

**Ran Mei**

Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

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**EDUCATION**

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- 2020 Ph.D. in Environmental Engineering, **University of Illinois Urbana-Champaign, USA**  
Dissertation: Investigating the roles of microbial immigration in wastewater treatment processes  
Advisor: Professor Wen-Tso Liu
- 2015 M.S. in Environmental Engineering, **University of Illinois Urbana-Champaign, USA**  
Thesis: Microbial community responses of an anaerobic enrichment to temperature shocks  
Advisor: Professor Wen-Tso Liu
- 2013 B.S. in Energy and Resources Engineering, **Peking University, China**  
Thesis: Identification, function evaluation, and genome analysis of a novel bacterial species isolated from Daqing oil field  
Advisor: Professor Xiaolei Wu

**APPOINTMENTS**

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- Oct 2024 Assistant Professor (upcoming)  
Department of Civil and Environmental Engineering, **University of Illinois Urbana-Champaign, USA**
- 2023-now Postdoctoral Fellow  
Institute for Extra-cutting-edge Science and Technology Avant-garde Research (X-star), **Japan Agency for Marine-Earth Science and Technology (JAMSTEC)**, Japan
- 2021-2023 Postdoctoral Fellow  
Bioproduction Research Institute, **National Institute of Advanced Industrial Science and Technology (AIST)**, Japan

**HONORS AND AWARDS**

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- 2023 CSP New Investigator Award, Joint Genome Institute, USA Department of Energy
- 2022 Postdoctoral Fellowship for Research in Japan, Japan Society for the Promotion of Science
- 2021 Jacobs Engineering Group/AEESP Outstanding Doctoral Dissertation Award, Association of Environmental Engineering and Science Professors
- 2020 Outstanding Self-financed Students Abroad, China Scholarship Council
- 2020 Engelbrecht Fellowship, University of Illinois Urbana-Champaign
- 2019 Warren W. Yee Memorial Fellowship, University of Illinois Urbana-Champaign
- 2013 Civil & Environmental Engineering Department Fellowship, University of Illinois Urbana-Champaign
- 2012 Yihai Kerry Scholarship, Peking University
- 2011 Kwang-Hua Scholarship, Peking University

**RESEARCH INTERESTS**

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Microbial genomics, ecology, and evolution; water and wastewater treatment; methanogenesis; anaerobic cultivation

**FUNDED RESEARCH**

- 2023-2026 Community Sequencing Program New Investigator Award, Joint Genome Institute, Department of Energy, USA  
Unraveling the interplay between sediment microorganisms in biomass consumption (in-kind sequencing of 3 TB genomic data, ~60k USD equivalent)  
**Principal Investigator** (co-PI: Dr. Masaru K. Nobu; Dr. Hiroyuki Imachi)
- 2022-2024 Grant-in-Aid for JSPS Fellow, Japan Society for the Promotion of Science, Japan  
Global gene cataloguing-based reconstruction of the evolutionary transition from simple to complex cells (2.2 mil JPY, ~15k USD).  
**Foreign Research Fellow** (Host researcher: Dr. Masaru K. Nobu)

**PUBLICATIONS**

Peer-reviewed journal articles (\*Corresponding author, †Co-first authors)

