

# BO ZHANG, PhD

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Santa Barbara, CA

## EDUCATION

**Ph.D.**, Animal Biology, University of California, Davis. 9/2019 – 9/2022

**Ph.D.**, Animal Molecular and Cellular Biology, University of Florida, Gainesville, 8/2018 – 5/2019

**M.S.**, Microbiology, University of Chinese Academy of Sciences (UCAS), Beijing, China, 9/2012 – 7/2016

**B.S.**, Biological Science, Jiangxi Normal University (JXNU), Nanchang, China, 9/2008 – 7/2012

## RESEARCH EXPERIENCE

Department of Animal Sciences, University of Florida, 8/2018 – 5/2019; Department of Animal Science, UC Davis, 5/2019 – 9/2022. PI: Dr. Timothy Hackmann.

**Doctoral Research.** Revealed new biochemical pathways for fermentation acids production by bacteria, using genomic, proteomics, biochemical, and bioinformatic analysis.

1) Identified a new pathway for forming acetate in bacteria, and 2) identified an ion pump (Rnf) that fills gaps for regenerating redox cofactor for propionate production in bacteria.

Institute of Microbiology, Chinese Academy of Sciences, PI: Dr. Xiuzhu Dong.

**Research Assistant.** Uncovered mechanism by which TRAM protein (RNA chaperone) interact with RNA molecules in methanogen, by genetic, physiological, biochemical and transcriptomic studies, 7/2016 – 8/2018.

**Masters Research.** Characterized the biochemical and physiological function of a methanoarchaeal RNA chaperone TRAM protein, 6/2013 – 6/2016.

**Student Training Program.** 1) Explored cold-adaptive mechanism of *Methanlobus psychrophilus* by proteomic analysis, and 2) uncovered mechanism leading to different cellular morphologies of *Methanosaeta harundinacea* by transcriptomic analysis, 7/2012 – 7/2013.

College of Life Sciences, Jiangxi Normal University. PI: Dr. Zhong-er Long.

**Undergraduate Graduation Project.** Identified the proper condition to establish breeding methods by protoplast fusion of an antibiotic producing bacterium, *Micromonospora carbonacea* JXNU-1, 11/2011 – 5/2012.

## PUBLICATIONS

1. **Zhang, B.**, Lingga, C., De Groot, H. and Hackmann, T.J., The enzyme Rnf completes the pathway for forming propionate during fermentation in *Prevotella*. DOI: [10.1101/2022.11.08.515646](https://doi.org/10.1101/2022.11.08.515646)
2. **Zhang, B.**, Lingga, C., Bowman, C. and Hackmann, T.J., 2021. A new pathway for forming acetate and synthesizing ATP during fermentation in bacteria. *Applied and Environmental Microbiology*, 87(14), pp.e02959-20. DOI: [10.1128/AEM.02959-20](https://doi.org/10.1128/AEM.02959-20)
3. Hackmann, T.J. and **Zhang, B.**, 2021. Using neural networks to mine text and predict metabolic traits for thousands of microbes. *PLoS computational biology*, 17(3), p.e1008757. DOI: [10.1371/journal.pcbi.1008757](https://doi.org/10.1371/journal.pcbi.1008757)
4. Li, J., **Zhang, B.**, Zhou, L., Qi, L., Yue, L., Zhang, W., Cheng, H., Whitman, W.B. and Dong, X., 2019. The archaeal RNA chaperone TRAM0076 shapes the transcriptome and optimizes the growth of *Methanococcus maripaludis*. *PLoS genetics*, 15(8), p.e1008328. DOI: [10.1371/journal.pgen.1008328](https://doi.org/10.1371/journal.pgen.1008328) (**Co-first author**)

5. **Zhang, B.**, Yue, L., Zhou, L., Qi, L., Li, J. and Dong, X., 2017. Conserved TRAM domain functions as an archaeal cold shock protein via RNA chaperone activity. *Frontiers in microbiology*, 8, p.1597. DOI: [10.3389/fmicb.2017.01597](https://doi.org/10.3389/fmicb.2017.01597)
6. Chen, Z., Feng, D., **Zhang, B.**, Wang, Q., Luo, Y. and Dong, X., 2015. Proteomic insights into the temperature responses of a cold-adaptive archaeon *Methanlobus psychrophilus* R15. *Extremophiles*, 19(2), pp.249-259. DOI: [10.1007/s00792-014-0709-y](https://doi.org/10.1007/s00792-014-0709-y)
7. Zhou, L., Yu, H., Ai, G., **Zhang, B.**, Hu, S. and Dong, X., 2015. Transcriptomic and physiological insights into the robustness of long filamentous cells of *Methanosaeta harundinacea*, prevalent in upflow anaerobic sludge blanket granules. *Applied and environmental microbiology*, 81(3), pp.831-839. DOI: [10.1128/AEM.03092-14](https://doi.org/10.1128/AEM.03092-14)

