Zhuosheng Liu

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EDUCATION

Ph.D. candidate in Food Science and Technology ***2020-present***
Research area: Food Microbiology/Microbial genomics/Applied Bioinformatics
University of California, Davis
GPA**: 3.97/4.0**

Master's degree in biotechnology (Thesis-driven) ***2020***
Columbia University, New York
GPA: **3.84/4.0**

Bachelor's degree in food science and technology ***2019***
University of California, Davis
GPA: **3.59/4.0** Major GPA: **3.62/4.0**

AWARDS

- First place in NCIFT Student Poster Competition — Northern California Institute of Food Technology, 2023
- LUGG Graduate Student Award — UC Davis, 2023
- Fresh Express Incorporated Graduate Student Support Fund — UC Davis, 2023
- Jastro-Shields Research Award — UC Davis, 2022/2021/2023
- Victor Chu Endowment — UC Davis, 2022
- Fresh Express Incorporated Graduate Student Support Fund — UC Davis, 2022
- James and Marilyn Lugg Graduate Student Award — UC Davis, 2022/2023
- Bor Luh Scholarship — UC Davis, 2021
- George Stewart Memorial Award — UC Davis, 2021
- Doctoral Student Fellowship — UC Davis, 2020
- Departmental Master Student Scholarship — Columbia University, 2019
- 3rd place in student presentation competition — CAFPNA, 2019
- Marie and William Cruess Scholarship — Northern California Institute of Food Technology, 2019
- Departmental Citation for Outstanding Performance — UC Davis, 2019
- Undergraduate Research Travel Award — UC Davis, 2019
- Provost's Undergraduate Research Fellowship — UC Davis, 2018

PEER-REVIEWED PUBLICATION

1. **Liu, Zhuosheng**, Zhou, Y., Wang, H., and Wang, L. 2022. Advanced understanding about fitness and survival mechanisms of *Vibrio parahaemolyticus* through pre- to post-omics era International Journal of Food Microbiology (under review).
2. **Liu, Zhuosheng,** Li, Z., Zhang, J., Wang, L. 2023. Pathogenicity prediction of *Vibrio parahaemolyticus* by using pangenome data with high performance machine learning algorithms (In preparation).
3. Li, Z., **Liu, Zhuosheng.,** Zhang, J., Parameter-Efficient Fine-Tuning for Vision-Language Models submitted to CVPR 2024.
4. **Liu, Zhuosheng**, Sheng, L., Canakapalli, S., Phillips, S., and Wang, L. 2022. Microbial risk assessment of the preparation and storage of dried fruit. *Lwt Food Science and Technology* (**IF 6.0**). https://doi.org/10.1016/j.lwt.2022.113734
5. **Liu Zhuosheng**, Shaposhnikov M., Wang H., Zhuang S., Wang, L. 2022 Growth and survival of common spoilage and pathogenic bacteria in ground beef and plant-based meat analogues. *Food Research International* (**IF 8.1**). https://doi.org/10.1016/j.foodres.2022.112408

6. **Liu, Zhuosheng**, Liao, C., Wang, L. 2022. Fitness and transcriptomic analysis of *Vibrio parahaemolyticus* at different oyster harvesting temperatures. *Microbiology spectrum* (**IF 9.0**) https://doi.org/10.1128/spectrum.02783-23.
7. **Liu, Zhuosheng,** Golson, K., Liao, C., Phillips, S., and Wang, L. 2021. Survival of common foodborne pathogens on dried apricots made with and without sulfur dioxide treatment. *Food Control* (**IF 6.652**). 121, 107569. https://doi.org/10.1016/j.foodcont.2020.107569
8. Wang, H., Sheng, L., **Zhuosheng Liu**, Li, X., Harris, L., Wang, L. 2023 Fate of foodborne pathogens on lemons after lab- and pilot-scale finishing wax application Journal of Food Protection (**IF 2.7**) (Under review).

