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The Ohio State University Department of Microbiology provides an interface between academic molecular biology and real world applications in human health care and environment. The teaching and research interests of microbiology faculty span all aspects of interactions of microorganisms with animals and the environment.



These jars contain samples of “produced water fluids” from wells in Marcellus and Utica shale formations. By analyzing the genomes of microbes in the water, the researchers are piecing together the existence of microbial communities inside the wells.

NEW GENUS OF BACTERIA FOUND LIVING INSIDE HYDRAULIC FRACTURING WELLS

Kelly Wrighton, assistant professor of microbiology and biophysics, and her team of researchers analyzing the genomes of microorganisms living in shale oil and gas wells have found evidence of sustainable ecosystems taking hold there — populated in part by a never-before-seen genus of bacteria they have dubbed “Frackibacter.” Though the wells examined were hundreds of miles apart and drilled in different kinds of shale formations, the microbial communities inside them were nearly identical. Almost all the microbes they found had been seen elsewhere before, but that’s not the case with the newly identified *Candidatus* Frackibacter, which may be unique to hydraulic fracturing sites.

Studying all aspects of the biology and activities of microorganisms.

AT A GLANCE

Research projects, financed by federal, state, industrial, and private sources, with more than \$5 million in revenue annually, result in more than 100 research articles, reviews, and books each year.

DEGREE PROGRAMS

UNDERGRADUATE

- BS, Microbiology
- Minor, Microbiology

GRADUATE

- PhD, Microbiology

“The Department of Microbiology has a rich history and long tradition of training world-class scientists.”

{Tina Henkin, Department of Microbiology, Distinguished University Professor and Member of the National Academy of Sciences}

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COLLEGE OF ARTS AND SCIENCES

MAPPING GLOBAL OCEAN VIRAL AND PLANKTON COMMUNITIES

Matthew Sullivan, professor of microbiology, is the Virus Coordinator for the three-year Tara Oceans research expedition and senior author of a new study that leverages this unique sampling platform to systematically characterize viral communities. Combining electron microscopy and next generation sequencing, Sullivan and colleagues show that the 70-year-old ecological hypothesis that “everything is everywhere and the environment selects” developed for macro-organisms also applies to ocean viruses. This and other work that Sullivan and his lab contributed to describe the diversity, ecological drivers and interactions of viruses, prokaryotic and microbial eukaryotes in the surface waters of the world’s oceans.

THE GRADUATE STUDENT EXPERIENCE

The department’s PhD program offers an individualized approach to graduate study in one of the nation’s largest teaching and research institutions. Students will actively participate in planning their graduate program while working with colleagues from around the world. In this new era of genomics and molecular life sciences, research students on the PhD track are training to become the next generation of researchers.



Student in Microbiology lab

THE ACADEMIC EXPERIENCE

STUDENTS LEARN ABOUT:

- Molecular architecture of microbial cells
- Microbial diversity
- Fundamental mechanisms of gene regulation and protein synthesis
- Metabolic processes
- Growth of microbial cells and populations
- Applications of microbial processes: vaccine production, water treatment, alternative fuels, production of antibiotics
- Mechanisms of microbial diseases: host pathogen interaction and the host immune responses
- Mechanisms of microbial resistance to antibiotics
- HIV

STUDENTS GAIN VALUABLE LABORATORY EXPERIENCE IN:

- Gene cloning
- Antigen-antibody interactions
- Western blotting, enzyme-linked immunoassay, immunofluorescence
- The use of microorganisms for chemical analysis
- DNA-agarose gel electrophoresis
- Determining environmental factors that influence microorganisms
- Transposon mutagenesis
- The analysis of microbial diversity
- The isolation and analysis of plasmic DNA
- Culture of T-lymphocytes

RESEARCH

Faculty members in the Department of Microbiology have research interests that cover all aspects of the biology of microorganisms and their interactions with humans, animals, and the environment. Research topics range from the molecular basis of diseases and antibiotic resistance to production of commercial enzymes, from immunobiology and cancer to pollutant biodegradation and environmental remediation, from life at 100°C at the bottom of the ocean to photosynthesis, from basic molecular mechanisms to food protection and bioenergy.

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DISCOVER ASC