

# Yike Shen, Ph.D.

Postdoctoral Research Scientist

Department of Environmental Health Sciences

Columbia University in the City of New York

630 West 168th Street, Physicians and Surgeons Building, Room 16-416, New York, NY 10032

Email: [yike.shen@columbia.edu](mailto:yike.shen@columbia.edu); [shenyike@msu.edu](mailto:shenyike@msu.edu)

Tel: +1 (517) 488-9282, Website: <https://yikeshen.github.io/>

## Education

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<b>Ph.D. Crop and Soil Science – Environmental Toxicology</b>	08/2016 – 05/2020
<b>Ph.D. dual major Environmental Science and Policy</b>	08/2016 – 05/2020
Michigan State University, East Lansing, Michigan, USA	
Dissertation: Antibiotic Resistance and Bacterial Microbiome in Lettuce-Soil Systems	
<b>B.Sc. Environmental and Conservation Sciences</b>	09/2013 – 06/2016
University of Alberta, Edmonton, Alberta, Canada	

## Experiences

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<b>Postdoctoral Research Scientist</b>	06/2020 – present
Department of Environmental Health Sciences Columbia University in the City of New York Mentor: <a href="#">Andrea A. Baccarelli, MD, Ph.D.</a>	
<b>Graduate Research Assistant</b>	08/2016 – 05/2020
Department of Plant, Soil, and Microbial Sciences Michigan State University Mentor, Advisor: <a href="#">Wei Zhang, Ph.D.</a> Committee members: Drs. Hui Li, Elliot Ryser, Ashley Shade	
<b>Environmental Science and Policy Fellow</b>	09/2016 – 05/2020
Environmental Science and Policy Program Michigan State University	
<b>Student Research Assistant</b>	06/2015 – 02/2016
Department of Renewable Resources University of Alberta Mentor: <a href="#">Scott X. Chang, Ph.D.</a>	

## Research Interest

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- One health
- Microbiome
- Machine learning
- High dimensional data
- Bioinformatics
- Multi-omics
- Environmental exposures

## Publications

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**Dr. Shen** highlighted in **bold**; Corresponding authors marked \*

### Published

1. **Shen Y**, Zhao E, Zhang W\*, Baccarelli AA, Gao F\*. (2022) Predicting pesticide dissipation half-life intervals in plants with machine learning models. *Journal of Hazardous Materials* (Accepted).
2. Gao F, Zhang W, Baccarelli AA, **Shen Y**\*. (2022). Predicting Chemical Ecotoxicity by Learning Latent Space Chemical Representations. *Environment International* 163, 107224.
3. **Shen Y**\*, Laue HE, Shrubsole MJ, Wu H, Bloomquist TR, Larouche A, Zhao K, Gao F, Boivin A, Prada D, Hunting DJ, Gillet V, Takser L, Baccarelli AA. (2022). Associations of childhood and maternal metal exposure with children's gut microbiomes in a Canadian gestation cohort. *Environmental Health Perspectives* 130 (1): 017007.
4. Gao F<sup>1</sup>, **Shen Y**<sup>1</sup>, Sallach JB, Li H, Zhang W, Li Y\*, Liu C\*. (2022). Predicting crop root concentration factors of organic contaminants with machine learning models. *Journal of Hazardous Materials* 424,127437. <sup>1</sup>co-first
5. Gao F, **Shen Y**, Sallach JB, Li H, Liu C\*, Li Y\*. (2021). Direct prediction of bioaccumulation of organic contaminants in plant roots from soils with machine learning models based on molecular structures. *Environmental Science & Technology* 55(24):16358-16368.
6. **Shen Y**, Hamm J, Gao F, Ryser ET, Zhang W\*. (2021). Machine learning and statistical models to predict customers' willingness to buy and pay more for labeled products. *Journal of Food Protection* 84.9 (2021): 1560-1566.
7. **Shen Y**, Ryser ET, Li H, Zhang W\*. (2021). Bacterial community assembly and antibiotic resistance genes in the lettuce-soil system upon antibiotic exposure. *Science of the Total Environment* 778, 146255.
8. **Shen Y**, Li H, Ryser ET, Zhang W\*. (2021). Comparing root concentration factors of antibiotics for lettuce (*Lactuca sativa*) measured in rhizosphere and bulk soils. *Chemosphere* 262, 127677.
9. **Shen Y**, Stedtfeld RD, Guo X, Bhalsod GD, Jeon S, Tiedje JM, Li H, Zhang W\*. (2019). Pharmaceutical exposure changed antibiotic resistance genes and bacterial communities in soil-surface- and overhead-irrigated greenhouse lettuce. *Environment International* 131, 105031.

