

Education

Pennsylvania State University (PSU) | Aug. 2023 – 2028

Ph.D. Student: Intercollege Program in **Ecology**
Dual Title in **International Agriculture and Development**
Burghardt Lab, Dept. Plant Science, College of Agricultural Sciences
Member, Center for Root and Rhizosphere Biology and One Health Microbiome Center

University of New Hampshire (UNH) | Aug. 2017 – May 2021

BS: Sustainable Agriculture & Food Systems (Concentration: Agroecology & Research for Community Resilience)
BS: Biochemistry, Molecular & Cellular Biology (Minor: International Affairs)
Honors Senior Thesis: Roles of non-*Frankia* bacteria in root nodule formation and function in *Alnus* sp.
Advised by Dr. Louis S. Tisa, Dept. Molecular, Cellular, & Biomedical Sciences
Summa cum laude, University Honors Program: Interdisciplinary Honors, Phi Sigma Biological Sciences Honor Society

Publications & Conference Presentations

Publications

- **Mercurio, K.**, J. Sevigny, C. Pesce, W. K. Thomas, and L.S. Tisa. 2022. Draft genome sequences for bacteria associated with root nodules of *Alnus incana* in New England. Microbiology Resource Announcements: e00914-22. (DOI: <https://doi.org/10.1128/mra.00914-22>)
- Davis, I., J. Sevigny, V. Kleiner, **K. Mercurio**, C. Pesce, E. Swanson, W. K. Thomas and L. S. Tisa. 2020. Draft genome sequences of 10 bacterial strains Isolated from root nodules of *Alnus* trees in New Hampshire. Microbiol. Res. Annoc. 9:e01440-19 (DOI:10.1128/MRA.01440-19)

Presentations

- **Mercurio, K.**, E. Pallian, J. Harris, E. Bingham, and L. Burghardt. Influence of Legume Cover Crop Legacy on Soybean Microbiomes. Poster presentation. 26th Annual North American Symbiotic Nitrogen Fixation Conference, Burlington, Vermont. June 4, 2024.
- **Mercurio, K.**, S. Zglobicki, A. Galahenga, T. Aremu Nassari, L. Burghardt, farmer participants, and the community of Nghumbi, Tanzania (Kongwa District, Dodoma Region). Collaborating with Farmers to Improve Soil Health and Soil Fertility in Nghumbi, Tanzania. *Poster presentation:* Center for Root and Rhizosphere Biology 2nd Annual Symposium, Pennsylvania State University. May 9, 2024 & International Agriculture and Development 5th Global Gallery, "Innovation in the Era of Sustainability," Pennsylvania State University. Feb. 23, 2024.
- Diouf, D., S. Fall, D. Fonceka, A. Gueddou, D. Gully, V. Hoher, F. Ibañez, **K. Mercurio**, D. Niang, D. Nzepang, S. Stefanini, S. Svistoonoff, L. Tisa, G.T. Tejerizo, and A. Zaia. 2022. Phylogenomic characterization of peanut (*Arachis hypogaea* l.) microsymbionts obtained from Argentina and Senegal. 19^{ème} Congres de l'Association Africaine Pour La Fixation Biologique de l'Azote (19th Congress of the African Association for Nitrogen Fixation.), Dakar, Senegal, Nov. 29-Dec. 2, 2022.
- **Mercurio, K.**, I. Davis, C. Pesce, E. Swanson and L.S. Tisa. 2021 Roles of non-*Frankia* bacteria in root nodule formation and function in *Alnus* sp.: symbiosis as a community event. *Poster presentation:* The 30th Annual COLSA Undergraduate Research Conference, University of New Hampshire. April 24th, 2021. *Oral presentation:* Interdisciplinary Science and Engineering Undergraduate Research Conference, University of New Hampshire. April 20, 2021.
- **Mercurio, K.**, I. Davis, C. Pesce, E. Swanson and L.S. Tisa. 2020. *Frankia* and Friends: Roles of various nodule inhabitants in the actinorhizal symbiosis. Poster presentation. The 29th Annual COLSA Undergraduate Research Conference. April 24th, 2020.

