BO ZHANG, PhD

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Santa Barbara, CA

EDUCATION

Ph.D., Animal Biology, University of California, Davis; 9/2019 – 9/2022; 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 Chemical Engineering, UC Santa Barbara, 10/2022 – Present, PI: **Dr. Michelle O'Malley**

Postdoctoral Researcher. Study anaerobic consortia & metabolism of biomass degrading organisms (*i.e.* anaerobic gut fungi from the rumen of cattle), aiming to leverage rumen consortia for producing valuable fermentation products.

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

Doctoral Research. Identified new ways of forming fermentation products (acetate and propionate) by biomass-degrading bacteria, filling knowledge gaps in understanding how they degrade feedstuff to benefit dairy cattle in agriculture production.

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

Research Assistant. Discovered mechanisms by which TRAM protein (RNA chaperone) interact with RNA molecules in anaerobic archaea (methanogen), 7/2016 – 8/2018.

Masters Research. Characterized function of a methanoarchaeal RNA chaperone TRAM protein, 6/2013 – 6/2016.

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

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

Undergraduate Graduation Project. Identified a 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, Bo**, Ivan Hrdy, Jan Tachezy, Scott E. Baker, Michelle A. O'Malley. "The anaerobic gut fungus *Caecomyces churrovis* produces H_2 via a non-bifurcating NADH-dependent enzyme complex composed of [FeFe] hydrogenase (HydA) and NADH dehydrogenase subunits EF (NuoEF)". *In preparation*
2. Jin, Shiyan, Isabella R. Farrand, Yan Chen, Jennifer W. Gin, **Bo Zhang**, Elaine Kirschke, Christopher J. Petzold, Paul D. Adams, and Michelle A. O'Malley. "A large-scale screening campaign of putative carbohydrate-active enzymes reveals a novel xylanase from anaerobic gut fungi." *mBio* (2025): e01007-25.

3. **Zhang, Bo**, Christopher Lingga, Hannah De Groot, and Timothy J. Hackmann. "The oxidoreductase activity of Rnf balances redox cofactors during fermentation of glucose to propionate in Prevotella." *Scientific Reports* 13, no. 1 (2023): 16429. DOI: 10.1038/s41598-023-43282-9
4. Hackmann, Timothy J., and **Bo Zhang**. "The phenotype and genotype of fermentative prokaryotes." *Science Advances* 9, no. 39 (2023): eadg8687. DOI: 10.1126/sciadv.adg8687
5. **Zhang, Bo**, Christopher Lingga, Courtney Bowman, and Timothy J. Hackmann. "A new pathway for forming acetate and synthesizing ATP during fermentation in bacteria." *Applied and environmental microbiology* 87, no. 14 (2021): e02959-20. DOI: 10.1128/AEM.02959-20
6. Hackmann, Timothy J., and **Bo Zhang**. "Using neural networks to mine text and predict metabolic traits for thousands of microbes." *PLoS Computational Biology* 17, no. 3 (2021): e1008757. DOI: 10.1371/journal.pcbi.1008757
7. Li, Jie, **Bo Zhang**, Liguang Zhou, Lei Qi, Lei Yue, Wenting Zhang, Huicai Cheng, William B. Whitman, and Xiuzhu Dong. "The archaeal RNA chaperone TRAM0076 shapes the transcriptome and optimizes the growth of *Methanococcus maripaludis*." *PLoS Genetics* 15, no. 8 (2019): e1008328. DOI: 10.1371/journal.pgen.1008328 (***Co-first author***)
8. **Zhang, Bo**, Lei Yue, Liguang Zhou, Lei Qi, Jie Li, and Xiuzhu Dong. "Conserved TRAM domain functions as an archaeal cold shock protein via RNA chaperone activity." *Frontiers in Microbiology* 8 (2017):1597. DOI: 10.3389/fmicb.2017.01597
9. Chen, Zijuan, Deqin Feng, **Bo Zhang**, Qian Wang, Yuanming Luo, and Xiuzhu Dong. "Proteomic insights into the temperature responses of a cold-adaptive archaeon *Methanolobus psychrophilus* R15." *Extremophiles* 19 (2015): 249-259. DOI: 10.1007/s00792-014-0709-y
10. Zhou, Liguang, Haiying Yu, Guomin Ai, **Bo Zhang**, Songnian Hu, and Xiuzhu Dong. "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, no. 3 (2015): 831-839. DOI: 10.1128/AEM.03092-14

