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**CURRENT POSITION**

**The Ohio State University** Columbus, OH  
Graduate Research Associate 2020-Present

**EDUCATION**

**The Ohio State University** Columbus, OH  
PhD Candidate, Environmental Sciences Expected Spring 2026  
(Focus: Engineering/Environmental Health/Microbial Genomics)  
Dissertation: Microbial function and volatile emissions as markers of indoor environmental microbial exposures.

**Purdue University** West Lafayette, IN  
MS, Civil Engineering (Focus: Environmental Engineering) 2020

**Anna University** Chennai, India  
B.Tech, Chemical Engineering 2018

**FELLOWSHIPS AND AWARDS**

**Graduate Mentor Award, Microbiome Sciences, Midwest Microbiome** May 2025  
For having mentored and directed the projects of undergraduates (15+ students) through the NSF REU and Student Experience and Engagement Delegates (SEEDs) programs in environmental microbiome sciences.

**National Science Foundation (NSF) INTERN awardee, \$47,000** July 2024  
Microbial Genomics and Bioinformatics INTERN fellow at Abbott Nutrition (Jan 2025-Jun 2025)

**Doctoral University Fellow** 2020-2021  
The Ohio State University Graduate School

**RESEARCH EXPERIENCE**

**Abbott** Columbus, OH  
Food Safety group, Nutrition Division, NSF INTERN fellow & Abbott Research Park Intern Jan 2025-Present

- Implemented and validated Whole Genome Sequencing pipelines consisting of metagenomics, AMR & virulence profiling, Single Nucleotide Polymorphism (SNP), cg- & wg-Multi Locus Sequence Typing to support foodborne pathogen monitoring efforts.
- Built version-controlled bioinformatics workflows with containerization and orchestration technologies including Docker, Kubernetes and Gitlab for streamlined and reproducible application deployment on local, cluster (HPC), and cloud computing environments (AWS).
- Optimized containerized workflows and bioinformatics pipelines for business use cases by implementing custom NextFlow, Bash, and Python scripts enabling custom deployment, data management, and visualization solutions.
- Designed and executed laboratory feasibility studies assessing long-read sequencing technology for R&D and operational use cases, gaining applied microbiology and NGS library preparation experience.
- Collaborated with cross-divisional cloud infrastructure engineers and bioinformatics teams for best practices in DevOps, cloud-native deployments, automation and containerization.
- Cultivated business & regulatory awareness and strategic communication skills by engaging with cross-functional teams, presenting innovation updates to key stakeholders, and managing project documentation and knowledge transfer for business alignment and continuity.

**The Ohio State University** Columbus, OH  
Graduate Research Associate; Advisor: Karen C. Dannemiller 2020-Present

- Metatranscriptomics to identify fungal gene markers of water damage in homes and in the International Space Station (ISS) to provide insights into human and astronaut exposures and health outcomes.  
*(4 first-author manuscripts: 2 published (*Microbiome & Scientific Reports*), 2 under revision)*

- Led R&D studies to profile microbial communities and gene expression patterns in indoor environments, contributing to respiratory health risk assessment and exposure quantification.
- Designed and executed RNA-seq pipeline for functional metatranscriptomic analysis, leveraging Trinity, Bash scripting, DESeq2, and KEGG/GO enrichment tools on HPC infrastructure (Ohio Supercomputer).
- Translated the lab's end to end RNAseq pipeline into Nextflow with containerized processes on the HPC for complete reproducibility, scalability and automation.
- Automated data workflows in R to standardize annotation sources (BLAST, GO, KEGG) across datasets and merge with gene expression outputs, streamlining downstream biological insights and reproducibility.
- Developed scripts in R to perform statistical analysis and visualization for dimensionality reduction (PCA, PCoA), differential analysis, and hypothesis testing of -omics datasets.
- Applied multi-omics data integration techniques (WGCNA, HALLA) to reveal correlated microbial functions and metabolic pathways across transcriptomic and metabolomic (PTR-ToF-MS) datasets.
- Developed and performed manual and automated RNA and DNA isolation assays for complex low-biomass indoor environmental samples such as dust from swabs, carpet samples, ISS HVAC filters and pure bacterial and filamentous fungal cultures.
- Designed and developed RT-qPCR assays for fungal target genes, utilizing novel absolute quantification standards developed from purified and sequenced amplicons.
- Contributed to SARS-CoV-2 environmental surveillance through targeted viral RNA isolation and RT-qPCR quantification in built environment samples.

#### **Purdue University**

Graduate Researcher

West Lafayette, IN  
2018-2020

- Modeled pollutant transport and inhalation exposure using an eddy transport model and Monte Carlo simulations in MATLAB to estimate breathing zone concentrations.
- Involved in collecting participant exhaled breath for tetrachloroethylene analysis and analyzed metabolite levels measured by ICP-MS in workers exposed to heavy metals and solvents.

#### **Indian Institute of Technology Madras**

Research Intern, Department of Chemical Engineering

Chennai, India  
Summer 2016

Fluorescence microscopy-based quantification of fungal spores using image detection tools and maintained pure fungal cultures of *P. chrysogenum*.

#### **Anna University**

Research Assistant, Department of Chemical Engineering

Chennai, India  
Summer 2016

Kinetic modeling, reactor design and experiments to determine efficacy of pretreatment of lignocellulosic biomass using coffee grounds.