POSTER & ORAL PRESENTATIONS

Liu, Zhuosheng, Liao, C., Wang, L. 2019. Behavior of Shiga toxin-producing *Escherichia coli*, *Salmonella* spp., and *Listeria monocytogenes* on dried apricots made with and without sulfur dioxide. International Association of Food Protection 2019 Annual Meeting. Louisville, KY. July 21-24, 2019.

Wang, H, Sheng, L, Li, X, **Liu, Zhuosheng**, Canakapalli, S, Zhou, Y, Liao, C, Martinez , ES, Wang, L 2022. The Impact of Florfenicol Treatment on the Microbial Populations Associated with Live Catfish. Food Protection 2022 Annual Meeting. Pittsburg, PA. July 31-Aug 3, 2022.

Liu, Zhuosheng, Shaposhnikov, M, Wang, H, Zhuang, S, Wang, L, 2022. Evaluation of the Microbial Quality of Plant-Based Meat Analogs. Food Protection 2022 Annual Meeting. Pittsburg, PA. July 31-Aug 3, 2022.

Liu, Zhuosheng, Liao, C., Wang, L. 2022. Fitness and transcriptomic analysis of *Vibrio parahaemolyticus* at different oyster harvesting temperatures. Food Protection 2022 Annual Meeting. Pittsburg, PA. July 31-Aug 3, 2022.

Liu, Zhuosheng, Liao, C., Wang, L. 2022. Fitness and transcriptomic analysis of *Vibrio parahaemolyticus* at different oyster harvesting temperatures. Pacific Fishery Technology conference 2022. Newport, OR. February 22, 2022.

Liu, Zhuosheng, Liao, C., Wang, L. 2022. Fitness and transcriptomic analysis of *Vibrio parahaemolyticus* at different oyster harvesting temperatures. Aquaculture America. New Orleans, LA. February 23, 2023.

Wang, H., Sheng, L., **Zhuosheng Liu**, Li, X., Harris, L., Wang, L. 2023 Fate of foodborne pathogens on lemons after lab- and pilot-scale finishing wax application. International Association of Food Protection 2023 Annual Meeting. Toronto, Canada. July 16-19, 2023.

PEER REVIEW RECORD

- Member (Peer review panel) IFT First Technical Research Paper ***January 2023***

Provided comments and feedbacks to 20 conference abstracts submitted to Institute of Food Technologists First 2023 annual meeting

SELECTED RESEARCH EXPERIENCE

Graduate research assistant (Luxin Wang lab), UC Davis ***September 2020 - present***

Project 1: Assessment of pathogenic potential for *Vibrio parahaemolyticus* achieved by high performance machine learning models

The utilization of machine learning (ML) methods that leverage whole-genome sequencing (WGS) data has garnered considerable attention and interest in recent years. The goal of this study is to address the urgent need for effective control measures against *Vibrio parahaemolyticus* by fast and accurate fundamental virulence

prediction using level-1 machine learning and level-2 deep learning algorithms. This study aims to leverage ML methods and WGS data to advance the characterization *Vibrio parahaemolyticus* pathogenicity and benefit the modern public health.

Project 2: Assessment of Competitive Exclusion Potential of Bacteria Isolated from Commercial Lettuce Samples

32 bacteria isolates were obtained from commercial lettuce sample, of which extracted DNA was sent for sequencing, quality checks, de-novo assembly of genomes, and parallel analyses for gene functions, similarity to known bacteria, and the presence of genes for bacteriocins (natural antibacterial compounds). Lactococcin-like producing 3 candidate strains were subjected for extraction and purification. This research could lead to natural ways to enhance food safety by using metabolites of beneficial bacteria to outcompete pathogens on fresh produce.

Project 3: Transcriptomic analysis of pathogenic *Vibrio parahaemolyticus* survival in seawaters at different oyster harvesting temperatures

Vibrio parahaemolyticus is a common foodborne pathogen presenting ubiquitously in seawater and seafood products. However, the gene expression profile of persistent *Vibrio parahaemolyticus* surviving under different oyster production and storage conditions remains largely unknown. The aim of this study is to use RNA sequencing to investigate the survival mechanisms of *Vibrio. parahaemolyticus* when persisting in seawater at different oyster harvesting temperatures.

