CAITLYN B. SMITH

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I am a fifth year PhD student at the University of Kentucky College of Medicine, focusing on intestinal microbiota and *Campylobacter jejuni* pathogenesis. In the Laboratory of Dr. M. Ashfaqul Alam, currently, I have been elucidating the influence of metabolites and proteins utilized in bacterial infections of the gastrointestinal tract and the mechanisms of *Campylobacter jejuni* pathogenesis. Further investigating into the interactions and functional roles between the host, and commensal bacteria in assisting or impeding pathogenesis of *C. jejuni*. In the past years, I committed my time to expanding in both my curricular and extracurricular specialties, as I have taken classes from both, the Microbiology, Immunology and Molecular Genetics PhD core curriculum, and the Molecular and Cellular Biochemistry PhD core curriculum. Beyond my current academic and educational initiatives, I strive to serve in opportunities across UKY's COM that would help influence the betterment of the training of new researchers, much like myself.

EDUCATION

Seeking PhD	University of Kentucky (UKY) College of Medicine Department of Microbiology, Immunology and Molecular Genetics (MIMG) Laboratory of Dr. Ashfaqul Alam	2020- 2025 (Expected)
BS	Loyola University Chicago, Biochemistry Major Biology Minor Graduated with a 3.2 GPA	2018-2020
AS	City Colleges of Chicago, Biochemistry Major Graduated with a 4.0 GPA Phi Theta Kappa Honors	2017-2018
N/A	University of Illinois Chicago, Biochemistry Focus, Pre-Med Track	2012-2016

HONORS AND AWARDS

2024 Markey Cancer Center Trainee MOMENTUM Mentorship Award, University of Kentucky
2020 Dean's List, Loyola University Chicago
2019 Dean's List, Loyola University Chicago
2018 Presidential Scholar, City Colleges of Chicago
2017 Presidential Scholar, City Colleges of Chicago
2017 Honors, Phi Theta Kappa Honor Society
2017 Presidential Scholar, City Colleges of Chicago

RESEARCH EXPERIENCE

Ashfaqul Alam Lab, UKY, Graduate Student Research-Dissertation Lab, MIMG, 2021 - Present

- The Alam Lab focuses on the gut microbiota and their metabolites in influencing the human host gastrointestinal tract.

- With my nomination, Dr. Ashfaqul Alam was awarded the Faculty Mentorship Award at the 2022 Markey Cancer Center Research Day.
- Current project focuses on the intestinal commensal microbiota and how bacterially produced metabolites influence the pathogenesis of *Campylobacter jejuni*, developing an intervention for *C. jejuni* infections and teasing out mechanisms for *C. jejuni* colonization in the human intestinal tract.
- Research will include bacterial cultures, cell culture and co-culture work, microbiome analysis, transcriptomic, metabolomic and phylogenic analysis of mice models, manipulations of bacterial genomes, and mechanistic determination of pathogenesis.
- In addition to the research conducted in the lab, I wrote Standard Operating Procedures for all lab members and mentored junior members on basic principles of both science and experiments conducted within the lab.

Craig Vander Kooi Lab, UKY, Graduate Lab Rotation, Molecular and Cellular Biochemistry, 2021

- The Vander Kooi Lab researches a glucan phosphorylase from red algae that mimics the functionality of Laforin, the enzyme thought to be the major cause of pathogenesis of neurodegenerative Lafora disease.
- Focused on analyzing the protein's structure using computational and structural biologic techniques, including AlphaFold2 and Phyre for probable domain structures of the protein.
- Utilized on Hydrogen-Deuterium Exchange (HDX) Mass Spectrometry for protein structure determination.

Stefan Stamm Lab, UKY, Graduate Lab Rotation, Molecular and Cellular Biochemistry, 2021

- The Stamm Lab has a focus on circular RNA specifically, and its implications in different diseases, such as Alzheimer's and Prader-Willi syndrome.
- Determined interactions between different Tau products synthesized from circular RNA and eIF4b.
- Learned and utilized (kit-less) DNA isolation, Restriction Digestion, PCR amplification, Gibson Cloning, Pull Down reactions with magnetic beads, in vitro Transcription and Translation, and the data analysis.

Young-Sam Lee Lab, UKY, Graduate Lab Rotation, Molecular and Cellular Biochemistry, 2020

- Lab studied abnormal metabolism in human diseases, such as cancer, diabetes and neurodegeneration.
- Worked primarily with substrates and inhibitors to determine the Kd and IC50 concentrations for 6-phosphogluconate dehydrogenase in the Pentose Phosphate Pathway.
- Conducted protein kinetics assays, determine activation curves, induce and isolate protein from bacteria, also learned to use and analyze data from a Mass Spectrometer.