- Hirakata, Y., **Mei, R.**, Morinaga K., Katayama T., Tamaki H., Meng X.Y., Watari T., Yamaguchi T., Hatamoto M., & Nobu, M.K.\*, 2023. Discovery of anaerobic bacterial scavengers of dead cells. *The ISME Journal*, 17 (12). 10.1038/s41396-023-01538-2
- Mei, R.**, Kaneko, M., Imachi, H., & Nobu, M.K.\*, 2023. The origin and evolution of methanogenesis and *Archaea* are intertwined. *PNAS Nexus*, 2 (2). 10.1093/pnasnexus/pgad023
- Mei, R.** & Liu, W.T.\*, 2022. Meta-omics supervised characterization of respiration activities associated with microbial immigration in anaerobic digestion. *Environmental Science & Technology*, 56 (10). 10.1021/acs.est.2c01029
- Kim, J.†, **Mei, R.†**, Wilson, F.P., Yuan, H., Bocher, B.T.W., & Liu, W.T.\*, 2020. Ecogenomics-based mass balance model reveals the effects of fermentation conditions on microbial activity. *Frontiers in Microbiology*, 11. 10.3389/fmicb.2020.595036
- Nobu, M.K.†, Narihiro, T.†, **Mei, R.**, Kamagata, Y., Lee, P.H., Lee, P.K., McInerney, M.J., & Liu, W.T.\*, 2020. Catabolism and interactions of uncultured organisms shaped by eco-thermodynamics in methanogenic bioprocesses. *Microbiome*, 8. 10.1186/s40168-020-00885-y
- Ye, L.\*, **Mei, R.**, Liu, W.T., Ren H., & Zhang, X.X.\*, 2020. Machine learning-aided analyses of thousands of draft genomes reveal specific features of activated sludge processes. *Microbiome*, 8. 10.1186/s40168-020-0794-3
- Mei, R.**, Nobu, M.K., Narihiro, T., & Liu, W.T.\*, 2020. Metagenomic and metatranscriptomic analyses revealed uncultured *Bacteroidales* populations as the dominant proteolytic amino acid degraders in anaerobic digesters. *Frontiers in Microbiology*, 11. 10.3389/fmicb.2020.593006
- Lam, Y.C.†, **Mei, R.†**, Wu, Z., Lee, P.K., Liu, W.T.\*, & Lee, P.H.\*, 2020. Superior resolution characterization of microbial diversity in anaerobic digesters using full-length 16S rRNA gene amplicon sequencing. *Water Research*, 178. 10.1016/j.watres.2020.115815
- Mei, R.**, Nobu, M.K., & Liu, W.T.\*, 2020. Identifying anaerobic amino acids degraders through the comparison of short-term and long-term enrichments. *Environmental Microbiology Reports*, 12 (2). 10.1111/1758-2229.12821
- Sun, H., **Mei, R.**, Zhang, X.X., Ren H., Liu, W.T., & Ye, L.\*, 2019. Bacterial enrichment in highly selective acetate-fed bioreactors and its application in rapid biofilm formation. *Water Research*, 170. 10.1016/j.watres.2019.115359
- Mei, R.** & Liu, W.T.\*, 2019. Quantifying the contribution of microbial immigration in engineered water systems. *Microbiome*, 7. 10.1186/s40168-019-0760-0
- Mei, R.**, Kim, J., Wilson, F.P., Bocher, B.T.W., & Liu, W.T.\*, 2019. Coupling growth kinetics model and machine learning quantifies microbial immigration impacts and identifies key