Project 4: Systematic and integrated approach to mitigation of antimicrobial resistance in aquaculture

The use of antibiotics in animal agriculture is one of the drivers of antimicrobial resistance (AMR). In order to ensure sustainable use of antibiotics, the impact of the use of oxytetracycline hydrochloride, sulfadimethoxine and ormetoprim, and florfenicol on the abundance, diversity, and changes of AMR bacteria and genes presenting in catfish and rearing water was investigated. For this project, the field trail was completed in 2020 and I am currently working on the data analysis with another Ph.D. student. The goal of this proposal is to generate useful information that can be used by catfish farmers and veterinarians when issuing antibiotic treatments to fish.

Project 5: Microbial risk assessment of the preparation and storage of dried fruits

Dried fruits are one of the most economically valuable specialty crops in the U.S. Unfortunately, most processors have not validated the antimicrobial efficacy of their pre-drying dipping treatments and determined if the drying step has antimicrobial effects on foodborne bacterial pathogens. The aim of this study is to investigate the anti-microbial effects of pre-drying dipping treatments and drying on *Salmonella*. Moreover, the fitness of *Enterococcus faecium* as the surrogate of *Salmonella* in dried fruit production has also been evaluated.

Project 6: Development of a loop-mediated isothermal amplification (LAMP)-based *Bacteroidales* detection platform for monitoring animal fecal contamination in environment

Indicator microorganisms have been widely used for the prediction of microbial food safety. However, there are several drawbacks associated with traditional fecal indicator bacteria monitoring protocols. For example, the current coliform enumeration protocol does not provide any information about contamination sources. For example, it is impossible to find out whether contamination is from a cattle farm or a horse ranch. To address this need, we propose to use *Bacteroidales* as the biomarker for monitoring fecal contamination in water or other environmental samples. In this project, a multiple animal species-targeted real-time biomarker detection protocol was developed. By incorporating it with the LAMP platform, the new detection protocol and platform serves as a great tool for farmers to trace back contamination sources on their farms.

Undergraduate research assistant (Luxin Wang lab), UC Davis

Project 1: Evaluation of pathogen behaviors in dried fruits ***September 2018- August 2019***

In this project, I investigated the survival of *Escherichia coli* O157:H7, *Salmonella* spp., and *Listeria monocytogenes* on dried apricots that were made with or without sulfur dioxide treatment.

OTHER ACITIVITIES

Graduate teaching assistant, UC Davis ***March 2021-present***

- Guided undergraduates in FST 104L "*Food Microbiology Laboratory*" and MIC 103L "*Introductory Microbiology Laboratory*"
- Hold office hour and graded assignments for 300 undergraduates in FST 10 "*Introduction to Food Science*"
- Lead discussion section of FST 100B "*Food Property*"

Undergraduate learning assistant, UC Davis ***August 2017 - April 2019***

- Tutored students on Microbiology 103 teaching lab for three hours every week for a whole quarter
- Tutored students general Chemistry 2 series courses twice every week for a whole quarter

PROFESSIONAL MEMBERSHIPS

- Chinese Association for Food Protection in North America ***Student Committee Member***
- Biotechnology Graduate Student Club at Columbia University ***Student Committee Member***
- International Association of Food Protection ***Student Member***
- Institute of Food Technologists ***Student Member***
- American Society for Microbiology ***Student Member***

TECHNICAL SKILLS

Language: Python, R, C/C++, Bash

Bioinformatic techniques: Automatic workflow construct using Snakemake, 16s rRNA-sequencing analysis RNA-sequencing analysis, Whole-genome sequencing analysis, machine learning/AI in genomics (scikit-learn, Deep learning frame work PyTorch)

Wet benchwork skills: NGS-library prep, qPCR, PCR, traditional microbial techniques