GENERAL INFORMATION

Program sponsor: Princeton Environmental Institute

Position number: C1ZHA1

Project title: Understanding Fixed-Nitrogen Control on Biological Nitrogen Fixation

Organization/research group: Zhang Microbial Biogeochemistry Lab

Primary location(s) of internship: Princeton University, Guyot Hall

Additional cities and/or countries to be visited (if applicable): n/a

Note: If this internship is located in a country with an International SOS risk rating of High or Extreme, final candidates must participate in a travel review process overseen by the Travel Oversight Group (TOG), and obtain safety guidance prior to departure. The University reserves the right to revoke support and funding for travel at any time there has been a significant deterioration in the safety and security conditions surrounding travel arrangements, or in the sector of the country, or countries, where travel is to occur.

FACULTY SPONSOR(s)/HOST INFORMATION

Name(s): Xinning Zhang

University Department(s): Geosciences

E-mail: xinningz@princeton.edu

Website: https://scholar.princeton.edu/xinningz

Phone: 609 258 2489

INTERNSHIP/RESEARCH PROJECT INFORMATION

Internship/project description:

Nitrogenases are the enzymes responsible for the entrance of new nitrogen (N) into unmanaged ecosystems, with critical implications in sustaining natural ecosystems carbon sequestration capacity (i.e. C sink). Because using nitrogenases is energetically expensive, current knowledge assumes that N-fixing species will prefer using sources of already fixed-N (e.g. NH4+), if available, over the use of the nitrogenase. However, recent literature demonstrates evidence of N fixation activity while substantial amounts of NH4+ is present. This is challenging our understanding of the controls of N input in the environment. This project will aim to provide a better understanding on how biological and physicochemical factors influence the N sensitivity of N-fixing species, using well-established model bacteria (cyanobacteria, sulfate-reducing bacteria, soil bacteria) and possibly organisms from natural environment (sediment, forest soil, cryptogams). This research will help to understand how this crucial enzyme is regulated, to increase our ability to predict the responses of natural ecosystems to anthropic pressure and management practices.

Student's role and responsibilities:

This internship is an excellent opportunity for a student interested in learning more about how microbes are shaping our environment. The intern will be responsible for culturing different strain of bacteria in aerobic and anaerobic condition. He or she will be trained in the use of UV-spectrophotometer, gas chromatography, as well as in analytical method for the chemical characterization of growth media. In addition, there will be the possibility for outdoor sample collection, and/or working with environmental material already collected.
Internship/project learning objectives:
Following this internship, the selected student will have gain multiple skills in environmental microbiology and analytical chemistry, from the conduct of experiment with model micro-organism to the measurement of chemical species in gas and solution. He or she will have gained a clear theoretical understanding of the importance of biological nitrogen fixation within the N cycle, and a better insight on the current challenges in the field. In addition to the scientific knowledge, the student will have a first-hand experience of how academic research projects are conducted.

PROGRAM REQUIREMENTS

Academic background and any course pre-requisites:
Natural sciences

Technical skills:
Basic laboratory experience. Previous culturing/microbiology experience would be appreciated

Additional training(s):
Lab safety training and Radioactive training for non-user (completed post-selection, prior to start of internship).

Equipment:
n/a

Physical demands:
n/a

Language abilities/competencies (if applicable): n/a

Additional information about the internship/project:
Selected student will be required to participate in lab safety and radiation safety trainings prior to the start of the internship.

INTERNATIONAL TRAVEL REQUIREMENTS (if applicable)

Visa(s) required? Yes ☐ No ☐
Research permit/pass required? Yes ☐ No ☐
Immunizations required? Yes ☐ No ☐

INTERNERSHIP/PROJECT SUPERVISOR(S)

Name and title of primary supervisor: Xinning Zhang (PI)
Email: xinningz@princeton.edu
Phone: 

Name and title of additional supervisor, if applicable:
Romain Darnajoux, (Postdoc)
E-mail: romaind@princeton.edu
Phone: 6093799628

PROGRAM DATES AND FUNDING INFORMATION

Weekly Stipend: $500
Number of Positions Available: 1
Tentative Start Date (mm/dd/yyyy): 05/20/2019
Number of Weeks: 12 (negotiable)
Tentative End Date (mm/dd/yyyy): 08/10/2019

Note: PEI funding is for full-time work, 35 hours per week minimum, and for a period of at least 8 continuous weeks.

Application Deadline: January 11, 2019