### Under review or in revision

10. Laue HE\*<sup>1</sup>, **Shen Y**<sup>1</sup>, Bloomquist TR, Wu H, Brennan, KJM, Raphael C, Wilkie E, Gillet V, Desautels A, Abdelouahab N, Bellenger JP, Burris HH, Coull BA, Weisskopf MG, Zhang W, Takser L, Baccarelli AA. *In utero* exposure to caffeine and acetaminophen, the gut microbiome, and neurodevelopmental outcomes, a prospective birth cohort study. *JAMA Network Open* (under review). <sup>1</sup>co-first
11. Campana AM\*, Laue HE, **Shen Y**, Shrubsole MJ, Baccarelli AA. (202\_). The Gut Microbiota: Assessing the Influences of Environmental Chemicals Exposures on Human Health. *Environmental Pollution* (revision R1 under review).
12. Campana AM\*, Wu H, **Shen Y**, Laue HE, Larouche A, Bloomquist TR, Desautels A, Gillet V, Wilkie E, Posner J, Takser L, Baccarelli AA. What is the relationship between neurocognitive outcomes and gut microbiota? Facts from a pilot study with GESTE, a Canadian longitudinal cohort. *Pediatric Research* (submitted).

### In preparation

13. **Shen Y**, Gao F\*, Domingo-Relloso A, Kupsco A, Kioumourtzoglou MA, Haack K, Zhang Y, Fretts AM, Umans JG, Tellez-Plaza M, Cole S, Wu H, Baccarelli AA, Navas-Acien A. Deep epigenome wide association study (DeepEWAS) assists early prediction of coronary heart disease.
14. **Shen Y**, Kioumourtzoglou MA, Wu H, Spiro A, Vokonas P, Baccarelli AA, Gao F\*. Exploring exposure-outcome relationships inside the VA Normative Aging Study using network analysis.
15. **Shen Y\***, Bloomquist TR, Rauso A, Gao F, Gillet V, Lau FK, Kupsco A, Takser L, Baccarelli AA. Evaluation of bacterial RNA quality and shotgun metatranscriptome sequencing.
16. Chen Z, Zhang W, Peng A, **Shen Y**, Jin X, Stedtfeld RD, Boyd SA, Teppen BJ, Gu C, Zhu D, Luo Y, Li H\*. Antibiotic resistance genes and bacterial community assembly in soils exposed to antibiotics at environmentally relevant concentration.

### Analysis in progress

.....Coauthors to be add, order may change.

17. **Shen Y\***, Laue HE, ....., Campana AM, Bellenger JP, Takser L, Posner J, Baccarelli AA. Effects of Childhood Flame Retardants on Brain Function and Attentional Deficits in School-age Children – Brain Imaging, Neurobehavioral, and Gut Microbiome Studies in GESTE.
18. **Shen Y**, ....., Liu S, Busch A, Almansa XF, Norton J, Safferman S, Zhang W\*. Impact of biosolids application on agricultural soil microbial community structure and functional potential.
19. Liu S, **Shen Y**, Busch A, Almansa XF, Norton J, Safferman S, Zhang W\*. Biosolid application increases nitrogen and phosphorus availability and microbial activities in agricultural soils: a bi-decadal meta-analysis (2000–2020).

### Teaching Assistant Experiences

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- SHARP Python Boot Camp, Columbia University Summer 2021
- SHARP Epigenetics Boot Camp, Columbia University Summer 2020
- CSS 340: Applied Soil Physics, Michigan State University Spring 2018 and Spring 2019
- CSS 330: Soil Chemistry, Michigan State University Spring 2019
- RenR 299: Environmental and Forestry Spring Field School, University of Alberta Spring 2015

### Skills

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Computational: R, Python, Linux, Unix, Shell Script, and High-Performance Computing Clusters, Amazon Web Service, GitHub

Data analysis: big data analytics, metagenomics data analysis, machine learning, data visualization

Laboratory: DNA and RNA extraction, PCR, sequencing, gel electrophoresis, molecular biology, bacterial culture, chemical hygiene, laboratory safety, hazardous waste; biosafety principles (level 1 and 2), and lab security awareness

