

# Hannah M. McMillan

NSF PRFB Fellow | Duke Biology | He Lab  
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## EDUCATION

**Duke University**, Durham, NC (August 30, 2021)  
Ph.D. in Molecular Genetics and Microbiology  
Certificate in Cell and Molecular Biology  
Certificate in College Teaching

**Davidson College**, Davidson, NC (May 17, 2015)  
Bachelor of Science in Biology  
Minor in Dance  
Magna Cum Laude, Honors in Biology

## RESEARCH AND PROFESSIONAL EXPERIENCE

- 2021-present** **Duke University Department of Biological Sciences**, Durham, NC  
*Postdoctoral Research Associate, He Lab*  
Projects: Uncovering the mechanisms of temperature-dependent microbiome colonization and function and their effects on plant phenotypes; Profiling the roles of plant extracellular vesicles in interkingdom communication with microbiome communities
- 2015-2021** **Duke University Department of Microbial Genetics and Microbiology, Program in Cell and Molecular Biology**, Durham, NC  
*Graduate Research Assistant, Kuehn Lab*  
Projects: Defining the role of *Pseudomonas* outer membrane vesicles in plant infection; NSF Convergence RAISE Grant Collaboration: Harnessing extracellular vesicle mediated interkingdom communication
- 2014-2015** **Duke University Department of Biological Sciences**, Durham, NC  
*Undergraduate Research Assistant, Dong Lab*  
Projects: Profiling Calcium Dynamics in *Arabidopsis thaliana* during Effector Triggered Immunity; Developing Stably Expressing Mutant Lines using the CRISPR Targeted Genome Editing System in *Arabidopsis thaliana*
- 2013-2014** **Davidson College Department of Biology**, Davidson, NC  
*Undergraduate Research Assistant, Hales Lab*  
Project: Characterization of mitochondrial phenotypes in *Drosophila melanogaster* PINK1 and Parkin overexpression lines during spermatogenesis
- Summers** **Duke University Department of Biological Sciences**, Durham, NC  
**2010-2013** *High School/Undergraduate Research Assistant, Dong Lab*  
**and Winters** **2011-2013** Projects: Bimolecular Fluorescence Complementation in *Arabidopsis thaliana* and *Escherichia coli*; Characterization of protein pathways and protein interactions using yeast two-hybrid techniques in *Saccharomyces cerevisiae*; Exploring the relationship between the circadian clock and plant immunity in *Arabidopsis thaliana*

## PUBLICATIONS | ORCID: 0000-0003-0926-5198

- 2021** **MCMILLAN, H. M.**, ZEBELL, S. G., RISTAINO, J. B., DONG, X. & KUEHN, M. J. 2021. Protective Plant Immune Responses are Elicited by Bacterial Outer Membrane Vesicles. *Cell Reports*, 34(3).
- 2021** **MCMILLAN, H. M.** and KUEHN, M.J. 2021. The Extracellular Vesicle Generation Paradox: A Bacterial Point of View. *The EMBO Journal*, 40(21): e108174.
- 2021** **MCMILLAN, H. M.**, ROGERS, N., WADLE, A., KUEHN, M. J., HSU-KIM, H., WIESNER, M. R., HENDREN, C. O. 2021. Microbial Vesicle-Mediated Communication: Convergence to Understand Interactions Within and Between Domains of Life. *Environmental Science: Processes and Impacts*, 23(5): 664-677.
- 2022** **MCMILLAN, H.M.** and KUEHN, M.J. 2022. Proteomic Profiling Reveals Distinct Bacterial Extracellular Vesicle Subpopulations with Possibly Unique Functionality. *Applied and Environmental Microbiology*, 0(0): e01686-01622.
- 2022** ROGERS, N. M. K., MCCUMBER, A. W., **MCMILLAN, H. M.**, MCNAMARA, R. P., DITTMER, D. P., KUEHN, M. J. HENDREN, C. O., WIESNER, M. R. 2022. Comparative

