 distinct sensor proteins on demand, using CRISPR-based logic gates (**169%** activation, **92%** repression efficiency)

- **Sex Dimorphism in DEN/TCPOBOP-Induced Hepatocellular Carcinoma** *Mar 2026 - Present*
  Tools: R (DESeq2, WGCNA), Python, Transcriptomics, Metabolomics
  - *Advised by Dr. Wenbin Zhou, Prof. Meihua Sui's Lab, School of Medicine, Zhejiang University*
  - **Multi-omics analysis:** Analyzed transcriptomic and metabolomic data across hepatitis, cirrhosis, and HCC stages from 174 mice, identifying 12 core sex-biased metabolites in bile acid, tryptophan, and acylcarnitine pathways
  - **Hormone rescue (+97% TUDCA):** Found estrogen supplementation reversed the bile acid marker TUDCA and rescued half of the male-female gap in a composite disease score
  - **Network integration (155 links):** Linked WGCNA/PPI hub genes to metabolomic findings, revealing candidate drivers of sex-biased liver disease progression

- **Provincial Research Grant (SRTP): A Sustainable Pigment Biosynthesis System** *March 2025 - Feb 2026*
  Tools: GROMACS, LC-MS, SnapGene, GSMM, Python, R, Optogenetics [🌐]
  - *Advised by Prof. Ming Chen, School of Life Sciences, Zhejiang University*
  - **Enzyme & metabolic engineering:** Identified a vioE mutant (+32% activity) via semi-rational design and MD simulation, and two gene knockouts (+48%/+23% yield) via genome-scale metabolic modeling
  - **Genetic circuit design:** Built dual orthogonal quorum-sensing circuits and a blue-light-inducible split-Cre system to enable programmable, reversible switching of pigment output

Honors and Awards

- **WEHI InSPIRE Scholarship** *2026*
  Walter and Eliza Hall Institute of Medical Research — 8,000 AUD; competitively selected, ZJU-nominated
- **iGEM 2025 Silver Medal** *Oct 2025*
  International Genetically Engineered Machine Competition — Technical Lead, ZJU-China LumaManta [🌐]
- **Grand Prize, National Synthetic Biology Innovation Competition** *Aug 2025*
  Chinese Society for Biotechnology & Shenzhen Institute of Synthetic Biology — 1st place nationally
- **Gold Medal, 18th "Dandelion" Undergraduate Innovation Competition** *Mar 2026*
  Zhejiang University — CTO, LumaManta eDNA-based aquatic pathogen detection
- **First Prize (Champion), 2nd "Forbel Cup" National Pet Industry Innovation Competition** *Jan 2025*
  Shanghai Society of Animal Husbandry & Veterinary Medicine — Led "Pet Smart Health" team
- **Provincial SRTP Research Grant** *2025*
  Zhejiang Provincial Department of Science and Technology — 12,000 RMB
- **5th Place, Stand-Up Paddleboard 200m, University Sports Championship** *Jun 2025*
  Zhejiang University
- **Academic Honors & Scholarships**
  Zhejiang University 2023–2025
  - Professional Excellence Scholarship (2023–2024)
  - Third-Class Scholarship (2024–2025)
  - Innovation & Entrepreneurship Model; Academic Excellence Model (2024–2025)

Skills

- **Programming Languages:** Python, R, Bash/Shell, C
- **Computational Biology & Bioinformatics:** Rosetta, AlphaFold3, GROMACS, ESM2, ThermoMPNN, PyMOL, SnapGene, CHARMM-GUI, MEGA
- **Molecular & Synthetic Biology:** CRISPR-i/a, Optogenetics, Gibson Assembly, Molecular Cloning, Site-Directed Mutagenesis, GSMM
- **Cell Biology & Protein:** Human Primary T Cell / Jurkat / HEK293T Culture, Viral Production & Purification, Flow Cytometry, Degranulation Assay, Cell Counting, Protein Expression & Purification, Western Blot, Immunofluorescence, Confocal Microscopy
- **Languages:** English (IELTS 6.5), Chinese (Native)

Leadership and Volunteer Experience

- **Class Monitor** *Sep 2023 - Jul 2025*
  School of Life Sciences & College of Yunfeng, Zhejiang University [🌐]
  - Led 30+ students across two cohorts, organizing 10+ career seminars and coordinating peer mentoring for 15+ students
  - Managed volunteer programs including animal welfare, West Lake conservation, and Hangzhou Zoo docent training