

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

M.A. in Biotechnology (Thesis-driven) **2020**

Columbia University, New York

GPA: 3.84/4.0

B.S. 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
- 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
- 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
- Dean's Honors List, UC Davis 2017 Winter Quarter UC Davis, 2017

PEER-REVIEWED PUBLICATION

1. **Liu, Zhuosheng**, Zhou, Y., Wang, H., and Wang, L. 2022. A comprehensive review of the prevalence and fitness of *Vibrio parahaemolyticus*. *Current Opinion in Biotechnology* (**IF 11.17**) (Under review).
2. **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 6.056**). <https://doi.org/10.1016/j.lwt.2022.113734>
3. **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 7.425**). <https://doi.org/10.1016/j.foodres.2022.112408>
4. **Liu, Zhuosheng**, Liao, C., Wang, L. 2022. Fitness and transcriptomic analysis of *Vibrio parahaemolyticus* at different oyster harvesting temperatures. Preprint available at <https://doi.org/10.1101/2023.05.03.539256> submitted to *Microbiology spectrum* (Under review).
5. **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>

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

- Registered reviewer in Microbiology society
- Registered reviewer in Journal of Food Science and Comprehensive review in Food Science and Food Safety
- Invited reviewer in Food Additive and Contaminants

RESEARCH EXPERIENCE

Graduate research assistant (Luxin Wang lab), UC Davis

September 2020 - present

Project 1: 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 2: 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 3: 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 4: 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 5: 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.

Graduate research assistant (Songtao Jia lab), Columbia University

August 2019-March 2019

Project 1: The involvement of Ino80 complex in the epigenetic inheritance of heterochromatin

Ino80 complex is an ATP-dependent chromatin remodeler. Previous studies on epigenetics show that the Ino80 sub-unit deletion of nh1 and hap2 can rescue the phenotype of Dicer 1 deletion cells. However, the mechanism of nht1Δ or hap2Δ rescuing dce1Δ is still unknown. The purpose of this study is to find out the interaction of nht1Δ or hap2Δ with other epigenetic regulation genes using high throughput genetic screens.

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 ACTIVITIES

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

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| ▪ Chinese Association for Food Protection in North America | <i>Student Committee Member</i> |
| ▪ Biotechnology Graduate Student Club at Columbia University | <i>Student Committee Member</i> |
| ▪ International Association of Food Protection | <i>Student Member</i> |
| ▪ Institute of Food Technologists | <i>Student Member</i> |
| ▪ American Society for Microbiology | <i>Student Member</i> |

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