- Electrokinetic Properties of Extracellular Vesicles Produced by Yeast and Bacteria. *Colloids and Surfaces B: Biointerfaces. (Submitted)*
- 2023 **MCMILLAN, H.M., RODRIGUEZ, B.V., KUEHN, M.J.** 2023. Bacterial OMV/MV Purification, Characterization, and Infiltration into Plants. *(In Preparation, STAR Protocols)*

## FELLOWSHIPS and ACADEMIC HONORS

- 2022-2024 **NSF Postdoctoral Research Fellowship in Biology Award 2208939 (\$138,000).**
- 2021 **Office of Biomedical Graduate Education Professional Development Award (\$450).**
- 2020 **Young Investigator Award American Society for Exosomes and Microvesicles (\$400).**
- 2019 **Mitchell Meritorious Research Travel Award (\$1000).**
- 2019 **Poster Award Symposium on Food Systems, Nutrition, and the Microbiome.**
- 2019 **Shimamoto Travel Award ISMPMI (\$1500).**
- 2019 **Kamin Travel Fellowship (\$400).**
- 2019 **Duke Graduate School Conference Travel Award (\$525).**
- 2018 **Best Talk Award Molecular Genetics and Microbiology Departmental Retreat.**
- 2018 **Poster Award Innate Immunity, Inflammation, and Disease Symposium.**
- 2018 **Kamin Travel Fellowship (\$400).**
- 2018 **Additional Kamin Travel Fellowship (\$400).**
- 2018 **Duke Graduate School Conference Travel Award (\$525).**
- 2017 **Mitchell Meritorious Research Travel Award (\$1000).**
- 2015 **Sigma Xi Grants in Aid of Research (\$300).**
- 2015 **Phi Beta Kappa Society Davidson College Gamma Chapter**
- 2015 **Sigma Xi Award Davidson College**
- 2015 **Chancellor's Scholars Fellowship Duke University**
- 2013 **GlaxoSmithKline Women in Science Scholarship Davidson College**

## TEACHING AND MENTORING

- Fall 2022 **Graduate Student Rotation Mentor, Rachel Loney, He Lab**  
Project: pathogen evolution at elevated temperature
- Fall 2021 **Graduate Student Rotation Mentor, Paula Collado Cordon, He Lab**  
Project: impact of salt and pH stress on plant immune signaling
- Fall 2020 **Graduate Student Rotation Mentor, Alex Hofler, Kuehn Lab**  
Projects: biochemical fractionation of *Pseudomonas aeruginosa* vesicles and characterization of their immunogenicity in plants
- Fall 2019 **Graduate Student Rotation Mentor, George Georgiou, Kuehn Lab**  
Projects: surface properties of bacterial vesicles and biotin labeling
- Spring 2019 **Teaching Assistant, Microbial Pathogenesis**  
*Duke University Molecular Genetics and Microbiology Department, Durham, NC*  
Responsibilities: Lead four paper discussion sessions, write and grade exam questions
- Spring 2019 **Graduate Student Rotation Mentor, Zeni Ramirez, MS and Clariss Limso, MS, Kuehn Lab**  
Projects: bacterial vesicle interaction with the plant cell wall (ZR) and within biofilms (CL)
- 2018-2019 **Preparing Future Faculty Fellow**  
*Duke University Graduate School, Durham, NC and NC State University Department of Biology, Raleigh, NC*  
Mentor: Jean Ristaino, Ph.D.
- Spring 2018 **Teaching Assistant, Introductory Biochemistry I**  
*Duke University Department of Biochemistry, Durham, NC*  
Responsibilities: Lead two recitation sessions, hold two office hours per week, grade exams
- Spring 2018 **Microbiology Workshop Designer**  
*Catalyst Program for Students with Disabilities Saturday Workshop, Raleigh, NC*