- environmental parameters in a biological wastewater treatment process. *Microbiome*, 7. 10.1186/s40168-019-0682-x
13. Yuan, H., **Mei, R.**, Liao, J., & Liu, W.T.\*, 2019. Nexus of stochastic and deterministic processes on microbial community assembly in biological systems. *Frontiers in Microbiology*, 10. 10.3389/fmicb.2019.01536
  14. Zealand, A. M., **Mei, R.**, Papachristodoulou, P., Roskilly, A. P., Liu, W. T., & Graham, D. W.\*, 2019. Molecular microbial ecology of stable versus failing rice straw anaerobic digesters. *Microbial Biotechnology*, 12 (5). 10.1111/1751-7915.13438
  15. **Mei, R.**, Nobu, M.K., Narihiro, T., Yu, J., Sathyagal, A., Willman, E., & Liu, W.T.\*, 2018. Novel *Geobacter* species and diverse methanogens contribute to enhanced methane production in media-added methanogenic reactors. *Water Research*, 147. 10.1016/j.watres.2018.10.026
  16. Narihiro, T.†, Nobu, M.K.†, Bocher, B.T.W., **Mei, R.**, & Liu, W.T.\*, 2018. Co-occurrence network analysis reveals thermodynamics-driven microbial interactions in methanogenic bioreactors. *Environmental Microbiology Reports*, 10 (6). 10.1111/1758-2229.12689
  17. Zealand, A. M., **Mei, R.**, Papachristodoulou, P., Roskilly, A. P., Liu, W. T., & Graham, D. W.\*, 2018. Microbial community composition and diversity in rice straw digestion bioreactors with and without dairy manure. *Applied Microbiology and Biotechnology*, 102 (19). 10.1007/s00253-018-9243-7
  18. Nobu, M.K.†, Narihiro, T.†, Liu, M.M., Kuroda, K., **Mei, R.**, & Liu, W.T.\*, 2017. Thermodynamically diverse syntrophic aromatic compound catabolism. *Environmental Microbiology*, 19 (11). 10.1111/1462-2920.13922
  19. **Mei, R.**, Nobu, M.K., Narihiro, T., Kuroda, K., Sierra, J., Wu, Z.Y., Ye, L., Lee, P.K.H., Lee, P.H., van Lier, J.B., McInerney, M.J., Kamagata, Y., & Liu, W.T.\*, 2017. Operation-driven heterogeneity and overlooked feed-associated populations in anaerobic digester microbiome. *Water Research*, 124. 10.1016/j.watres.2017.07.050
  20. Kuroda, K.†, Nobu, M.K.†, **Mei, R.**, Narihiro, T., Bocher, B.T., Yamaguchi, T., & Liu, W.T.\*, 2016. A single-granule-level approach reveals ecological heterogeneity in an upflow anaerobic sludge blanket reactor. *PLOS ONE*, 11 (12). 10.1371/journal.pone.0167788
  21. **Mei, R.**, Narihiro, T., Nobu, M.K., & Liu, W.T.\*, 2016. Effects of heat shocks on microbial community structure and microbial activity of a methanogenic enrichment degrading benzoate. *Letters in Applied Microbiology*, 63 (5). 10.1111/lam.12629
  22. Nobu, M.K., Narihiro, T., Kuroda, K., **Mei, R.**, & Liu, W.T.\*, 2016. Chasing the elusive Euryarchaeota class WSA2: genomes reveal a uniquely fastidious methyl-reducing methanogen. *The ISME Journal*, 10 (10). 10.1038/ismej.2016.33
  23. **Mei, R.**, Narihiro, T., Nobu, M.K., Kuroda, K., & Liu, W.T.\*, 2016. Evaluating digestion efficiency in full-scale anaerobic digesters by identifying active microbial populations through the lens of microbial activity. *Scientific Reports*, 6. 10.1038/srep34090
  24. Pan, X.C.†, Geng, S., Lv, X.L.†, **Mei, R.**, Jiangyang, J.H., Wang, Y.N., Xu, L., Liu, X.Y., Tang, Y.Q., Wang, G.J., & Wu, X.L.\*, 2015. *Deffluviimonas alba* sp. nov., isolated from an oilfield. *International Journal of Systematic and Evolutionary Microbiology*, 65 (6). 10.1099/ijs.0.000181
  25. Narihiro, T., Kim, N.K., **Mei, R.**, Nobu, M.K., & Liu, W.T.\*, 2015. Microbial community analysis of anaerobic reactors treating soft drink wastewater. *PLOS ONE*, 10 (3). 10.1371/journal.pone.0119131
  26. Geng, S., Pan, X.C., **Mei, R.**, Wang, Y.N., Liu, X.Y., Wang, X.B., Tang, Y.Q., & Wu, X.L.\*, 2015. *Glyvocaulis alkaliphilus* sp. nov., a dimorphic prosthecate bacterium isolated from crude oil. *International Journal of Systematic and Evolutionary Microbiology*, 65 (3). 10.1099/ijs.0.000023