SPEAKING PRESENTATIONS

1. **Zhang, B.** (10/15/2025) "Understanding and characterization of unusual metabolic pathways in anaerobic microbes", CPOS (Center for Polymers and Organic Solids) seminar at UCSB, University of California, Santa Barbara, CA. **(as an invited speaker)**
2. **Zhang, B.**, Hrdy, I., Tachezy, J., Baker, S.E. and O'Malley, M.A., (6/20/2025) "The anaerobic gut fungus *Caecomyces churrovis* produces hydrogen via a complex composed of NADH dehydrogenase and [FeFe]-hydrogenase", ASM Microbe 2025, Los Angeles, CA (*Poster*)
3. **Zhang, B.**, Hrdy, I., Tachezy, J., Baker, S.E. and O'Malley, M.A., (3/25/2025) "Understanding and engineering hydrogen production in anaerobic gut fungi", ACS Spring 2025 (ACS-BIOT division), San Diego, CA
4. **Zhang, B.**, Blair, E., Kim, R., Howard, J., Leggieri, P., Lawson, C., Baker, S.E. and O'Malley, M.A., (4/2/2024) "Engineering synthetic anaerobic consortia inspired by the rumen for biomass breakdown and conversion", 2024 Genomic Science Program and Enabling Capabilities and Resources Principle Investigator Meetings (DOE BER Program), Bethesda, MD. (*Poster*)
5. **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
6. **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)
7. **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)**

8. **Zhang, B.** (10/19/2021) "New biochemical pathway for propionate formation during fermentation in rumen bacteria", Animal Biology Graduate Group Colloquium, Davis, CA
9. **Zhang, B.** (10/26/2020) "A new acetate-forming pathway during fermentation in bacteria", Animal Biology Graduate Group Colloquium (*virtual poster*), Davis, CA
10. **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*)
11. **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
12. **Zhang, B.** (5/12/2016) "Biochemical characterization and physiological function of a methanoarchaeal RNA chaperone TRAM protein", Master Exist Seminar, Beijing, China
13. **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
14. **Zhang, B.** (5/12/2014) "Function of TRAM protein in a cold-adaptive methanogen, *Methanolobus psychrophilus* R15", Graduate Student Seminar, 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

- ExFAB Fellowship, Fall Quarter 2025 to Winter Quarter 2026
- ExFAB Fellowship, Spring Quarter to Summer Quarter 2025
- Heeger Travel Fellowship, UCSB, 1/2025
- American Society for Microbiology (ASM) Future Leaders Mentorship Fellowship (FLMF) as a mentor, 2023-2025
- 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

SELECTED AWARDS AND HONORS

- Training award for EMSL Summer School in Pacific Northwest National Laboratory (PNNL), 7/2024
- 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 (4 times), 2008 – 2012
- Excellent Undergraduate Scholarship, JXNU (4 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

Teaching Assistant Experience and Mentorship Experience

- American Society of Microbiology Future Leaders Mentorship Fellowship, as a mentor, 5/2023 – 4/2025
- 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
- Teaching as a science teacher (8^{th}-grade) at Heling Middle School, Gao'an, China, 9/2011 – 11/2011

PROFESSIONAL AFFILIATIONS

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

TECHNIQUES

Specialty

- Anaerobic techniques, isolation, identification, and culturing of anaerobic fungi, archaea and bacteria
- Genome editing of anaerobic archaea (a methanogen, *Methanococcus maripaludis*)
- Performing gas chromatography to detect gas and volatile metabolites
- Enzymatic assays to measure enzymatic activity
- Sample preparations for Omics analysis
- Bioinformatic analysis of omics data (e.g. genomic, proteomic, and metabolomic data)
- Detection of macromolecular interactions by electrophoretic mobility shift assay, BIAcore SPR, RIP-Chip
- 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)
- Transmission electron microscopy (TEM), fluorescence microscopy, confocal microscopy
- Common molecular biology software (e.g. SnapGene, DNAMAN, Primer Premier) and databases (e.g. KEGG, JGI/IMG, JGI/MycoCosm, MetaCyc/EcoCyc)
- Experience working with dairy cattle (rumen fluid collection)

CERTIFICATES

- Automation in Biology – Automated liquid handling processes, High-content imaging, LCMS-based metabolomics, and bio-image processing. (ExFAB 2025 Summer School, 8/11 - 8/15, 2025)
- From artificial intelligence and machine learning to agent-based science (EMSL Summer School, 7/7 - 7/11, 2025)