### Presentations

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**Presenter** highlighted in **bold**

A. *Voluntary Presentations*

1. **Yike Shen**, Feng Gao, Arce Domingo-Relloso, Allison Kupsco, Marianthi-Anna Kioumourtzoglou, Karin Haack, Maria Tellez-Plaza, Jason G. Umans, Amanda M. Fretts, Ying Zhang, Shelley A. Cole, Haotian Wu, Andrea A. Baccarelli, Ana Navas-Acien. 2022. DeepEWAS assists early intervention of coronary heart disease. 8<sup>th</sup> New York City Epidemiology Forum. New York, NY, May 23 (poster presentation).
2. **Yike Shen**, Feng Gao, Wei Zhang, Andrea A. Baccarelli. 2022. Predicting Chemical Ecotoxicity by Learning Latent Space Chemical Representations. American Chemical Society National Meeting Spring 2022. San Diego, CA, March 20-24 (oral presentation).
3. **Yike Shen**. 2022. Harnessing High Dimensional Exposure and Omics Data in Environmental Health Sciences. Department of Environmental Health Sciences, Columbia University, February 21 (seminar talk).
4. **Yike Shen**, Hannah E. Laue, Martha J. Shrubsole, Haotian Wu, Tessa R. Bloomquist, Annie Larouche, Kankan Zhao, Feng Gao, Amélie Boivin, Diddier Prada, Darel J. Hunting, Virginie Gillet, Larissa Takser, Andrea A. Baccarelli. 2021. Association of childhood and maternal metal exposure with children gut microbiome in a Canadian gestation cohort. International Society for Environmental Epidemiology. New York, NY. August 24 (spotlight oral presentation). (held online due to COVID19)
5. **Yike Shen**, Hannah E. Laue, Martha J. Shrubsole, Haotian Wu, Tessa R. Bloomquist, Annie Larouche, Kankan Zhao, Feng Gao, Amélie Boivin, Diddier Prada, Darel J. Hunting, Virginie Gillet, Larissa Takser, Andrea A. Baccarelli. 2021. Association of childhood and maternal metal exposure with children gut microbiome in a Canadian gestation cohort. American Society of Microbiology Conference – ASM World Microbe Forum, June 21 (poster presentation). (held online due to COVID19)
6. **Yike Shen**, Elliot T. Ryser, Hui Li, Wei Zhang. 2020. Bacterial Community Assembly and Antibiotic Resistance Genes in the Lettuce-Soil System upon Exposure to Anthropogenic Antibiotics. American Society of Microbiology Conference – ASM Microbe 2020. Chicago, IL, June 18, 2020 (poster presentation). (held online due to COVID19).
7. **Yike Shen**, Elliot T. Ryser, Hui Li, Wei Zhang. 2019. Uptake and Accumulation of Antibiotics and Associated Impact on Bacterial Microbiome and *Salmonella* Survival in Lettuce. ASA - CSSA-SSSA International Annual Meeting. San Antonio, TX, November 12 (oral presentation).
8. **Yike Shen**, Joseph Hamm, Feng Gao, Wei Zhang. 2019. Machine learning and statistical models to predict customers' buy and pay preferences for labeled products. Environmental Science and Policy Research Symposium 2019. East Lansing, MI, Oct 28 (oral presentation).
9. **Yike Shen**, Elliot Ryser, Hui Li, Wei Zhang. 2019. Understanding *Salmonella* Survival and Microbiome Changes in Lettuce Production under Antibiotic Stress. US-China Environment and Sustainability Forum at the University of Michigan. Ann Arbor, MI, October 2 (poster presentation).
10. **Yike Shen**, Elliot T. Ryser, Hui Li, Wei Zhang. 2019. Antibiotic resistance genes, microbiomes and *Salmonella* survival in lettuce exposed to antibiotics via soil surface irrigation. American Chemical Society National Meeting #257. San Diego, CA, August 25-29 (oral presentation).
11. **Yike Shen**, Robert D. Stedtfeld, Xueping Guo, Gemini D. Bhalsod, Sangho Jeon, James M. Tiedje, Hui Li, and Wei Zhang. 2018. Pharmaceutical Exposure Changed Bacterial Community and Antibiotic Resistance Gene Profiles in Surface- and Overhead-Irrigated Greenhouse Lettuce. American Chemical Society National Meeting #256. Boston, MA, August 19-23 (oral presentation).

