MEDINI K. ANNAVAJHALA, Ph.D.

Date of Preparation: July 9, 2019

Academic Appointments and Other Work Experience

12/2018 – Present	Infectious Disease Division, Columbia University	New York, NY
	Postdoctoral Research Fellow	
06/2017 – 11/2018	Infectious Disease Division, Columbia University	New York, NY
	Postdoctoral Research Scientist	
08/2012 – 05/2017	Dept. of Earth and Environ. Eng., Columbia University	New York, NY
	Graduate Research Assistant	
10/2010 – 05/2012	Dept. of Chemistry, Carnegie Mellon University	Pittsburgh, PA
	Undergraduate Research Assistant	
06/2010 – 08/2010	Proctor & Gamble, Home Care Research & Development	Cincinnati, OH
	Products Research Intern	

Education

08/2012 – 05/2017 Columbia University, School of Engineering and Applied Sciences

Department of Earth and Environmental Engineering

MS, May 2014 New York, NY

PhD, May 2017 New York, NY

*Sponsor***:** Dr. Kartik Chandran

*Thesis***:** "Meta-omics-derived structure, function, and activity of mixed microbial communities driving biological nutrient removal and recovery"

Citation: Annavajhala, MK, Columbia University, New York, NY

08/2008-12/2011 Carnegie Mellon University, Mellon College of Science

Department of Biological Sciences & Department of Philosophy

BS, December 2011 Pittsburgh, PA

Gaps in training: I fulfilled requirements for my B.S. in Biological Sciences and additional major in Environmental Policy by Dec 2011 and therefore graduated in 7 semesters rather than 8. Between Dec 2011 and May 2012, I was employed as a Teaching Assistant for the Experimental Biochemistry laboratory course in the Department of Biological Sciences at Carnegie Mellon University. I also continued my ongoing undergraduate research in the Collins Laboratory and was involved in the writing and publication of a manuscript as second author in that time.

Honors and Awards

2019 Up-Goer Five Thing Symposium, ASM Microbe 2019: *Team MVP, Best Phrase*

Science Communication Symposium; Presentations of research abstracts using only 1,000 most commonly used words in English.

2019 Outstanding Abstract Award, ASM Microbe 2019

2019 ASM Travel Award, ASM Microbe 2019

2018 Conference Participation Grant, International Microbiome in HIV Workshop

2017 Herbert H. Kellogg Fellowship, Columbia School of Engineering and Applied Sciences

Recognizing distinguished ability as a teaching assistant

2012 – 2016 Presidential Fellowship, Columbia School of Engineering and Applied Sciences

Selected by a panel of SEAS faculty for the distinguished Presidential Fellowship as an incoming MS/PhD candidate due to an "outstanding potential for graduate research and training." The fellowship provided full financial support to pursue my doctoral research with intellectual freedom in any field of choice within SEAS.

2014 – 2015 International Fellows Program, Columbia School of International and Public Affairs

Selected for a multidisciplinary group of 30 students to participate in discussions on the role of the US in international affairs.

2012 University Honors, Carnegie Mellon University

2012 Mellon College of Science Honors, Carnegie Mellon University

2012 Outstanding Undergraduate Research, Carnegie Mellon University

2012 Outstanding Academic Achievement, Carnegie Mellon University

2008 – 2011 Science & Humanities Scholar, Carnegie Mellon University

Academic Service

2009 – 2011 AmeriCorps Scholar in Service Pittsburgh, PA

Selected as the Community Service Intern at Carnegie Mellon University through AmeriCorps. I networked with local non-profit organizations and organized targeted local service experiences for all campus student groups.

2010 – 2012 Biology Outreach Programs Pittsburgh, PA

Introduced local high school students to biology laboratory practices through the Carnegie Mellon University Department of Biological Sciences.

Professional Organizations and Societies

Memberships

2018 – Present American Society of Microbiology

2016 – Present American Association for the Advancement of Science (AAAS)

2016 – Present Water Environment Federation (WEF)

2016 – Present NY Water Environment Association (NYWEA)

2012 – Present Phi Kappa Phi

2012 – Present	Phi Beta Kappa

***Ad hoc* Reviewer**

2017	Environmental Science & Technology
2016	Chemical Engineering Journal

Fellowship and Grant Support

Current Support

12/2018 – 12/2020 TRANSFORM TL1, Irving Institute for Clinical and Translational Research

Columbia University Irving Medical Center; Role: Postdoctoral Fellow

"Microbial metagenomic pathways contributing to chronic inflammation in patients with HIV."