Ken Olsen Lab, Loyola University Chicago, Unpaid Undergraduate Researcher, Biochemistry, 2019-2020

- The primary topic of my research was creating Molecular Dynamics simulations to predict and visualize the interactions between drug crystals and surfactants.
- My project consisted of looking at Molecular Dynamics Simulation of bile salts and a celecoxib (Celebrex™) crystal to investigate interaction energies for optimization of emulsification.
- I learned multiple dynamics programs, as well as developing my own scripts and data analysis/conversion.
- Learned how to mentor and teach new students to use the programs and fit my scripts to their projects.

Miguel Ballicora Lab, Loyola University Chicago, Senior Project, Biochemistry, 2019-2020

- Project consisted of determining enzyme kinetics and thermodynamics of ADP-glucose pyrophosphorylase verses mutants, for the determination of catalytically conserved residues.
- Learned techniques such as transfection, transformation, bacterial expression of proteins, kinetics assays, thermodynamic assays, and thermal shift assays.

PUBLICATIONS

Manuscripts in Preparation

Smith, C. B. & Olsen, K. W. Molecular Dynamics Simulations of 13 bile salts and Celecoxib demonstrate mostly hydrophobic interactions, affected by specific substituents.

Manuscripts in Review

Smith, C. B., Gao, A., Bravo, P., & Alam, M. A. "Microbial Metabolite Trimethylamine N-Oxide Promotes *Campylobacter jejuni* Infection by Escalating Intestinal Inflammation, Epithelial Damage, and Barrier Disruption." *microorganisms*

Published Manuscripts

Smith CB, Gao A, Bravo P, Alam A. Microbial Metabolite Trimethylamine N-Oxide Promotes *Campylobacter jejuni* Infection by Escalating Intestinal Inflammation, Epithelial Damage, and Barrier Disruption. Preprint. *bioRxiv*. 2024;2024.04.10.588895. Published 2024 Apr 10. doi:10.1101/2024.04.10.588895

PRESENTATIONS, SEMINARS AND CONFERENCE ATTENDANCE

2024 Conference Attendance Only, ASM Microbe 2024, Atlanta, GA
2024 Poster Presentation, "Impact of intestinal microbiota on *Campylobacter jejuni* pathogenesis," 15th Annual Trainee Research Day
2024 Invited Research Seminar Presentation, "The effect of gut microbiota and microbial metabolites on *Campylobacter jejuni* pathogenesis," MI 120 Microbes and Society Course, UKY
2024 Journal Club Presentation, "Enterohemorrhagic *Escherichia coli* senses microbiota-derived nicotinamide to increase its virulence and colonization in the large intestine," MIMG Journal Club
2024 Research Seminar Presentation, "The effect of gut microbiota and microbial metabolites on *Campylobacter jejuni* pathogenesis," MIMG Seminar Series
2023 Research Seminar Presentation, "The effect of gut microbiota and microbial metabolites on *Campylobacter jejuni* pathogenesis," MIMG Seminar Series
2023 Poster Presentation, "Impact of intestinal microbiota on *Campylobacter jejuni* pathogenesis," MIMG Recruitment Day
2023 Conference Attendance Only, ASM Kentucky/Tennessee Bring Spring 2023 Meeting
2023 Poster Presentation, "Impact of intestinal microbiota on *Campylobacter jejuni* pathogenesis," 14th Annual Trainee Research Day
2023 Journal Club Presentation, "Dietary inclusion of nitrite-containing frankfurter exacerbates colorectal cancer pathology and alters metabolism in APC^{min} mice," MIMG Journal Club
2023 Data Presentation, "Determining *Campylobacter jejuni* chemosensing for Energy Taxis," MIMG Data Club
2023 Trainee Club Presentation, "Dietary inclusion of nitrite-containing frankfurter exacerbates colorectal cancer pathology and alters metabolism in APC^{min} mice," Biomedical Sciences Trainee Club
2022 Poster Presentation, "Impact of intestinal microbiota on *Campylobacter jejuni* pathogenesis," MIMG Retreat
2022 Journal Club Presentation, "Human gut bacteria produce Th17-modulating bile acid metabolites," MIMG Journal Club
2022 Data Presentation, "Impact of intestinal microbiota on *Campylobacter jejuni* pathogenesis," MIMG Data Club
2021 Trainee Club Presentation, "*Bacteroides fragilis* fucosidases facilitate growth and invasion of *Campylobacter jejuni* in the presence of mucins," Biomedical Sciences Trainee Club
2021 Data Presentation, "Impact of intestinal microbiota on *Campylobacter jejuni* pathogenesis," MIMG Data Club
2021 Seminar Presentation, "CAR-T cells in Pediatric B-cell Acute Lymphocytic Leukemia (ALL)" MIMG Seminar Series
2021 Poster Presentation, "Impact of intestinal microbiota on *Campylobacter jejuni* pathogenesis," MIMG Recruitment Day
2021 Poster Presentation, "Impact of intestinal microbiota on *Campylobacter jejuni* pathogenesis," MIMG Retreat
2019 Poster Presentation, "Simulations of Surfactant-Celecoxib Nanocrystal Interactions," Autumn Immunology Conference
2019 Invited Research Seminar Presentation, "Simulations of Surfactant-Celecoxib Nanocrystal Interactions," Autumn Immunology Conference
2019 Poster Presentation, "Simulations of Surfactant-Celecoxib Nanocrystal Interactions," Midwest Enzyme Conference Chicago