12. **Yike Shen**, Gemini D. Bhalsod, Xueping Guo, Sangho Jeon, Tiffany Stedtfeld, Robert D. Stedtfeld, James M. Tiedje, Hui Li, and Wei Zhang. 2017. Antibiotic Stress Changed Microbial Community and Distribution of Antibiotic Resistance Genes in Surface and Overhead Irrigated Greenhouse Lettuce. 4<sup>th</sup> International Symposium on the Environmental Dimension of Antibiotic Resistance. East Lansing, MI, August 13-17 (poster presentation).
13. **Yike Shen**, Gemini D. Bhalsod, Xueping Guo, Luxi Yang, Sangho Jeon, Robert D. Stedtfeld, James M. Tiedje, Hui Li, and Wei Zhang. 2017. Distribution of antibiotic resistance genes in surface and overhead irrigated greenhouse lettuce. American Society for Microbiology Conference - Innovative Microbial Ecology for Mitigation of Antibiotic Resistance and Bacterial Diseases. Crystal City, VA, March 22-25 (oral presentation).

#### *B. Invited Oral Presentations*

1. **Yike Shen**, Feng Gao, Marianthi-Anna Kioumourtoglou, Andrea A. Baccarelli. Deep Learning based Network Analysis in the Normative Aging Study. December 10, 2021. Invited by Columbia University Data Science and Health Initiative.
2. **Yike Shen**. GESTE Microbiome. Université de Sherbrooke, Quebec, Canada. June 22, 2021. Invited by Dr. Larissa Takser.
3. **Yike Shen**. Assessing Antibiotics, Antibiotic Resistance Genes and Microbiome in Lettuce and Food Safety Related Consumer Preference.
  - a. EMBLab, Westlake University, Hangzhou, Zhejiang, China. January 17, 2020. Invited by Dr. Feng Ju.
  - b. Institute of Nuclear-Agricultural Science, Zhejiang University, Hangzhou, Zhejiang, China. January 16, 2020. Invited by Dr. Haiyan Wang.
  - c. College of Environmental Science and Engineering, Nankai University, Tianjin, China. January 14, 2020. Invited by Dr. Zeyou Chen.
  - d. Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing, China. January 13, 2020. Invited by Dr. Yuanbo Li.
  - e. Institute of Soil-Water Resource and Environment, Zhejiang University, Hangzhou, Zhejiang, China. January 6, 2020. Invited by Dr. Bin Ma.
  - f. The International Youth Scholars Forum of Zhejiang A&F University, Zhejiang A&F University, Hangzhou, Zhejiang, China. December 28, 2019. Invited by School of Environmental and Resource Sciences.
4. **Yike Shen** and Wei Zhang. The T concept of research in Environmental Dimension of Antimicrobial Resistance – Perspectives from an interdisciplinary Environmental Scientist in training. Institute of Soil-Water Resource and Environment, Zhejiang University, Hangzhou, Zhejiang, China. December 25, 2017. Invited by Dr. Bin Ma.

#### **Review Service**

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- Environmental Science & Technology – #1
- Environmental Research – #1
- Science of the Total Environment – #1
- Food Chemistry – #1
- BMC Genomics – #2
- Environmental Pollution – #2
- Frontiers in Microbiology – #2

- Journal of Environmental Management – #1
- Reviews of Environmental Contamination and Toxicology – #1

## Awards

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Awards from Michigan State University:

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| • Graduate Research Assistantship                                      | 2016 – 2020 |
| • Institute for Integrative Toxicology Summer Travel Award             | 2017 – 2020 |
| • Dissertation Completion Fellowship                                   | 2019        |
| • Graduate School Travel Funds   | 2019        |
| • College of Agriculture and Natural Resources Food Systems Fellowship | 2019        |
| • Environmental Science and Policy Program Travel Grant                | 2017, 2019  |
| • Environmental Science and Policy Doctoral Recruitment Fellowship     | 2016        |

External Awards

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| • ASM Travel Grant (American Society for Microbiology)   | 2017       |
| • First Class Standing (University of Alberta)   | 2015, 2016 |
| • Undergraduate Research Grant (Natural Science and Engineering Research Council of Canada - CREATE Grant) | 2015       |
| • ALES Student Engagement Fund (University of Alberta)   | 2015       |
| • ZAFU - UofA (ALES) Award (University of Alberta)   | 2013       |
| • National Scholarship of China (Ministry of Education in China)   | 2013       |

## Languages

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- English
- Chinese