Past Support

2011	Howard Hughes Medical Institute (HHMI) Researcher Grant
2011	Howard Hughes Medical Institute (HHMI) Small Undergraduate Research Grant (SURG)

Teaching Experience and Responsibilities

06/2016 – Present Microbiome Working Group Research seminar series New York, NY

Organize monthly educational conferences on topics of microbiome research at Columbia University Medical Center

09/2016 – 12/2016 Dept. of Earth and Environ. Eng., Columbia University New York, NY

Teaching Assistant, Aquatic Chemistry

01/2012 – 05/2012 Dept. of Biological Sciences, Carnegie Mellon University Pittsburgh, PA

Teaching Assistant, Experimental Techniques in Molecular Biology

09/2011 – 12/2011 Dept. of Biological Sciences, Carnegie Mellon University Pittsburgh, PA

Teaching Assistant, Experimental Biochemistry

08/2010 – 12/2010 Dept. of Philosophy, Carnegie Mellon University Pittsburgh, PA

Teaching Assistant, Ethical Judgments in Professional Life

Public Health Activities

04/2019 *Supervisory Scientist*, Blueprint Earth Mojave National Preserve, CA

I was selected by the non-profit organization Blueprint Earth to serve as a Supervisory Scientist in Hydrology for a 5-day field expedition in the Mojave National Preserve. The mission of Blueprint Earth is to catalog unique ecosystems through a combination of atmospheric, geological, hydrological, zoological, and botanical testing in order to better understand complex systems-level interactions in the natural

environment. In my role, I designed a protocol for sampling, culturing, and sequencing of bacteria in water sources around the study area. I helped supervise the 12 undergraduate and post-undergraduate students during the trip, helping provide them with hands-on experience in field research.

05/2014 – 08/2015 *Water Programs Officer*, FACE Africa Rivercess, Liberia; New York, NY

In my role on the Executive Board of the grassroots non-profit organization FACE Africa, I oversaw the planning and implementation of clean drinking water and sanitation facilities in Rivercess County, Liberia through remote and in-person field work. My responsibilities included the selection of appropriate project sites based on local public health need and engineering considerations; oversight of project implementation by local teams; management of up to $100,000 grants; and reporting to governmental agencies and donors.

Publications

A. Original, Peer-Reviewed Research Publications

1. Macesic N, Khan S, Giddins MJ, Freedberg D, Whittier S, Green D, Furuya EY, Verna EC, **Annavajhala MK**, Gomez-Simmonds A, Uhlemann A-C. *Escherichia coli* harboring mcr-1 in a cluster of liver transplant recipients: detection through active surveillance and whole genome sequencing. *Antimicrob Agents Chemother*. 2019. doi: 10.1128/AAC.02680-18
2. Gabryszewski SJ, Wong Fok Lung T, **Annavajhala MK**, Tomlinson KL, Riquelme SA, Khan IN, Noguera LP, Wickersham M, Zhao A, Mulenos AM, Peaper D, Koff JL, Uhlemann AC, Prince A. Metabolic Adaptation Supports Persistent Methicillin-Resistant *Staphylococcus aureus* Pulmonary Infection. *Am. J. Respir. Cell Mol. Biol.* 2019. doi: 10.1165/rcmb.2018-0389OC. PMID: 30742488.
3. Brotto AC*, **Annavajhala MK***, Chandran K. Metatranscriptomic investigation of adaptation in NO and N2O production from a lab-scale nitrification process upon repeated exposure to anoxic-aerobic cycling. *Front. Microbiol*. 2018;9:3012. doi:10.3389/fmicb.2018.03012 ***contributed equally**
4. **Annavajhala MK**, Kapoor V, Santo-Domingo J, Chandran K. Structural and Functional Interrogation of Selected Biological Nitrogen Removal Systems in the United States, Denmark, and Singapore Using Shotgun Metagenomics. *Front. Microbiol*. 2018; 9:2544. doi: 10.3389/fmicb.2018.02544
5. Gomez-Simmonds A, Stump S, Giddins MJ, **Annavajhala MK**, Uhlemann AC. Clonal background, resistance gene profile, and porin gene mutations modulate *in vitro* susceptibility to imipenem/relebactam in diverse Enterobacteriaceae. *Antimicrob Agents Chemother*. 2018; 62:e00573-18. doi: 10.1128/AAC.00573-18. PMID: 29891602.
6. Freedberg DE, Zhou MJ, Cohen ME, **Annavajhala MK**, Khan S, Moscoso DI, Brooks C, Whittier S, Chong DH, Uhlemann AC, Abrams JA. Pathogen colonization of the gastrointestinal microbiome at intensive care unit admission and risk for subsequent death or infection. *Intensive Care Med*. 2018 Jun 23. doi: 10.1007/s00134-018-5268-8. PMID: 29936583.
7. Gomez-Simmonds A*, **Annavajhala MK***, Wang Z*, Macesic N, Hu Yue, Giddins MJ, O'Malley A, Toussaint NC, Whittier S, Torres VJ, Uhlemann A-C. Genomic and geographic context for the evolution of high-risk carbapenem-resistant *Enterobacter cloacae* complex