Fellowships & Grants

National Science Foundation (NSF) Graduate Research Fellowship | 2023-2028

Supporting Community-Driven Sustainable Agriculture in Tanzania Using Legume Cover Crops and Participatory Science | Jun.-Jul. 2025

- International research internship program supported by NSF Innovations in Graduate Education Award No. 2105726: Stakeholder-Driven Sustainable Development Experiences for Enhancing STEM Graduate Education

Ecology Mini Grant | PSU Ecology Program | Mar.-Apr. 2025

Investigating Root Nodule Microbiomes of Cowpea Cover Crops to Support Farmer Participatory Research in Nghumbi Village, Kongwa District, Tanzania | Jan.-Jul. 2025

- International Agriculture & Development Competitive Grant, INTAD Graduate Dual Title Program, PSU

University Graduate Fellowship | Penn State University | Aug. 2023 – May 2024

The impact of *Casuarina*, its symbionts, and seasonal variation on microbial communities and soil properties in a salt-affected field | June-Aug. 2020 | Dakar & Palmarin, Senegal

- International Research Opportunities Program for Undergraduates, UNH (Awarded but canceled due to COVID-19)
- Centre National de Recherches Agronomiques, Institut Sénégalais de Recherches Agricoles (CNRA/ISRA) and the Institute of Research and Development (IRD)

Fulbright Semi-Finalist | Dakar & Palmarin, Senegal | 2020 & 2021 Application Cycles

Research Experience

Graduate Researcher | Burghardt Lab (Penn State) | State College, PA | Aug. 2023 – present

- Influence of legume cover crop legacy on soybean microbiomes
- Impact of cowpea growth habit and soil texture on dry season soil cover, root nodule microbiomes, and performance as an intercrop and cover crop across 15 farms in Nghumbi Village, Kongwa District
- Effects of legume cover crop microbiomes on cash crop health
- MKARUN 2025 program field assessment and microbial isolation from legume cover crops

Plant-Microbe Interactions Researcher | Tisa Lab (UNH) | Durham, NH |

- Part-Time Undergraduate Researcher Jan. 2018 – May 2021, Full-Time Research Technician June-Sept. 2021

Research Experience & Apprenticeship Program | Poleatewich Lab | Summer 2018

- Effects of tomato cultivar on population dynamics of *Bacillus subtilis* over time: developing a model assay.

Extension & Outreach

Agroecology Specialist | Mradi wa Kuboresha Afya na Rutuba ya Udongo Nghumbi (MKARUN) | Community Development Empowerment Organization

Nghumbi Village, Kongwa District, Dodoma Region, Tanzania | June 2022-present (part-time volunteer)

Soil Conservationist | Natural Resources Conservation Service | U.S. Dept. Agriculture

Holden, MA, USA | Sept. 2021-July 2023 (full-time)

Educational Materials

- Komalafe, C., **Mercurio, K.**, Armesto-Gomez, A., Blue, V. Submitted 2025. Balance in the WEF Nexus: Tradeoffs and Synergies in the Water Energy Food Nexus. Online professional development module for high school educators, Global Teach Ag Network.
- Blue, V., Armesto-Gomez, A., **Mercurio, K.** & Komalafe, C. Submitted 2025. Growing Through the Seasons: How Climate Shapes Agriculture. Online professional development module for high school educators, Global Teach Ag Network.

Teaching & Mentoring

Research Mentoring & Training

- **Burghardt Lab** | Pennsylvania State University | 2024
Trained 2 undergraduates in DNA extraction, 1 in PCR and testing new sample processing techniques
- **University of Dodoma** | Dodoma, Tanzania | 2024-25
Trained 1 lab technician in field data and sample collection, sample processing, DNA extraction, and microbial isolation; assisted with graduate school applications and making professional contacts
- **MKARUN** | Nghumbi, Tanzania | 2024-25
Worked with MKARUN team to train a local agriculture officer and 7 farmer collaborators in field data and sample collection and sample processing, using a combination of English and Swahili
- **Tisa Lab** | University of New Hampshire | 2021
Trained 2 undergraduates in lab protocols, theory, microbiology technique, aseptic plant propagation and care, data collection, and experimental design

Science Education

- **Young Women in Stem Workshop** | Graduate Women in Science | Dec. 2, 2023 | State College, PA
Co-led a hands-on session on the legume-rhizobia symbiosis in cover crops for female middle school girls
- **Enrichment Meet-up Intern** | UNH Honors Program | June-Aug. 2020
Facilitated discussions about environmental issues with incoming freshman over Zoom
- **Camp Green Thumbs Volunteer** | Grow Nashua | Nashua, NH | July 2020
facilitated gardening, nutrition, and science activities for elementary school students in a low-income neighborhood

Teaching Workshops

- Teaching and TAing in the Plant Sciences, Schreyer Institute of Teaching Excellence, Oct. 17, 2023

Awards & Scholarships

Walter Thomas Memorial Scholarship | PSU Dept. Plant Science | 2024-25 & 2025-26
Runner-up | Biology Section, Interdisciplinary Science & Engineering Undergrad. Research Conf. | 2021
Finalist | NH Social Venture Innovation Challenge | SymbioExchange | July – Dec. 2020
Plant Sciences Scholarship | UNH Dept. Agriculture, Nutrition, & Food Systems | 2020-21
Agricultural Alumni Scholarship | UNH Dept. Agriculture, Nutrition, & Food Systems | 2020-21
T. J. Giampietro '57 Scholarship | UNH Dept. Agriculture, Nutrition, & Food Systems | 2020-21
Huntington Family Scholarship | UNH College of Life Sciences & Agriculture | 2019-20
Hamel Scholarship | University of New Hampshire | 2017-21
Presidential Scholarship | University of New Hampshire | 2017-21
Naruse Academic Scholarship | AFL Global | 2017-21

