Opportunity Title: USDA-ARS SCINet/AI-COE Postdoctoral Fellowship in Fungal Secondary Metabolomes
Opportunity Reference Code: USDA-ARS-SCINet-2024-0308

Organization U.S. Department of Agriculture (USDA)

Reference Code USDA-ARS-SCINet-2024-0308

How to Apply ***To submit your application, scroll to the bottom of this opportunity and click APPLY.***

A complete application consists of:

- An application
- Transcript(s) – For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. Click here for detailed information about acceptable transcripts.
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list
- Two educational or professional recommendations
- A copy of an abstract or reprint of an article

All documents must be in English or include an official English translation.

Connect with ORISE...on the GO! Download the new ORISE GO mobile app in the Apple App Store or Google Play Store to help you stay engaged, connected, and informed during your ORISE experience and beyond!"

Application Deadline 10/25/2024 3:00:00 PM Eastern Time Zone

Description **ARS Office/Lab and Location:** A postdoctoral research opportunity is available with the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS), in the Emerging Pests and Pathogens Unit in Ithaca, New York.

The Agricultural Research Service (ARS) is the U.S. Department of Agriculture's chief scientific in-house research agency with a mission to find solutions to agricultural problems that affect Americans every day from field to table. ARS will deliver cutting-edge, scientific tools and innovative solutions for American farmers, producers, industry, and communities to support the nourishment and well-being of all people; sustain our nation's agroecosystems and natural resources; and ensure the economic competitiveness and excellence of our agriculture. The vision of the agency is to provide global leadership in agricultural discoveries through scientific excellence.

The SCINet/Big Data Research Participation Program of the USDA ARS offers research opportunities to motivated postdoctoral fellows interested in solving agriculture-related problems at a range of spatial and temporal scales, from the genome to the continent, and sub-daily to evolutionary time scales. One of the goals of the SCINet Initiative is to develop and apply new technologies, including artificial intelligence (AI) and machine learning, to help solve complex agricultural problems that also depend on collaboration across scientific disciplines and geographic locations. In addition, many of these technologies rely on the synthesis, integration, and analysis of large, diverse datasets that benefit from high-performance

computing (HPC) clusters. The objective of these fellowships is to facilitate cross-disciplinary, cross-location research through collaborative research on problems of interest to each applicant and amenable to or requiring the HPC environment. Training will be provided in data science, scientific computing, AI/machine learning, and related topics as needed for the fellow to complete their research.

Research Project: This fellowship will support research on mechanisms of antagonism of fungi against nematodes. The project will focus on fungal parasites of the soybean cyst nematode, the most economically damaging pathogen of soybean worldwide. While the genomes of several of these nematode parasitic fungi are available, tools for predicting metabolites from genomic data in fungi are mostly lacking due to limited data on chemical products. This postdoctoral fellowship will address this challenge by using a multi-omics approach (comparative genomics, transcriptomics, proteomics, and metabolomics) to explore the secondary metabolome of nematode parasitic fungi and probe the role(s) of fungal metabolites in the interaction of these fungi with both nematode and plant hosts. Using a three-pronged approach, the aims of the project are to:

- Identify secondary metabolite gene clusters (SMBCs) in the genomes of nematode parasitic fungi using bioinformatic approaches,
- Understand their regulation in interactions with nematodes through parallel transcriptomics, proteomics, and metabolomics of experimental co-cultures of fungi with nematodes and/or plants, and
- Develop bioinformatic and machine learning tools to integrate these distinct omics datasets and to predict the chemical products of metabolite clusters.

The results will advance basic science to support development of novel approaches for managing nematode pests in agriculture.

Throughout the course of this research project, the participant will have the opportunity to gain experience in and learn about the challenges associated with managing, coordinating, and training a diverse scientific workforce to access and successfully use high-performance computing resources for scientific research. The participant will learn about the ARS Big Data Initiative (BDI; scinet.usda.gov) that is responsible for three major components:

- A high-capacity network as the backbone of a research data and information conduit among ARS locations (SCINet);
- High-performance computing and storage infrastructure available to all ARS scientific staff; and
- A virtual research support core (VRSC), a group of personnel with diverse skills in scientific computing that provides support and training to ARS scientists and staff.

Learning Objectives: This research project will present multiple opportunities for the participant to expand their bioinformatics skillset. This project will provide the participant an opportunity to learn about and

Opportunity Title: USDA-ARS SCINet/AI-COE Postdoctoral Fellowship in Fungal Secondary Metabolomes
Opportunity Reference Code: USDA-ARS-SCINet-2024-0308

develop skills in analysis of large transcriptomic, metabolomic, and proteomic datasets as well as methods for integrating these 'omics' datasets, big data curation and management, and collaboration among interdisciplinary researchers involved in the project. The participant will have the opportunity to develop new skills through training opportunities to learn relevant programming languages (e.g., R and Python) and machine learning/AI tools, participation in agency-wide and SCINet working groups focused on fungal genomics and multi-omics analysis, and experience in data curation and project management skills as part of a dynamic research team.

USDA-ARS Contact: If you have questions about the nature of the research, please contact Dr. Kathryn Bushley, Kathryn.Bushley@usda.gov.

Anticipated Appointment Start Date: Ideally, the start date will be between 11/01/2024 and 06/01/2025. Start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will initially be for one year but may be renewed for a second year upon recommendation of the mentor and ARS.

Level of Participation: The appointment is full-time.

Participant Stipend: The participant(s) will receive a monthly stipend commensurate with educational level and experience. **The current stipend range for this opportunity is $90,000 - $100,000/year plus a supplement to offset a health insurance premium.**

Citizenship Requirements: This opportunity is available to U.S. citizens, Lawful Permanent Residents (LPR), and foreign nationals. Non-U.S. citizen applicants should refer to the Guidelines for Non-U.S. Citizens Details page of the program website for information about the valid immigration statuses that are acceptable for program participation.

ORISE Information: This program, administered by ORAU through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and ARS. Participants do not become employees of USDA, ARS, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

Questions: Please visit our Program Website. If you have additional questions about the application process, please email: ORISE.ARS.SCINet@orau.org and include the reference code for this opportunity.

Qualifications The qualified candidate should be currently pursuing or have received a doctoral degree in the one of the relevant fields.

Preferred skills:

Opportunity Title: USDA-ARS SCINet/AI-COE Postdoctoral Fellowship in Fungal Secondary Metabolomes
Opportunity Reference Code: USDA-ARS-SCINet-2024-0308

- Experience managing diverse sequencing data types and analyzing large genomic, transcriptomic, metabolomic, or other omics datasets
- Experience with HPC clusters and use of bash scripting to submit jobs
- Experience with basic coding in R and/or Python and/or a willingness to learn
- Experience developing, testing, and refining machine learning models
- Experience or training in mycology or fungal biology, particularly previous work with nematophagous or endophytic fungi
- Excellent written and oral communication skills
- Experience in team and collaborative scientific environments

Eligibility Requirements

- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **Computer, Information, and Data Sciences** (4 👁)
  - **Environmental and Marine Sciences** (2 👁)
  - **Life Health and Medical Sciences** (51 👁)
  - **Mathematics and Statistics** (2 👁)

Affirmation I affirm that:

I am a US Citizen, OR;
I am a non-US citizen currently living in the United States