

PennState Huck Institutes of the Life Sciences

One Health Microbiome Center







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One Health Microbiome Center

As one of the largest and most active organizations in the field, Penn State's **One Health Microbiome Center** aims to optimize, accelerate, and disseminate long-lasting applications and knowledge on the microbiome across humans, agriculture, and the environment.

Microbiomes are communities of microorganisms (e.g., bacteria, fungi, viruses, archaea, and protozoa) that exist in all habitats, including plants, animals, soils, oceans, and our homes.

With more than 540 members, including research faculty from over 42 departments, we are fueled by a commitment to propel and distribute an integrative molecular-toecosystem approach to microbiome science, across the three pillars of the One Health framework.

Examples of our research include projects focused on optimizing soil and agricultural sustainability, supporting vital ecosystems in terrestrial and aquatic environments, building SciArt collaborations, and engineering resilience and solutions to combat chronic diseases and climate change.

Research

► Environmental Microbiomes — We explore the responses of environmental microbiomes to changes in climate and ecology, and we ask how these changes can be leveraged to address key sustainability challenges, including global warming, food security, vector-borne diseases, and ecosystem threats, such as coral reef bleaching.

> Microbiomes in Human Health — We investigate which microbes are crucial for disease initiation, evaluate the efficacy of treating metabolic diseases with probiotics, and develop microbial transplantation methods as a solution to microbiome-associated diseases.

Agricultural Microbiomes — We test the ways that microbiomes can be leveraged to improve food production, quality, and nutritional value. Our researchers' questions include, "Can soil and plant microbiomes improve farming output in the face of climate change?" "What are the effects of antibiotic resistance in food production?" And

"Can integrating microbiomes into classical food science research reduce foodborne illnesses?"

➤ **Microbiome Evolution** — We know that human microbiomes are influenced by nearly every aspect of human life, including diet, medication, cultural practices, ancestry, and environmental exposures. This knowledge begs the question, "How do interactions between microorganisms and hosts evolve within this complex web?"

► **Bi-annual Microbiome Symposium** — We host a biennual symposium that supports cutting-edge interdisciplinary research by bringing together diverse microbiome researchers at all career stages.

➤ Computational Analysis, Theory, and Statistics — We develop novel computation and statistical techniques and tools to integrate, examine, and extract insight from large datasets.

► **Microbiome Art** — We foster interdisciplinary values by bridging STEM and the arts, supporting and commissioning microbiome artwork from Penn State students and others.



Education

► **Graduate Students** are drawn from programs across the University: Ecology, Food Science, Anthropology, Biology, Psychology, and Plant Science, among others.

► First-in-kind **Dual Title PhD** in Microbiome Sciences affirms our commitment to authenticate the field.

Discover the Microbes Within: The Wolbachia Project engages middle school, high school, and college instructors and students in hands-on research and contributes to the collection of scientific data within the Wolbachia research community. The project also partners with Scientists in Residence, a three-day biotechnology training experience for select high school students.

► **Training grants**, such as a reproductive microbiome program funded by the USDA NIFA, support specialized microbiome research training.

> Ongoing, virtually accessible **seminar series** hosts 30+ speakers per year.

► Industry partnerships support training, conferences, workshops, and research breakthroughs.

Trainee-led Organizations and Outreach

► The **Data Analysis Working Group** offers training in the processing and analysis of sequencing datasets, promotes collaboration with scientists at Penn State and beyond, and provides leadership opportunities.

➤ The Macrobes for Microbes student organization brings together microbiome enthusiasts to collaborate on outreach projects, journal clubs, and career development activities.

► The American Society for Microbiology club is an ASM registered chapter, primarily for undergraduate students.



Resources

► The OHMC's **Research Collaboratory** was created in **partnership with QIAGEN** in January 2024 to optimize and standardize microbiome sample extraction and sequencing library preparation. The Colllaboratory houses equipment, tools, and reagents that decrease sample preparation time and cost per sample.

► The OHMC offers **free access to a ROAR Collab paid allocation**, which has 120 cores with >1 TB of RAM.

► A **portable microscope**, the Echo Rebel, is available for members to reserve for outreach, educational events, and research needs.

► From experimental design advice to microbiome data analysis pipelines the OHMC is a one-stop shop for **microbiome research consulting**.

➤ Annual **Interdisciplinary Innovation Fellowships** are awarded to support short-term training experiences in the laboratory of another center faculty member or external colleague, with the goals of expanding the creative capabilities of the community and facilitating collaboration.



We foster long-term working relationships while simultaneously providing infrastructure and resources to support transformative, interdisciplinary microbiome research at Penn State and beyond. As a growing and highly active organization, we are keen to continue to expand our program portfolio and develop new partnerships with academia, industry, private foundations, and donors.

Contact Us

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