Opportunity Title: USDA-ARS Postdoctoral Fellowship to Investigate Genetic Factors Associated with Transmission of Salmonella Between Animals, Humans, and the Environment
Opportunity Reference Code: USDA-ARS-2022-0361

Organization U.S. Department of Agriculture (USDA)

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How to Apply

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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.

Description

***Applications may be reviewed on a rolling-basis.**

ARS Office/Lab and Location: A research opportunity is currently available with the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS) at the United States Poultry Research Center located in Athens, Georgia.

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.

Research Project: The postdoctoral fellow will participate in developing a machine learning model to identify genetic factors that enable particular serotypes and strains of Salmonella to be transmitted from the environment to animals, between animals, and to humans. The fellow will take a "One Health" approach to this issue that includes influence of transmission on antimicrobial resistance (AMR), food safety, animal health, and environmental pollution. This research will utilize Mississippi State University Atlas High Performance Computing Cluster resources. WGS data will be acquired from the Food Safety and Inspection Service (FSIS) isolates from Hazard Analysis and Critical Control Point (HACCP) samples. A genome wide association study (GWAS) approach will be used to identify

genetic markers for transmission which will be further characterized and targeted for interventions. The role of the environment in transmission of Salmonella from animals to humans will also be investigated.

A previous comparison of Salmonella isolated from the Upper Oconee Watershed to Salmonella isolated from humans using Pulsed-Field Gel Electrophoresis showed that 46.1% of 1,190 Salmonella isolated from surface water matched isolates from human infections. These matches will be analyzed at a much higher resolution by the fellow comparing WGS data from Salmonella watershed isolates to WGS data from the human isolates. Additionally, our geographic information system (GIS) database includes the location of the 105 sampling sites as well as all sewers, wastewater treatment, and septic systems in the watershed. The fellow will expand the GIS database by adding recreation water access sites, agricultural land use, meat processing plants, poultry houses, and cow-calf farms. Analysis will determine the likelihood of sources as well as the effect of location and proximity to sources on the genetics of the Salmonella. Machine learning and artificial intelligence will be used to find associations and to develop methods to predict Salmonella spread and AMR phenotypes.

Learning Objectives: This project provides the postdoctoral fellow a unique opportunity to use their bioinformatic, computational biology, and GIS skills to help answer questions about how humans, animals, and the environment interact to affect the development of AMR and its transmission between humans, animals, and the environment.

Mentor: The mentor(s) for this opportunity are Drs. Jonathan Frye (jonathan.frye@usda.gov) and Charlene Jackson (Charlene.Jackson@ars.usda.gov). If you have questions about the nature of the research, please contact the mentor.

Anticipated Appointment Start Date: As soon as a qualified candidate is identified. 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 for this opportunity will be $5,823.17 plus $562.68 for medical, prescriptions, dental and vision each month.**

Citizenship Requirements: This opportunity is available to U.S. citizens, Lawful Permanent Residents (LPR), and foreign

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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. After reading, if you have additional questions about the application process please email ORISE.ARS.Southeast@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. Degree must have been received within the last five years.

Preferred Skills:

- Proficiency in multiple computer languages, coding, bioinformatics, computational biology, GIS analysis, artificial intelligence, and machine learning
- Microbiologist skills with a functional understanding of zoonotic infections, antimicrobial resistance, virulence and pathogenicity, and food safety
- Wet lab experience including whole genome sequencing, metagenomics, microbiology, molecular biology, culturing of enteric bacteria especially Salmonella, Escherichia coli, Enterococcus spp. etc.
- Independence, self-reliance, and ability to help draft reports, presentations, and manuscripts

Eligibility Requirements

- **Degree:** Doctoral Degree received within the last 60 month(s).
- **Discipline(s):**
  - **Computer, Information, and Data Sciences** (17 👁)
  - **Earth and Geosciences** (21 👁)
  - **Environmental and Marine Sciences** (14 👁)
  - **Life Health and Medical Sciences** (48 👁)
- **Veteran Status:** Veterans Preference, degree received within the last 120 month(s).