TEACHING EXPERIENCE

2024 Markey Cancer Center STRONG Scholar Summer Program
Tumor Immunology and Immunotherapy Lecturer (~2hr/yr)

2024 MI 120 Microbes and Society
University of Kentucky Course, Microbiome and Biotechnology Lecturer (~8hr/yr)
2023 Markey Cancer Center STRONG Scholar Summer Program
Tumor Immunology and Immunotherapy Lecturer (~2hr/yr)

MENTORING EXPERIENCE

2024 - Present	Selena Kassis – Undergraduate in Alam Lab. Assist with experimental protocols, design and project development.
2024 - Present	Jackson Moon – Technician in Alam Lab. Assist with experimental protocols, design and project development.
2023 - Present	Anna Edens – Started as undergraduate in Alam Lab, now working as a technician. Assist with experimental protocols, design and project development. Has interests in biomedical engineering and working in industry, I have been assisting via introductions to my network and sites to aid in finding resources to find jobs.
Fall 2023	Morgan Morrow, MS – Technician in Alam Lab. Assist with experimental protocols, design and project development. Interests in MD/PhD program, assisted with transition to next position, letters of recommendation for medical shadowing hours, and career development.
2022 - Present	Violet Newhart – Undergraduate in Alam Lab. Assist with experimental protocols, design and project development.
2021 - Present	Angela Gao – Undergraduate in Alam Lab, started as a high school student. Assist with experimental protocols, design and project development. Co-author on *microorganisms* paper.
2020 – 2022	Andie Woodcox Thompson – Technician within the lab, had interests in Neuroscience. Assist with experimental protocols, design and project development. Currently a PhD student within the Physiology department here at UK, on a Neuroscience project.
2020 – 2021	Sangeet Sheth, MS – Completed Masters Degree in the Alam Lab. Assist with experimental protocols, design and project development. Currently in Medical School at UK.
2020 - 2021	Avery Childress, MS – Completed Masters degree in the Alam lab. Assist with experimental protocols, design and project development. Had interest in tumor microenvironment, current PhD student at UK in Toxicology and Concer Biology, researching tumor microenvironments.
Summer 2022	Lily King – Near-Peer-Mentor for the UK SURES Summer Program. Currently applying for PhD programs in Public Health.
Summer 2021	Paloma Bravo – Summer Undergraduate in the Alam Lab, co-author on *microorganisms* paper. Assist with experimental protocols, design and project development.
Summer 2021	Kameron Kraus – Near-Peer-Mentor for the UK SURES Summer Program. Currently in Medical School.

INTERNSHIPS

2024 University of Kentucky, College of Medicine, Office of Biomedical Education, Office of Finance, Funding and Analytics, Internship in Education Research and Mixed Methods Data
Suggested by Dr. Beth Garvy, the current Senior Associate Dean of Biomedical Education, I contacted Dr. Diane Lally, who is currently the Director of Trainee Development at the University of Kentucky's College of Medicine within the Office of Biomedical Research. Together, we built this 6-week internship so that I may get hands-on experience with education research initiatives, as well as the advancement of educational practices. My duties included: literature review, data collection and analysis, article writing, project coordination, data visualization and quality assurance. I also learned about overall project design, as well as how to structure research questions supported by mixed methods data.

2024 University of Kentucky, College of Medicine, Office of Biomedical Education, Internship in Academia: Experiential Learning in Academic Faculty Careers
Led by Dr. Beth Garvy, the Senior Associate Dean for Biomedical Education. This 4-week internship was built to give PhD students interested in futures within academia the introductory trainings and experiences to have

successful career. In-person, interactive sessions hosted topics including: mentoring, classroom teaching basics, setting up a research program, hiring and managing people, budgeting, and time management.

PROFESSIONAL EXPERIENCE

2024 Becoming a Resilient Scientist Program
Hosted by UKY's Markey Oncology Mentoring, Education, Networking and Training Umbrella (MOMENTUM) in junction with the Office of Postdoctoral Affairs, developed from the National Institutes of Health (NIH) Office of Intramural Training and Education.

2024 Introduction to Bioinformatics Workshop
Hosted by UKY's Markey Cancer Center, 4-week session long workshop on how to utilize different resources and enhance personal research.