Skills

Languages

- **English:** Native speaker
- **Kiswahili:** Limited working proficiency in agricultural topics, basic conversational in other topics
- **French:** Basic proficiency in reading, writing, speaking, and listening

Technical Skillset

- **Field Work:** Design of sampling schemes in agricultural field experiments, collecting soil and root samples, estimating soil cover via image analysis, measuring plant traits, assessing plant growth stages, use of GPS waypoints, managing a multi-lingual field work team
- **Molecular Biology & Biochemistry:** Sample processing & DNA extraction (from culture, root nodules, soil), PCR for amplicon & Sanger sequencing (16S, *ni/H*), gel electrophoresis, Nanopore library preparation & sequencing, spectroscopy (UV-VIS, IR, NMR), chromatography (thin layer, ion exchange, affinity, gel filtration, gas), assay design and optimization
- **Microbiology:** Aseptic technique, microbial isolation & culture, working with difficult-to-culture organisms, standardizing cell concentration, dilutions and plate counting, centrifugation, specialized media preparation, phenotypic screening, microscopy
- **Plant Care:** Plant propagation, inoculation with microorganisms, management, harvest, and trait measurement in axenic, greenhouse, and field settings
- **Data Analysis:** Microbiome data processing, (amplicons and basic metagenomics), ANOVA, linear mixed models, principle coordinate analysis, distance-based redundancy analysis, comparative & genomic analysis of metabolic pathways and protein function, use of basic GIS tools
- **Interviews and Focus Groups:** informed consent, questionnaire development, semi-structured interviews, focus group facilitation, working with translators and/or in second language

Other Skills

- **Synthesis of knowledge across disciplines** and ability to **address complex challenges**
- **Scientific communication** for diverse audiences
- **Deep listening and a desire to understand** and learn from the perspectives of others
- **Long-term and collaborative project planning** in the lab, field, and social sphere

Community Engagement

Choir Member | Our Lady of Victory Parish | State College, PA | Feb. 2024 - present
Volunteer | Think We Not Me: Community Food Growing Program | Centre County, PA | Sept.- 2023 - present
Choir Member | African Catholic Community, St. Andrew's Parish | Worcester, MA | Sept. 2021 – Aug. 2023
Food Pantry Volunteer | St. Peter's Parish | Worcester, MA | Sept. 2021-July 2023
Encounter Missionaries To The Homeless | Boston, MA | Feb. 2021 – July 2023
Engineers Without Borders | University of New Hampshire | Nghumbi, Tanzania | Sept. 2018 – May 2021
President | UNH Students for Life | Aug. 2019-May 2020 (Member Jan. 2018 – May 2021)
Co-Leader | Food Security & Homelessness Task Force | UNH Hamel Scholars | 2018-2019 (member to 2021)
Partners For World Health | UNH Chapter | Portland, ME | Oct. 2018 – Dec. 2020
Music Ministry | St. Christopher Parish | approximately 2007 - 2021

Additional Experience

Community Garden Assistant Manager | Grow Nashua | Nashua, NH, USA | July-Aug 2020
Vegetable Crop Team | Temple-Wilton Community Farm | Wilton, NH, USA | June-Aug 2019
Farmhand | Berry Hill Farm | Stratham, NH, USA | May-July 2019

UNH Organic Garden Club | April 2019 – May 2021

I2 Passport Entrepreneurship Program | UNH | Fall 2019

Human-Centered Design Workshop | UNH Center for Social Innovation & Enterprise | Oct. 2018

References

- **Dr. Liana Burghardt | Assistant Professor** | Director of the Huck Center for Root and Rhizosphere Biology | Dept. Plant Sciences | Pennsylvania State University | liana.burghardt@psu.edu
- **Dr. Suzanne Fleishman | Assistant Professor of Root Biology** | Dept. Plant Sciences | Pennsylvania State University | suf44@psu.edu
- **Dr. Louis S. Tisa | Professor of Microbiology & Genetics** | Dept. Molecular, Cellular, & Biomedical Sciences | University of New Hampshire | louis.tisa@unh.edu
- **Robert Purcell | District Conservationist** | Natural Resources Conservation Service | U.S. Dept. Agriculture | Worcester, Middlesex, Essex, and Suffolk Counties, Massachusetts | robert.purcell@usda.gov
- **Terevael Aremu Nassari | Managing Director** | Community Development Empowerment Organization | Arusha, Tanzania | cdeotz1@gmail.com