clones ST171 and ST78. *mBio* 2018; 9:e00542-18. doi: 10.1128/mBio.00542-18.
***contributed equally**

8. **Annavajhala MK**, Kapoor V, Santo-Domingo J, Chandran K. Comammox Functionality Identified in Diverse Engineered Biological Wastewater Treatment Systems. *Environ Sci Technol Lett*. 2018; 5(2):110-116.
9. Giddins MJ, Macesic N, **Annavajhala MK**, Stump S, Khan S, McConville TH, Gomez-Simmonds A, Uhlemann A-C. Successive emergence of ceftazidime-avibactam resistance through distinct genomic adaptations in blaKPC-2-harboring Klebsiella pneumoniae ST307. *Antimicrob Agents Chemother.* 2018; 62(3):e02101-17. PMID: 29263067.
10. Kundu S, **Annavajhala MK**, Kurnikov IV, Ryabov AD, Collins TJ. Experimental and Theoretical Evidence for Multiple FeIV Reactive Intermediates in TAML Activator Catalysis: Rationalizing a Counterintuitive Reactivity Order. *Chem. Eur. J.* 2012*;* **18**(33):10244-10249.

B. Oral Presentations

1. Yoo K, **Annavajhala MK**, Kapoor V, Santo-Domingo J, Chandran, K. Mining antibiotic resistance genes and potential human pathogens in Biological Nitrogen Removal processes nationwide using shot-gun metagenomic analysis. WEFTEC; 2019, Chicago, IL.
2. **Annavajhala MK**, Gomez-Simmonds A, Macesic N, Sullivan SB, Khan SD, Giddins MJ, Stump S, Verna EC, Uhlemann A-C. Microbial signatures of colonization by multidrug-resistant organisms (MDRO) in liver transplant recipients. ASM Microbe; 2019 June; San Francisco, CA.
3. Verna E, **Annavajhala MK**, Nenad M, Brown R, Sullivan S, Korakani G, Giddins M, Khan S, Gomez-Simmonds A, Uhlemann A-C. Intestinal Microbiome Diversity is Associated with Liver Disease Etiology and Predicts Post-Liver Transplant Mortality. ATC; 2018 June; Seattle, WA.
4. Zhou MJ, Cohen ME, **Annavajhala MK**, Moscosco D, Brooks C, Whittier S, Chong DH, Uhlemann A-C, Abrams JA, Freedberg DE. Gastrointestinal Bacterial Pathogen Colonization and Risk for Subsequent Infection in the Intensive Care Unit. DDW; 2018 June; Washington, D.C.
5. Verna EC, Macesic N, **Annavajhala MK**, Giddins MJ, Stump S, Brown RS, Gomez-Simmonds A, Uhlemann A-C. Dynamic adaptations of intestinal microbiota after liver transplantation. AASLD; 2017 Oct; Washington, D.C.
6. **Annavajhala MK**, Kapoor V, Santo-Domingo J, Chandran K. Comammox functionality is ubiquitous in engineered biological wastewater treatment systems. WEFTEC; 2017 Oct; Chicago, IL.