27. Geng, S., Pan, X.C., **Mei, R.**, Wang, Y.N., Sun, J.Q., Liu, X.Y., Tang, Y.Q., & Wu, X.L.\*, 2015. *Paradevosia shaoguanensis* gen. nov., sp. nov., isolated from a coking wastewater. *Current Microbiology*, 70 (1). 10.1007/s00284-014-0689-2
28. Pan, X.C., Geng, S., **Mei, R.**, Wang, Y.N., Cai, H., Liu, X.Y., Tang, Y.Q., Nie, Y., Ye, S.Y., & Wu, X.L.\*, 2014. *Nitratireductor shengliensis* sp. nov., isolated from an oil-polluted saline soil. *Current Microbiology*, 69 (4). 10.1007/s00284-014-0624-6
29. Geng, S., Pan, X.C., **Mei, R.**, Wang, Y.N., Sun, J.Q., Liu, X.Y., Tang, Y.Q., & Wu, X.L.\*, 2014. *Ottovia shaoguanensis* sp. nov., isolated from coking wastewater. *Current Microbiology*, 68 (3). 10.1007/s00284-013-0481-8

## Book chapter

1. Narihiro, T., Nobu, M.K., **Mei, R.**, & Liu, W.T., 2015. Microbial community involved in anaerobic purified terephthalic acid treatment process. *Anaerobic Biotechnology: Environmental Protection and Resource Recovery*. Imperial College Press, London. 10.1142/9781783267910\_0003

## Unsubmitted manuscript

1. **Mei, R.**, Imachi, H., & Nobu, M.K. Archaea gene encyclopedia unveils critical branching points from simple to complex cells. In preparation.
2. Leng, L., **Mei, R.**, Qiu, Y.L., Leu, S.Y., Liu, W.T., & Nobu, M.K. Contemporary and ancient evolutionary paths behind bacteria eating plastics waste. In preparation.

**PRESENTATIONS**

1. The origin and evolution of methanogenesis and Archaea are intertwined. Oral presentation at 2023 AEESP Research & Education Conference, Boston, USA, 2023
2. The origin and evolution of methanogenesis and Archaea are intertwined. Oral and poster presentation at ASM Microbe, Houston, USA, 2023
3. Elucidating the diversification Archaea using comparative genomics. Invited talk at Japan Collection of Microorganisms, Tsukuba, Japan, 2023
4. Investigate microbial immigration using eco-genomics. Invited talk at Chinese Academy of Science, Beijing, China, 2022
5. Culture-dependent and independent investigation of anaerobic amino acid degraders. Invited talk at Zhejiang University, Hangzhou, China, 2021
6. Genomics-based investigation of microbial immigration in engineered ecosystems. Invited talk at Nanjing University, Nanjing, China, 2021
7. Coupling growth kinetics modeling with machine learning reveals Microbial immigration impacts and identifies key environmental parameters in a biological wastewater treatment process. Oral presentation at IWA MEWE Specialist Conference, Hiroshima, Japan, 2019
8. Identifying anaerobic amino acids degraders through the comparison of short-term and long-term enrichments. Poster presentation at IWA MEWE Specialist Conference, Hiroshima, Japan, 2019
9. Metabolic partitioning among microbial dark matter across anaerobic digesters. Poster presentation at JGI Annual Meeting, Walnut Creek, USA, 2018
10. Distribution of populations associated with known syntrophs and methanogens in the global anaerobic digester microbiome. Oral presentation at Anaerobic Microbial Syntrophy Forum, Chengdu, China, 2017
11. Operation-driven heterogeneity and overlooked feed-associated populations in anaerobic digester microbiome. Poster presentation at IWA International Conference on AD, Beijing, China, 2017
12. Operation-driven heterogeneity and overlooked feed-associated populations in anaerobic digesters. Poster presentation at JGI Annual Meeting, Walnut Creek, USA, 2017
13. Microbiome of anaerobic digesters in 51 municipal wastewater reclamation plants. Poster