- 2017-2020** Responsibilities: Design lesson plan and teach workshop to Catalyst students  
**Lesson Plan Developer**  
*The Scientific Research and Education Network, Raleigh, NC*
- 2016-2018** Responsibilities: Design lesson plan for NC educators to implement in classrooms  
**Outreach Coordinator and Curriculum Developer**  
*Molecular Genetics and Microbiology Department Outreach, Durham, NC*
- 2012-2015** Responsibilities: Design new curriculum for activities, plan ~10 events per year, organize volunteers, secure funding for activities and supplies  
**Biology and Chemistry Tutor**  
*Math and Science Center at Davidson College, Davidson, NC*
- Responsibilities: Teaching assistant for Plant Biology course, hold weekly drop in tutoring hours for all courses in biology; introductory, and organic chemistry

## LEADERSHIP EXPERIENCES

- Oct. 2022** **Finding Funding Workshop Organizer** *Duke University Biology Department He Lab*
- 2022-present** **Co-Chair Climate Plant Innovation Center Series** *Duke University Biology Department*
- April 2022** **Agricultural Technology Industry Career Panel Organizer** *Duke Biology Plant Labs*
- 2021-present** **Alumni Advisor Campus Pantry Collaborative** *Duke GPSG Community Pantry*
- 2021-present** **Professional Development Workshop Series Organizer** *Duke University He Lab*
- 2020-2021** **Duke Student Alumni Board** *Duke University Alumni Association*
- 2020-2021** **Co-Chair Campus Pantry Collaborative** *Duke University GPSC Community Pantry*
- 2019-2020** **Chair of Resource Directory Task Force** *Graduate and Professional Student Council*
- 2018-2021** **Bacterial Pathogenesis Symposium Organizer** *Duke CHoMI Supergroup*
- 2018-2021** **Campus Food Insecurity Symposium Organizer** *Duke-UNC CPC Initiative*
- Spring 2019** **Emerging Leaders Institute** *Duke University Graduate School*
- 2018-2019** **Director of Community Outreach** *Executive Board Duke GPSG*
- 2018-2019** **Outreach Coordinator** *Duke Biochemistry Department Graduate Student Council*
- 2018-2021** **Laboratory Safety and Chemical Hygiene Officer** *Duke University Kuehn Lab*
- 2017-2021** **Operations and Donations Volunteer** *Duke GPSC Food Pantry*
- 2017-2018** **Cell and Molecular Biology Representative** *Graduate and Professional Student Council*
- Spring 2017** **Panelist Recruiter and Event Coordinator** *Alternative Career Panel*
- 2016-2017** **Content Developer** *Cell and Molecular Biology Website Committee*

## PRESENTATIONS

### CONFERENCES

- May 2022** **McMillan HM**, Zebell S, Ristaino JB, Dong X, Kuehn MJ. "Bacterial vesicles elicit protective plant immune responses and could have unexplored implications for microbiome function." 2022 *Pennsylvania State University: The Changing Microbiomes Symposium. Boalsburg, PA. (Poster)*
- Nov. 2020** **McMillan HM**, Zebell S, Dong X, Kuehn MJ. "Bacterial Vesicles: Vehicles for Inter-kingdom Communication and Modulators of Plant Immune Response." 2020 *Annual Meeting of the American Society for Exosomes and Microvesicles. Virtual. (Speaker selected from abstracts)*
- July 2020** **McMillan HM**, Zebell S, Ristaino JB, Dong X, Kuehn MJ. "Bacterial Vesicles Elicit Protective Plant Immune Responses." *ASPB: Plant Biology 2020. Virtual. (iPoster)*
- Jan. 2020** **McMillan HM**, Zebell S, Dong X, Kuehn MJ. "Bacterial vesicles: double agents for plant defense." *North Carolina State University Emerging Plant Disease Symposium. Raleigh, NC. (Poster)*
- July 2019** **McMillan HM**, Zebell S, Dong X, Kuehn MJ. "Bacterial vesicles: double agents for plant defense." *Gordon Research Conference: Microbial Adhesion and Signal Transduction. Newport, RI. (Poster)*
- July 2019** **McMillan HM**, Zebell S, Dong X, Kuehn MJ. "Bacterial vesicles: double agents for plant defense." *XVII Congress of the International Society for Molecular Plant Microbe Interactions. Glasgow, Scotland. (Poster)*