   ** Conference Featured Presentation/Speaker*

7. **Annavajhala MK**, Fanyin-Martin A, Taher E, Elk M, Kapoor V, Santo-Domingo J, Chandran K. Metagenomics of Anaerobic Food Waste Fermentation. WEFTEC; 2017 Oct; Chicago, IL.
8. Park MR, **Annavajhala MK**, Park H, Chandran K. Nationwide survey of microbial structure, function and metabolic pathways driven by wastewater treatment plant operating conditions and designs revealed using metagenomic and metatranscriptomic approaches. WEFTEC; 2017 Oct; Chicago, IL.
9. **Annavajhala MK**, Li Z, Chandran K. Metagenomics of a Mainstream Biofilm-Based Deammonification Process with and without Bioaugmentation from a Sidestream

Deammonification System. AEESP Late-Breaking Session, WEFTEC; 2016 Sept; New Orleans, LA.

10. Brotto AC, **Annavajhala MK**, Chandran K**.** Effect of Long-Term Anoxic-Aerobic Cycling on Nitrous Oxide Emissions through a Combined Metagenomics and Metatranscriptomics Approach. WEF/IWA Nutrient Removal & Recovery; 2016 July; Denver, CO.

C. Poster Presentations

1. **Annavajhala MK**, Gomez-Simmonds A, Macesic N, Sullivan SB, Kress A, Khan SD, Giddins MJ, Stump S, Verna EC, Uhlemann A-C. Drug Class-Specific Relationship between Antibiotic Exposure and the Gut Microbiota in a High-Risk Liver Transplant Cohort. ASM Microbe; 2019 June; San Francisco, CA.

   ** Selected for Outstanding Abstract Award and Rapid-Fire Poster Talk*

2. Rojas R, Macesic N, Tolari G, Guzman A, **Annavajhala MK**, Uhlemann A-C. Emergence of diverse carbapenem-resistant Enterobacteriaceae (CRE) in the Dominican Republic. ID Week; 2018 Oct; San Francisco, CA.

3. **Annavajhala MK**, Saidu R, Tergas A, Kuhn L, Denny L, Uhlemann AC. Distinct cervical microbial diversity and community structure by human papilloma-virus and cervical disease status in HIV-positive women in South Africa. Microbiome in HIV; 2018 Sep; Rockville, MD.

4. **Annavajhala MK**, Geng W, Hill-Ricciuti A, Ferguson S, Stump S, Giddins MJ, Messina M, Zachariah P, Green D, Whittier S, Saiman L, Uhlemann AC. Hybrid Sequencing and Assembly Reveals Genomic Diversity of Methicillin-susceptible Staphylococcus aureus (MSSA) from a Neonatal Intensive Care Unit (NICU) Surveillance Effort. ASM Rapid Applied Microbial Next Generation Sequencing and Bioinformatic Pipelines; 2018 Sep; Tysons, VA.

5. May M, **Annavajhala MK**, Compres G, Freedberg DE, Graham R, Uhlemann AC, Abrams JA. A Randomized Controlled Trial to Assess the Effects of an Antimicrobial Mouthwash on the Oral and Esophageal Microbiome. DDW; 2018 Jun; Washington, DC.

C. Thesis

1. **Annavajhala MK**. Meta-omics-derived structure, function, and activity of mixed microbial communities driving biological nutrient removal and recovery. Columbia University, New York, NY, 2017.

D. Reviews

1. **Annavajhala MK,** Gomez-Simmonds A, Uhlemann A-C. Multidrug-Resistant *Enterobacter cloacae* Complex Emerging as a Global, Diversifying Threat. *Front. Microbiol.* 2019; 10:44. doi: 10.3389/fmicb.2019.00044

Invited Presentations

A. Seminars

1. "Genomics of methicillin-susceptible *Staphylococcus aureus* (MSSA) from a neonatal intensive care unit (NICU)." Pediatric Infectious Diseases Division Conference Rounds, Columbia University Medical Center, 2019; New York, NY.

2. "Microbiome 101." Microbiome Working Group Seminar Series, Columbia University Medical Center, 2017; New York, NY.

3. **“**Using Molecular Techniques and Next-Generation Sequencing to Understand and Optimize Wastewater Treatment Processes.” Hot Topics in Water and Wastewater, NJAES Office of Continuing Professional Education, Rutgers University, 2015; Belvedere, NJ.
4. **“**Meta-Omics of the Engineered Water Cycle.” Ion Torrent World Tour, 2015; New York, NY.

Trainings and Workshops

Machine Learning Bootcamp, Columbia University Mailman School of Public Health, June 2019