Opportunity Title: USDA-ARS SCINet/AI-COE Postdoctoral Fellowship in Using AI to Develop a Cross Kingdom Gene Editing Tool Kit
Opportunity Reference Code: USDA-ARS-SCINet-2023-0245

Organization U.S. Department of Agriculture (USDA)

Reference Code USDA-ARS-SCINet-2023-0245

How to Apply ***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!

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

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

Application Deadline 12/31/2023 3:00:00 PM Eastern Time Zone

Description ***Applications are reviewed on a rolling basis.**

ARS Office/Lab and Location: A postdoctoral fellowship opportunity is currently available with the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS) located in Colombia, Missouri.

The U.S. Department of Agriculture - Agricultural Research Service (USDA ARS) mission involves problem-solving research in the widely diverse food and agricultural areas encompassing plant production and protection; animal production and protection; natural resources and sustainable agricultural systems; and nutrition; food safety; and quality. The programs are conducted in 46 of the 50 States, Puerto Rico, and the U.S. Virgin Islands. For ARS to maintain its standing as a premier scientific organization, major investments in computing, networking, and storage infrastructure are required. Training in data and information management are integral to the integrity, security, and accessibility of research findings, results, and outcomes within the ARS research enterprise. Nearly 2000 scientists and postdoctoral fellows conduct research within the ARS research enterprise.

Research Project: 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 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 this fellowship 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.

This research project involves the expertise of six USDA-ARS scientists, Paula Chen (PGRU), Jacob Washburn (PGRU), Norman Best (PGRU), Bethany Redel (PGRU), Dave Kang (BICRL), and Adam Rivers (GBRU), whose expertise range from applications of machine learning (ML) and artificial intelligence (AI) in agriculture to gene editing of livestock and crops. The project will focus on the development of a cross-kingdom genome editing tool kit, specifically focusing on CRISPR/Cas9, that will enable ARS scientists to design and predict the efficiency and specificity of guide RNAs prior to performing costly in vivo validation experiments. While this tool will be designed for use across kingdoms, the initial focus will be on the chicken genome because an extensive guide RNA library with three targets at almost every gene in the chicken genome is being developed by the Paula Chen's lab for in vitro validation. This will be supplemented by smaller datasets in pigs, maize, and microbes (co-mentors' labs) and eventually large-scale datasets for many species. Part of the tool kit's design will be user-friendly workflows for expansion to more species over time. Overall, this novel tool kit will be adaptable for multiple agriculturally important species to rapidly apply genome editing technology and acquire improvements in different production traits.

Learning Objectives: The fellow will learn about gene editing techniques, pitfalls, and biology as well as the complex genomic tasks of selecting and predicting the impacts of guide RNAs. The fellow will learn how to use state-of-the-art AI/ML/Big Data methods to manipulate data, develop prediction methods, troubleshoot those methods, and properly test and interpret the results. The fellow will be encouraged to participate in gene editing, AI, and ML workshops both online, through SCINet, and on the University of Missouri campus. They will also participate in relevant conferences, including presenting their research at the Plant and Animal Genome Conference (PAG).

Mentor(s): The mentor(s) for this opportunity is Paula Chen (Paula.Chen@usda.gov). Please contact the mentor if you have questions about this opportunity.

Anticipated Appointment Start Date: 2023; start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will initially be for two years but may be renewed upon recommendation of ARS and is contingent on the availability of funds.

Level of Participation: The appointment is full-time.

Participant Stipend: The participant will receive a monthly stipend commensurate with educational level and experience. **The current stipend range for this opportunity is $85,000 - $95,000/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.

The successful applicant(s) will be required to comply with Environmental, Safety and Health (ES&H) requirements of the hosting facility, including but not limited to, COVID-19 requirements (e.g., facial covering, physical distancing, testing, vaccination).

Questions: Please visit our Program Website. After reading, 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 have received a doctoral degree in one of the relevant fields or be currently pursuing the degree to be received before December 31, 2023.

Eligibility Requirements

- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **Computer, Information, and Data Sciences** (2 👁)
  - **Life Health and Medical Sciences** (8 👁)
  - **Mathematics and Statistics** (3 👁)