- presentation at The ISME Symposia, Montreal, Canada, 2016
14. Microbiome of anaerobic digesters in 51 municipal wastewater treatment plants. Poster presentation at JGI Annual Meeting, Walnut Creek, USA, 2016
  15. Microbial community response of a mesophilic methanogenic enrichment to temperature perturbations. Poster presentation at ASM Microbe, New Orleans, USA, 2015

### **TEACHING EXPERIENCES**

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#### Teaching

- 2019 Guest lecture. CEE444, Biological Principles in Environmental Engineering, UIUC  
Topic: Introduction of phylogenetic analysis and microbial systematics
- 2018 New course development and instruction. CEE540, Remediation Design, UIUC  
Topic: Application of thermodynamics, microbial phylogeny, microbial ecology, bioinformatics, and reactor kinetics in bioremediation.
- 2017 Guest lecture. CEE538, Water Quality Control Process II, UIUC  
Topic: Nitrogen cycle in wastewater treatment
- 2016 Guest lecture. CEE437, Water Quality Engineering, UIUC  
Topic: Overview of microbial processes in wastewater treatment

#### Mentoring

- 2018-2020 Tzu-Yu Lin, Ph.D. student  
Topic: Ph.D. dissertation research on application of meta-omics technologies to reveal microbial ecology in anaerobic digestion.  
Current position: Postdoctoral Associate at the Department of Energy, Environmental and Chemical Engineering, Washington University in St. Louis.
- 2018-2019 Gabriella Morales, M.S. student  
Topic: M.S. thesis research on bioreactor-based investigation of microbial immigration.  
Current position: Environmental Engineer at Idaho National Laboratory.
- 2016-2018 Jinha Kim, M.S. student  
Topic: M.S. thesis research on solid waste reduction in petrochemical wastewater treatment process.  
Current position: Ph.D. student at the Department of Civil and Environmental Engineering, Texas A&M University.
- 2016-2018 Bridget Ladell, M.S. student  
Topic: M.S. thesis research on silver carp microbial community dynamics.  
Current position: Research Specialist at the DNA Sequencing Facility at University of Wisconsin-Madison.
- 2015-2017 Junhui Liao, M.S. student  
Topic: M.S. thesis research on microbial ecology of a reactor treating high strength wastewater.  
Current position: Environmental Engineer at Jacobs.
- 2016 Qiuye (Jenny) Si, M.S. student  
Topic: Independent research on the enhancement of biogas production from soft drink wastewater.  
Current position: Environmental Engineer at Stantec.
- 2015 Lucas Rocha Melogno, visiting undergraduate student

Topic: Internship research on the effects of conductive materials on biological methane production.

Current position: Senior Health Scientist at ICF.

2014 Lama Aoudi, undergraduate student

Topic: The Research Experiences for Undergraduates program to test the digestibility of food waste by anaerobic digestion.

Current position: Data Scientist at Carbon Arc.

2014 Theodore Chan, undergraduate student

Topic: The Research Experiences for Undergraduates program to compile data obtained from wastewater treatment plants from around the world.

Current position: Civil Engineering at SoCore Energy.

### ***ACTIVITIES***

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#### Journal Editor

Letters in Applied Microbiology, Junior Editor, 2023-now

#### Journal Reviewer

Bioengineering, Bioresource Technology, Biotechnology Reports, BMC Microbiology, Chemical Engineering Journal, Engineering, Environment International, Environmental Microbiology Reports, Environmental Science & Technology, Frontiers in Microbiology, iMeta, Journal of Hazardous Materials, mSphere, PLOS ONE, Science of the Total Environment, Water Research

#### Professional Memberships

American Society of Microbiology (ASM), Applied Microbiology International (AMI), Association of Environmental Engineering and Science Professors (AEESP), Chinese-American Professors in Environmental Engineering and Science (CAPEES), Japan Society of Microbial Ecology (JSME)