2023 Certification in Methods to Promote Data Reproducibility in Laboratory Research
Hosted by UKY's Good Research Practices Resource Center, attended training, and received certification for Methods to Promote Data Reproducibility in Laboratory Research.

2022-Present OBE Career and Professional Development Series
Attended various seminars hosted by the OBE's CPD, on the following topics: Plagiarism and Research Misconduct, Rock Your Chalk Talk: Build your seminar to knock their socks off, Experiences in an Industry Internship, Career Path Discussion, Science Communication Skills, Writing a Primary Research Paper, etc.

2022 College Reading and Learning Association (CRLA) Level 1 Peer Mentor Certification
Completed training and received approval and certification of becoming a Certified Level 1 Peer Mentor with the College Reading and Learning Association.

2022 UKY's STEM Through Authentic Research Training (START) Peer Educator
Received training and completed the UK START program to become a START Peer Educator.

2022 Certified Kentucky Science Advocate
Received training and awarded certification from the Kentucky Academy of Science (KAS).

PROFESSIONAL AFFILIATIONS

2022-Present American Association for the Advancement of Science
The world's largest scientific community, focused on advocating for science funding and policy, valuing curiosity, discovery and evidence.

2022-Present American Society of Microbiology
Joined the American Society for Microbiology (ASM), and became a member of the UKY Student Chapter. As a part of the ASM, the Student Chapter works to promote the goals of the ASM by hosting events, seminars, community outreach and promoting the advancement of microbial science.

2021-Present UKY's Biomedical Graduate Student Organization
In the Constitution of the Biomedical Graduate Student Organization (BGSO), the mission is "to enhance social, networking, professional development, and outreach experiences for the graduate students in biomedical sciences."

2017 - Present Phi Theta Kappa Honors Society
Offered and Awarded membership to Phi Theta Kappa Honor Society. Phi Theta Kappa Honor Society is focused on students achieving high academic standing within 2-year colleges across the nation.

PROFESSIONAL SERVICE AND INITIATIVES

2023-2025 American Society of Microbiology UKY Student Chapter – Secretary
I was nominated and elected as the Secretary for the ASM Student Chapter Board of Directors for the 2023-2024 academic year, and reelected for the 2024-2025 academic year.

2022-Present UKY's MIMG Diversity, Equity and Inclusion (DEI) Committee Member

In September 2022, I became a member of the DEI Committee within the Department of Microbiology, Immunology and Molecular Genetics (MIMG). As education is the central mission of the MIMG Department, the DEI Committee also serves to bring attention to underrepresented groups and address educational equity with community outreach and programming.

2022-2023 American Society of Microbiology UKY Student Chapter – Public Relations Officer
I was nominated and elected as the Public Relations Officer for the ASM Student Chapter Board of Directors for the 2022-2023 academic year.

2021-2022 Biomedical Graduate Student Organization – Social Committee Member
I was selected as a Social Committee Member for the Biomedical Graduate Student Organization (BGSO) at the University of Kentucky. The Social Committee organizes and arranges social events to promote interactions and healthy relationship building of graduate students in the biomedical field.

2021 - 2022 SURES Near Peer Mentorship
I was asked to be a near-peer mentor for rising undergraduate Juniors and Seniors interested in STEM through the Summer Undergraduate Research Program in Environmental Health Sciences (SURES). The program included weekly meetings with our mentees over a span of two months, and judging a poster session at the end of the summer. I was invited to mentored for the 2021 and 2022 summer sessions, with a running *total of 36 mentoring hours*.

2021-Present Biomedical Sciences Trainee Club, Founder and Primary Coordinator
I founded the Biomedical Sciences Trainee Club (BSTC) and have been the primary coordinator at UK's COM. My goal is to widen the science that attendees learn while working in their field expertise, highlighting new techniques and research. The BSTC was officially sponsored by the Office of Biomedical Education at UK's COM in January 2022.

COMMUNITY SERVICE

2022-2023 Morton Middle School Science Fair, Lexington, KY
Volunteer Judge for the Morton Science Fair for the 6th, 7th and 8th graders for two years. This included speaking with students about their experiments and posters, judging their work, and an NIH-styled study section to determine 5 students from each grade that would continue to the State Science Fair.

2021-2022 STEPS/SURES/SURF/KBRIN Poster Session Judge, Lexington, KY
Volunteer Judge for the STEPS/SURES/SURF/KBRIN poster session for undergraduate summer research in Environmental Health Sciences and Pharmacological Sciences, for two years.

2015-2020 CircEsteem Youth Organization, Chicago, IL
Volunteered at CircEsteem, a Youth Organization dedicated to teaching values of inclusivism, acceptance, teamwork, leadership skills and self-esteem using methodologies from social circuses. CircEsteem also has outlets for supporting Chicago's youth through academic tutoring, mentoring and art enrichment programs with participating schools.

REFERENCES

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