- June 2018**     **McMillan HM**, Kuehn MJ. “Small Vesicles Pack a Big Punch: Bacterial Outer Membrane Vesicles Activate Plant Immune Responses.” *American Society for Microbiology: Microbe. Atlanta, GA. (Poster)*
- Mar. 2018**     **McMillan HM**, Kuehn MJ. “Bacterial Vesicles as Novel Plant Immune Activators: Plants Take the W in the Fight for Defense Response.” *Cells vs. Pathogens: Intrinsic Defenses and Counterdefenses. Monterey, CA. (Poster)*
- Sept. 2017**     **McMillan HM**, Dong X, Kuehn MJ. “Bacterial vesicles: novel plant immune activators.” *Bayer Crop Science 3<sup>rd</sup> Research Symposium. Durham, NC. (Poster)*
- June 2017**     **McMillan HM**, Kuehn MJ. “A novel OMV-mediated bacterial mechanism for plant innate immune activation.” *ASM: Microbe. New Orleans, LA. (Poster)*
- Aug. 2014**     **McMillan HM**, Zebell S, Dong X, Ph. D. “Profiling Calcium Dynamics during Effector Triggered Immunity.” *28<sup>th</sup> Annual Plant Molecular Biology Retreat. Wrightsville Beach, NC. (Chalk Talk)*

### SELECTED POSTERS AND ADDITIONAL PRESENTATIONS

- Oct. 2020**     Society of Duke Fellows. Virtual. *(Seminar Speaker)*
- Oct. 2020**     Cell Host and Microbial Interactions Supergroup: Bacterial Pathogenesis Symposium. *Virtual. (Flash Talk Speaker)*
- Nov. 2019**     Symposium on Food Systems, Nutrition, and the Microbiome.
- Feb. 2019**     Cell and Molecular Biology Program Recruitment. *(Requested Flash Talk Speaker)*
- Dec. 2018**     Duke University Cell and Molecular Biology Student Symposium: Proteins, to Pathways, to Patients. *(Invited Speaker)*
- April 2018**     Women in Science Symposium.
- Mar. 2018**     University of California Berkeley. *(Invited Seminar Speaker)*
- Feb. 2018**     Cell and Molecular Biology Program Recruitment. *(Requested Flash Talk Speaker)*
- April 2017**     Women in Science Symposium.

### SYNERGISTIC ACTIVITIES

#### PROFESSIONAL SERVICE

- 2023-2024**     **Assistant Features Editor, *Plant Physiology***
- 2022**     **Reviewer for NSF**
- 2021**     **Reviewer for *MPMI, Science***
- 2018**     **Reviewer for *Biochimie***
- 2017**     **Reviewer for *PLOS Pathogens, The Plant Journal***

#### COLLABORATIVE EFFORTS

- 2018-present**     **VESICLE Collaboration** *Funded 2019-present NSF Convergence RAISE initiative (Grant 1931309; \$1,000,000)*
- 2020-present**     **PNNL-EMSL Collaboration** *EMSL Project 51425 (\$83,995)*
- 2022-present**     **Predictive Modeling Collaboration** *Pixu Shi, Ph.D.*

#### PROFESSIONAL DEVELOPMENT

- Nov. 2022**     **Quantitative Biology of the Microbiome Symposium** *(Duke Center for Quantitative Bidesign, Duke Microbiome Center, Precision Microbiome Engineering Research Center)*
- May 2022**     **Microbiome/Metagenome Analysis Workshop** *(Duke Microbiome Center)*
- June 2021**     **Machine Learning Summer School** *(Duke + Data Science)*

### PROFESSIONAL SOCIETIES

- 2015-present**     **Phi Beta Kappa**  
*Member*