## SPEAKING PRESENTATIONS

1. **Zhang, B.**, Lingga, C., De Groot, H. and Hackmann, T.J., (6/22/2022) “New biochemical pathway for forming propionate during fermentation in rumen bacteria”, the 2022 American Dairy Science Association Annual Meeting, Kansas City, MO
2. **Zhang, B.**, Lingga, C., De Groot, H. and Hackmann, T.J., (4/12/2022) “Rnf is involved in propionate production during fermentation in rumen bacteria”, the 2022 Congress on Gastrointestinal Function (virtual)
3. **Zhang, B.** (3/24/2022) “New pathways for producing fermentation acids during glucose fermentation in bacteria”, Department of Pathology, Stanford University School of Medicine, Stanford, CA. **(as an invited speaker)**
4. **Zhang, B.** (10/19/2021) “New biochemical pathway for propionate formation during fermentation in rumen bacteria”, Animal Biology Graduate Group Colloquium, Davis, CA
5. **Zhang, B.** (10/26/2020) “A new acetate-forming pathway during fermentation in bacteria”, Animal Biology Graduate Group Colloquium (virtual poster), Davis, CA
6. **Zhang, B.**, Bowman, C. and Hackmann, T.J. (6/22/2020) “A new pathway for forming acetate during fermentation in bacteria”, the 2020 American Dairy Science Association Annual Meeting (virtual)
7. **Zhang, B.** (4/12/2019) “Determining how much ATP is yielded from fermentation by rumen microbes”, 17th Annual Research Symposium, Animal Molecular & Cellular Biology Graduate Program, Cocoa Beach, FL
8. **Zhang, B.** (5/12/2016) “Biochemical characterization and physiological function of a methanoarchaeal RNA chaperone TRAM protein”, Master Exist Seminar, Beijing, China
9. **Zhang, B.** (5/12/2015) “A methanoarchaeal RNA chaperone TRAM protein: biochemical characteristics and physiological function”, Graduate Student Seminar in 2015, Institute of Microbiology, Chinese Academy of Sciences (CAS), Beijing, China
10. **Zhang, B.** (5/12/2014) “Function of TRAM protein in a cold-adaptive methanogen, *Methanlobus psychrophilus* R15”, Graduate Student Seminar in 2014, Institute of Microbiology, CAS, Beijing, China

## RESEARCH GRANTS

- Henry A. Jastro Graduate Research Award (\$3,000), UC Davis, 2021 – 2022
- Graduate Program Fellowship (for research, \$3,000), UC Davis, 2020 – 2022

## FELLOWSHIPS AND FUNDING

- Humphries Fellowship, Department of Animal Science, UC Davis, Summer 2022
- Graduate Program Fellowship, Animal Biology Graduate Group, UC Davis, Summer 2022
- Ursula Abbott Travel Award, Department of Animal Science, UC Davis, Spring 2022
- Graduate Student Researcher (GSR) fellowship, Department of Animal Science, UC Davis, 2019 –

2022

- Graduate Student Association Travel Award, UC Davis, Spring 2022
- Rosenberg GSR I, Animal Science Department Summer Support, UC Davis (twice), 2020 & 2021
- Teaching Assistant fellowship, Department of Animal Science, UC Davis, 2019 – 2020
- Animal Molecular and Cellular Biology Fellowship, University of Florida, 2018 – 2019

### **Teaching Assistant Experience and Mentorship Experience**

- Worked as a Teaching Assistant for ANS001 (Domestic Animals and People) at UC Davis, Fall 2019
- Trained Christopher Lingga (undergraduate student), in lab research techniques, 7/2020 – 3/2021
- Trained Hannah De Groot (undergraduate student), in lab research techniques, 6/2021 – 3/2022
- Trained Wenting Zhang (undergraduate student) in laboratory research techniques, provided guidance on a project leading to a senior thesis, 9/2017 – 6/2018

### **TECHNIQUES**

#### **Specialty**

- Anaerobic techniques, e.g. isolation, identification, and culturing of anaerobic archaea and bacteria
- Genomic editing of a methanogen, *Methanococcus maripaludis*
- Performing gas chromatography to detect gas and volatile metabolites
- Sample preparation for metabolomic analysis, for shotgun proteomic analysis
- Protein identification by shotgun proteomics (LC-MS/MS)
- Enzymatic assays to measure enzymatic activity
- Detection of macromolecular interactions by electrophoretic mobility shift assay, Biacore, RIP-Chip
- Bioinformatic analysis of genomic and proteomic data
- Statistical analysis and figure generation using R

#### **General**

- Molecular biology related techniques, e.g. PCR, RT-PCR, plasmid construction, Northern blot, Western blot, RNA transcription and purification, sequencing library preparation
- Protein purification using fast protein liquid chromatography (FPLC)
- Fluorescence microscopy, light microscopy
- Familiar with common molecular biology software, e.g. Vector NTI, DNAMAN, Primer Premier, and life sciences databases, KEGG, Pfam, JGI/IMG, MetaCyc

### **SELECTED AWARDS AND HONORS**

- Fourth-Class Award of the SKLMR, Institute of Microbiology, Chinese Academy of Science, 5/2015
- Merit Student Scholarship, UCAS, 2015 – 2016
- Merit Student, UCAS (twice), 2013 & 2015
- Outstanding Graduates, JXNU, 2012
- Merit Student, JXNU (four times), 2008 – 2012
- Excellent Undergraduate Scholarship, JXNU (four times), 2008 – 2012
- The First-Class Professional Scholarship, JXNU (twice), 2010 & 2012
- The Second-Class Professional Scholarship, JXNU (twice), 2009 & 2011
- The First-Class Scholarship awarded by Fu Hui Education Foundation, 2011
- The National Encouragement Scholarship, 2009

### **PROFESSIONAL AFFILIATIONS**

- Member, American Society for Microbiology (ASM)
- Member, American Dairy Science Association (ADSA)