

DENIN Environmental Scholars Internships

Dates of internship: June 10, 2019 – August 16, 2019

Location: Delaware Biotechnology Institute, University of Delaware, Newark, DE 19711

Number of positions available: 1

Faculty Mentor: Thomas Hanson

Graduate Student Mentor: Alexa Bennett

Professional Staff Mentor:

Project Title: Defining microbial community structure and function in Delaware River waters

Research Description:

Next generation sequencing technologies have provided rapid insights into microbial communities by allowing us to identify what microbes are present in a given sample at a given time. However, these methods provide little information on what microbes actually do in a given environment. This project seeks to bridge the gap between microbial identity and function by merging both next generation sequencing with microbial cultivation to understand what groups of microbes consume different classes of organic carbon in the Delaware River and whether or not inorganic compounds can supplement organic carbon as an energy source in these communities. Preliminary data indicates that the cultivation methods capture previously uncultivated or difficult to cultivate microbes. A goal of this project is to understand whether the cultures obtained are representative of those present in the river at the time it was sampled. Understanding how microbial communities consume organic matter in an urbanized estuary will help maintain water quality improvements achieved over the last forty years.

Research Questions:

What microbial groups consume organic carbon in the Delaware River and are they capable of supplementing energy from organic carbon with inorganic compounds?

1. Using improved cultivation methods, can representative microbes of the native microbial community be brought into the laboratory for further study?
2. How does the Delaware River microbial community quantitatively respond to the addition of different classes of organic carbon and inorganic compounds that can be utilized for energy?

Student Learning Objectives: Professional and Research Skills

This internship focuses on the development of the following professional and scientific skills.

Broad Professional Skills	Specific Skills
Planning and time management	Ability to set and complete specific goals of varying scope
Work independently	Independent work ethic - work independently to problem-solve
Collaborative skills	Learning to complete tasks efficiently and effectively with others
Express ideas in writing and verbally	Communicate with diverse audiences - Development of impactful poster and oral presentations. Honing ability to deliver scientific results/impacts to people of interdisciplinary background.
Broad Scientific Research Skills	Specific Skills
Understand scientific terms	Correctly use terms and concepts from the fields of microbiology and molecular biology
Literature analysis	Ability to effectively find and utilize scientific manuscripts related to environmental microbiology
Use scientific tools	Microbial cultivation, microbial community analysis by next generation sequencing, bioinformatics
Recognize simple patterns in research data	Applying microbiology concepts to qualitative and quantitative data.
Apply research tools and techniques in research experiments	DNA isolation from environmental samples and isolates, PCR, and microbial growth assays to investigate Delaware River microbial communities.
Analyze research data	R, Excel, bioinformatics packages and instrument-specific software utilization to form effective figures and tables.
Understand, apply, and explain scientific concepts and theories	Freedom to form questions and plan methods for addressing challenges. Learning to effectively communicate results through oral presentations and manuscript writing.

Prerequisites:

Introductory experience with biology.

Work Environment and Expectations:

Laboratory environment: Delaware Biotechnology Institute. Hours are flexibly determined between student and mentor. Students will work full time during the summer, June 10-August 16, 2019. Students will participate in scheduled events for the UD EPSCoR program and participate in an end of program research symposium.

Stipend:

\$3,500 Direct deposit is required.

Funding Source:

National Science Foundation, Delaware EPSCoR Track I

How to apply: https://ugresearch.udel.edu/PUB_Program.aspx