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#### **TEACHING EXPERIENCE**

#### **Purdue University**

Graduate Teaching Assistant, Thermal Sciences (Thermodynamics)

West Lafayette, IN  
Spring 2021  
Spring 2021

Graduate Teaching Assistant, Air Quality Control

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#### **RELATED PROFESSIONAL EXPERIENCE**

- Mentored and directed the projects of groups undergraduates (15+ students total) through NSF REU and Student Experience and Engagement Delegates (SEEDs) programs. (2021-Present)
- Member, International Scientific Advisory Committee for the conference, Indoor Air 2024.
- Podium Presentation: Indoor Air 2024 conference. Honolulu, Hawaii. July 7-11, 2024.
- Invited talk: Scientific Governing Body for Next Generation Sequencing, Abbott (division-wide)
- Podium presentations: AEEPS 2025 (Metatranscriptomics of mold in homes), May 20-22, Midwest Microbiome 2025 (Metatranscriptomics of ISS HVAC filter dust).

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#### **TECHNICAL SKILLS**

<b>Molecular Biology &amp; Microbiology</b>	DNA/RNA isolation (manual & automated), QC methodologies (Bioanalyzer, Qubit, Nanodrop), PCR (reverse transcription, digital & quantitative), Liquid handlers programming, NGS library preparation and sequencing, Microbial culturing (BSL-2), Fluorescence microscopy
<b>Bioinformatics &amp; Omics</b>	Bacterial source tracing with WGS   RNA-Seq   Shotgun, 16S & ITS rRNA Metagenomics   Multi-omics integration   Visualizations   Statistics <ul style="list-style-type: none"> <li>• Select tools &amp; methods: <i>CSP2, Trinity, DESeq2, Kraken2, DADA2, WGNA, sPLS, ggplot2, ggTree, matplotlib, seaborn, MATLAB, Cytoscape, Inkscape, Illustrator, ArcGIS, Reads QC (fastp, trimmomatic)</i></li> <li>• Select databases: <i>NCBI, ENA, BLAST, KEGG, Uniprot</i></li> </ul>
<b>Bioinformatics DevOps</b>	Workflow tools: Nextflow, Bash, Make, Git/GitHub/GitLab Containerization: Docker, Apptainer, Kubernetes Platforms: HPC (Unix/Linux), AWS (Batch, EKS, HealthOmics) Languages: Python, R, DSL2 (Nextflow), SQL, MATLAB

## PEER-REVIEWED PUBLICATIONS AND CONFERENCE PROCEEDINGS

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**Balasubrahmaniam, N.**, King, J. C., Hegarty, B., & Dannemiller, K. C. (2024). Moving beyond species: Fungal function in house dust provides novel targets for potential indicators of mold growth in homes. *Microbiome*, 12(1), 231. <https://doi.org/10.1186/s40168-024-01915-9> **(Note: Patent filed on this work)**

**Balasubrahmaniam, N.**, Nastasi, N., Hegarty, B., Horack, J. M., Meyer, M. E., Haines, S. R., & Dannemiller, K. C. (2025). Exposure to elevated relative humidity in laboratory chambers alters fungal gene expression in dust from the International Space Station (ISS). *Scientific Reports*, 15(1), 28366.

Nastasi, N., Anderson, M. Z., **Balasubrahmaniam, N.**, Bope, A., ... & Dannemiller, K. C. (2022). Application of Emerging Innovations in Microbiome Science to Space Development and Settlement Systems. In *Proceedings of the International Astronautical Congress, IAC* (Vol. 2022). International Astronautical Federation, IAF.

Nastasi, N., Renninger, N., Bope, A., Cochran, S. J., Greaves, J., Haines, S. R., **Balasubrahmaniam, N.**, ... & Dannemiller, K. C. (2022). Persistence of viable MS2 and Phi6 bacteriophages on carpet and dust. *Indoor air*, 32(1), e12969.

Renninger, N., Nastasi, N., Bope, A., Cochran, S. J., Haines, S. R., **Balasubrahmaniam, N.**, ... & Dannemiller, K. C. (2021). Indoor Dust as a Matrix for Surveillance of COVID-19. *Msystems*, 6(2), 10-1128.

**Balasubrahmaniam, N.**, King, J., Hegarty, B. & Dannemiller, K. C. Quantitative reverse transcription assays of novel targets for potential indicators of mold growth in homes. *(In submission)*

- For the complete and updated list, please see:  
<https://scholar.google.com/citations?user=XJMt9RMAAAJ&hl=en&oi=ao>

## REFERENCES

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1. Dr. Karen Dannemiller, Associate Professor (PhD Thesis advisor, The Ohio State University)  
Email: [dannemiller.70@osu.edu](mailto:dannemiller.70@osu.edu)
2. Dr. Bridget Hegarty, Assistant Professor (Collaborator faculty), Case Western Reserve University  
Email: [beh53@case.edu](mailto:beh53@case.edu)
3. Dr. Lexie Blalock, Senior Scientist, Microbial Genomics, R&D Microbiology & Allergen group, Nutrition Division, Abbott  
Email: [lexie.blalock@abbott.com](mailto:lexie.blalock@abbott.com)
4. Dr. Sarah Haines, Assistant Professor (Collaborator faculty), University of Toronto  
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